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Price Developments in Japan

-A Review Focusing on the 1990s-

[Summary]

(Mid-to-Long-term Price Trends in Japan)

1. In the mid-to-long-term perspective, during the 1960s, Japan's economy experienced moderate inflation. Domestic wholesale prices rose by about 1 percent on average (year-to-year), while consumer prices increased faster by around 5 percent on average. In the 1970s, Japan experienced high inflation, triggered by excess liquidity and the first oil shock. Domestic wholesale prices and consumer prices both rose by more than 20 percent. The 1980s and 90s were periods of disinflation. During those years, inflation rates in domestic wholesale prices basically continued to be negative, and those in consumer prices remained in a small range of slightly more than 3 percent to a slightly negative level.

Close examination of the price developments during these 20 years shows that in the first half of the 1980s, inflation rates decelerated at a relatively rapid pace. During the asset bubble period in the second half of the 1980s, inflation rates were relatively stable, even when economic growth accelerated and asset prices skyrocketed. However, through the beginning of the 1990s, when the asset bubble was about to end, Japan's economy was under inflationary pressure and inflation rates began to increase gradually. Thereafter, they decelerated again and in the latter half of the 1990s, the economy sometimes suffered from deflationary pressure.

(Causes of Price Movements)

2. Factors that determine price developments discussed above are summarized as follows.

First, long-term trends in price movements from decade to decade depend largely on expected rates of inflation. Developments in expected rates of inflation are influenced by the Bank of Japan's reputation in regard to policy stance for price-stabilization. Furthermore, developments in money stock seem to have affected price levels in the long run.

Second, cyclical behavior of prices depends basically on strength in demand against domestic capacity for supply (the output gap) and on production costs, such as import prices.

Third, developments in productivity also affect long-run movements in prices. Productivity growth of the macro-economy influences overall trends in prices. A difference in productivity growth between manufacturing and nonmanufacturing industries means that inflation rates of domestic wholesale prices tend to be lower than those of consumer prices.

(Characteristics of Price Developments during the 1990s)

3. The price movements in Japan during the 1990s were determined basically by developments in the output gap and were affected by fluctuations in exchange rates and crude oil prices. At the same time, however, recent price developments have also presented the following puzzles.

- Japan's economy was once on the brink of a deflationary spiral, as nominal GDP began to decrease amid the credit crunch in 1998. Nonetheless, prices did not fall as much as predicted by the output gap calculated in the classical method.
- Since the economy started to recover in the early 1990s, the relationship between money stock and nominal GDP has weakened, as the former has grown faster while the latter has grown slowly with large fluctuations. The discrepancy

became significant from autumn 1997, when several large financial institutions failed, to the beginning of 1999.

- The price developments during the 1990s have been affected by technological innovation and streamlining of distribution channels. In these circumstances, since the middle of the 1990s, inflation rates in consumer prices of goods and domestic wholesale prices of associated goods have been converging considerably, and the relationship of consumer prices and wholesale prices has changed.

(Backgrounds of Price Behavior in 1998)

4. Although Japan's economy was once on the brink of a deflationary spiral in 1998, prices did not fall as sharply as predicted by the output gap for the following reasons.

First, Japan's potential growth has slowed in the mid-to-long-term perspective and capacity growth is also limited in the short-term perspective, as existing capital stock became obsolete amid economic globalization and progress in IT (information technology) since the second half of the 1990s. Consequently, the true output gap may have been smaller than expected from the potential growth usually imagined. Second, while firms undertook corporate restructuring, the labor skills required by firms changed, which increased the mismatch between demand and supply in the labor market. This in turn seemed to have lowered the equilibrium level of the output gap. In addition, facing unprecedented deterioration of the economy, firms became pessimistic about an expansion of the market in the future and tried to avoid immediate price cuts as much as possible to maintain short-term rates of profits.

(Unstable Relationship Between Money Stock and Nominal GDP Caused by Anxieties Over the Stability of the Financial System)

5. The instability of the relationship between money stock and nominal GDP increased from autumn 1997 to the beginning of 1999, because liquidity preference

strengthened sharply due to financial anxieties over the stability of the financial system that surged from autumn 1997. If this situation had been prolonged, firms would have provided the market with stocked commodities to gain liquidity, which would have likely led to further deflation. However, the Bank of Japan and government introduced financial measures in autumn 1998 mainly to avoid a further credit crunch. Furthermore, the Bank adopted the "zero interest rate policy" and the government injected public funds into private banks in 1999. These measures were effective to prevent the economy from falling into a deflationary spiral.

(Effects of Technological Innovation and Streamlining of Distribution Channels)

6. For the analysis of the price trends during the 1990s, it is indispensable to evaluate the effects of technological innovation and streamlining of distribution channels.

Technological innovation continued to exert downward pressure on prices throughout the 1990s by pulling down prices of electronic machinery and related goods. Further price cuts will occur, when more industries introduce new technology, thereby increasing economic productivity. In fact, technological innovation has recently been prompting structural changes in distribution sectors.

Additionally, since the 1990s, "price-destruction" or "globalization of prices" is becoming apparent, as the gap between domestic and foreign prices has diminished with the former falling down to the latter. (i) The appreciation of the yen encouraged the industrialization of Asian economies and the enlarged domestic-foreign price gap in some commodities caused the influx of inexpensive products from these economies into Japan. (ii) Deregulation in Japan exposed some industries to market competition, which exerted downward pressure on their prices. (iii) A new style of distribution business triggered streamlining of distribution channels particularly among apparel industries, during the first half of the 1990s as well as in recent years.

There are various backgrounds of the previous phenomenon including arbitrage between domestic and foreign prices as well as introduction of new business models applicable to global businesses. Their ultimate consequence is to enhance economic

efficiency. It should be kept in mind that certain industries and firms will suffer from a profit squeeze in the adjustment process however.

(Evaluation of the Current Movements in Prices)

7. Although it is still large, the output gap is closing gradually in line with the economic recovery that started in spring 1999.

In this situation, "downward pressure on prices stemming from weak demand" seems to be declining significantly, although the consumer price index and GDP deflator remain below the previous year's level.

Needless to say, it is difficult to measure how much of the changes in price levels comes from "downward pressure on prices stemming from weak demand." Furthermore, price declines may have a negative impact on the economy in the short run, even though they do not come from weak demand, such as price declines induced by closing of the gap between domestic and foreign prices. In this situation, one way to see whether the Japanese economy is under deflationary pressure is to examine the background of price behavior from the distributive side. Currently, corporate profits are increasing without a decrease in the compensation of employees. This implies that the current Japanese economy is "in a situation where deflationary pressure reflecting the imbalance between supply and demand is almost dispelling."

(Outlook for Price Developments)

8. The output gap will diminish and deflationary concern is expected to dispel in the near future. Nonetheless, because of the existence of a large output gap, prices are unlikely to rise sharply in the immediate future, unless the economy recovers at a rapid pace.

Investment to IT has started to become active in the Japanese economy. If such investment spreads throughout the economy and enhances the total productivity of the economy, it will constrain price rises. Nevertheless, there is no clear evidence that shows that IT stimulates the total productivity of the economy, except for the

enhancement of productivity among IT manufacturers, especially that of the electric machinery industry. It will also take some time before the mismatch in the labor market disappears, thereby enhancing the total efficiency of the economy.

Furthermore, in distribution sectors, various efforts have started to bear fruit by improving productivity and such progress may continue further. In addition, reduction in various fees due to deregulation is also expected to continue. Attention should be paid to the possibility that in these circumstances, consumer prices may weaken further even amid economic recovery.

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1. Price Developments in Japan

This paper will first review the long-term developments of prices in Japan.[1] It will focus especially on the 1990s by making clear the characteristics of price developments, such as the relatively moderate decrease in prices despite the substantial economic decline from 1998 to early 1999, the unstable relationship between money stock and nominal GDP, and structural change on the supply side. Then, it will examine how present price developments can be evaluated from the viewpoint of concerns about deflation. In addition, we explore the possibilities of a further weakening of prices amid economic recovery by taking structural change on the supply side into account.

(1) Characteristics of price developments since the high economic growth period

First, with respect to long-term price developments of goods and services (Chart 1), inflation was relatively high during the 1960s, but the economy underwent rapid inflation during the 1970s, and remained low from the 1980s.

When looking at the inflation rate of each period, there are differences between economic recovery and recession. Looking back real economic growth for the past 40 years (Charts 1 and 2[2]), the 1960s marked the highest growth, followed by the 1970s and then the 1980s and onwards. This indicates that real economic growth rates did not correspond to inflation rates. One reason for this is that the balance between supply and demand in the domestic market (Chart 2[2]) was tighter during the first half of the 1970s compared to the 1960s. In addition, inflationary expectations had a large impact on long-term trends for the inflation rate.

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[1] In this paper, "prices" indicate the general price level of goods and services. There are several price indices, such as the domestic wholesale price index, the consumer price index, the GDP deflator, the corporate service price index, the export price index, and the import price index, etc. This paper discusses the developments of various price indices while focusing on consumer prices reflecting the supply-demand conditions at the final demand stage and examines how economic conditions can be assessed when observing various price indices comprehensively. Although it is essential to see how accurately the price indices given in this paper capture movements of the general price level, this paper will not discuss the accuracy of price indices. For the characteristics of each price index, see Research and Statistics Department, Bank of Japan (2000a). Asset prices such as stock prices and land prices are excluded from the analysis.

With regard to price developments in each decade (Chart 2[1]), during the 1960s, domestic wholesale prices moved from around negative 3 percent to positive 3 percent, but consumer prices floated higher, basically around 5 percent but in a range of around 3 to 9 percent. The 1960s was the high economic growth period. Therefore, the inflation rate was relatively high on the whole, with a gap between inflation rates of consumer prices and domestic wholesale prices since the economy continued to grow at a high pace. Relatively high inflation rates caused inflationary expectations to remain at a high level and sometimes made them unstable.[2]

In the 1970s, the inflation rate of all price indices temporarily exceeded 20 percent during the first oil crisis. This was a time when the country shifted to a low economic growth trend, monetary conditions eased substantially, and crude oil prices rose threefold during a short period of time (the first oil crisis), thereby increasing considerably inflationary expectations (Chart 3). When prices actually rose, this seemed to push up inflationary expectation even further. The rise in inflationary expectations can be inferred from the fact that the real wage growth rate surpassed the labor productivity growth rate during 1973 to 1975 (Chart 4[1]).[3] Thereafter, crude oil prices increased again approximately twofold through 1979 to 1980 (the second oil crisis) and domestic wholesale prices rose nearly 20 percent. However, inflationary expectations did not rise as monetary policies were somewhat tight and since the Japanese people have learned their lesson from past experiences. Thus, the increase in consumer prices remained moderate.

From the 1980s, the rate of increase in consumer prices moved in the range from a somewhat negative to around 3 percent. On the other hand, as can be observed in the substantial decline during the beginning of the economic recovery from the end of 1986 ,

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[2] In Japan, when the inflation rate rises, it is statistically confirmed that the inertia of inflation becomes stronger. For details, see Kasuya and Oshima [2000].

[3] If present nominal wages are determined by incorporating future inflationary expectations, the rise in present real wages surpasses labor productivity. From the fact that the real wage growth rate reached its peak after the spring 1974, when it became obvious that the labor productivity growth rate declined, inflationary expectations at that time seemed to have increased further. See Research and Statistics Department, Bank of Japan [1975] for details.

domestic wholesale prices tended to remain below the previous year's level except for the period immediately after the second oil crisis. This period, after the effects on prices from the second oil crisis subsided, is when inflationary expectations remained stable. However, developments in inflation rates for the past 20 years cannot be considered to be stable. In the first half of the 1980s, inflationary expectations subsided and the inflation rate decelerated. This period is regarded as the price stability period. Then, from the second half of the 1980s, the economic growth rate accelerated and asset prices skyrocketed, but the inflation rate was relatively stable. Nevertheless, the inflation rate rose moderately towards the early 1990s when the asset bubble was about to end and some aspects of slight inflation were observed. From 1991 onwards, the inflation rate decelerated, or prices weakened, and the economy sometimes suffered from deflationary pressures,[4] reflecting the decrease in demand.

(2) Several factors affecting price developments

Price developments in the 1990s will be explained later in detail. First, we briefly examine various factors against the background of price developments in Japan.

(i) Supply-demand gap factor from the macroeconomic perspective

Needless to say, it is the relationship between aggregate demand and aggregate supply that explains price developments. Cyclically, for the past 40 years, inflation rates rose late in economic expansion phases to the beginning of recession phases. Then, as the recession was prolonged, inflation rates tended to decline. This indicates that prices are influenced by a) the supply-demand condition factor, that is, the strength in demand relative to capacity for supply(supply-demand gap).

However**,** changes in the inflation rate of each decade, the 1960s, 1970s, and 1980s onwards cannot be explained only by short-term cyclical supply-demand developments but also reflects long-term changes in b) the inflationary expectations. Several factors create long-term developments in inflationary

[4] "Deflation" indicates the overall and sustained decline in prices.

expectations. One factor is that inflationary expectations are based on past inflation rates. From this aspect, once the inflation rate rises (drops) as a result of factors such as the short-term supply-demand gap factor, the economic unit incorporates the rise (fall) of the inflation rate and adjusts product prices and wages. As a result, the high (low) inflation rate and the high (low) inflationary expectation are sustained. Another factor that must be taken into consideration in terms of developments in inflationary expectation is the private sectors' reaction to central bank actions towards the changes in the economy and prices. People's anticipation depends on the results of monetary policy to maintain price stability (track record). In order to attain actual price stability, the central bank must win the credibility from the private sector of its stance; making an economy without either inflation or deflation.

On the other hand, looking back at the first and second oil crises occurred during the 1970s, it is also necessary to examine developments in c) import prices as a short-term factor on the supply side. For example, when crude oil prices rise, the aggregate supply curve shifts upward through an increase in acquisition costs of raw materials, while the deterioration in the terms of trade decreases aggregate demand. Therefore, an increase in prices (particularly in prices of raw materials and intermediate goods) and the decline in income can coexist. This framework is also useful for understanding the impact of the Gulf Crisis (1990-1991) and the recent rise in crude oil prices, albeit to a small extent. On the other hand, the reverse oil shock period (1986-1987) is an example of a substantial decrease in crude oil prices leading to a drop in the inflation rate.

Yen appreciation can be a factor in import price fluctuation when it occurs in the short run as a result of an exogenous shock not reflecting a gap in inflation rate between Japan and overseas in the long run. In this case, the decrease in the acquisition cost of raw materials spills over to final goods. In recent years, there are even more routes through which the decline in the price of import goods directly influences import-competitive final goods. Meanwhile, as for the impact on income, the decline in both prices and income occurs since the effects from the

decline in demand due to the decrease in exports and the shift to imports of domestic demand surpass the effect of improvements in the terms of trade due to the decline in import prices. The appreciation of the yen at the time of the Nixon Shock (1971), the transition to the floating exchange rate system (1973), the Plaza Accord (1985) onwards, in 1995, and 1998-1999, have contributed to the price decline.

Apart from fluctuations in crude oil prices and the yen, an increasing number of product prices are influenced directly by overseas market conditions, reflecting progress in the globalization of economic transactions. This trend can be confirmed for products such as semiconductors and chemical products.

The standard way of grasping prices utilizes the Phillips curve which combines a) supply-demand gap, b) inflationary expectations, and c) import prices (Chart 5).[5] The Phillips curve originally focuses on the wage-determination mechanism in the labor market and examines the trade-off (the negative relationship) between the percentage change in nominal wages and the unemployment rate (labor supply-demand conditions). By expanding this concept to general prices, prices are influenced not only by the unemployment rate but also by supply-demand conditions in the overall economy (this is considered to be the output gap). This can be understood as a "Phillips curve in prices," indicating that the inflation rate and the output gap are trade-off. During wage negotiations, laborers tend to decide on real wages, not nominal wages. In light of this, the percentage change in nominal wages also depends on the public's inflationary expectations. Furthermore, prices are affected not only by wages but also by costs such as import prices as explained above (and the markup to costs[6]). Consequently, the

[5] This discussion is based on the standard ideas presented in the following papers; Phillips [1958], Samuelson and Solow [1960], Phelps [1967], Friedman [1968] [1977], Tobin [1972], and Modigliani and Papademos [1975].

[6] In fact, this markup may change according to the macroeconomic conditions and the price-setting behavior of firms. However, as long as the markup does not move significantly enough in a counter-cyclical way to the economy and does not offset the trade-off between the inflation rate and the unemployment rate, and if the relationship between the markup and the macroeconomic

generalized Phillips curve assumes that the inflation rate is determined by a) the supply-demand gap, b) inflationary expectations, and c) import prices.[7]

(ii) Monetary factors

No close relationship is observed between money stock and aggregate demand (economic activities) in the short-term but in the long-term it seems that both factors basically move in the same direction (Charts 2 and 3). When the increase in money stock overtakes real economic growth, it will eventually increase aggregate demand and this will lead to a rise in prices.[8] In relation to the Phillips curve mentioned above, developments in money stock affect inflationary expectations by changing expectations of future supply-demand developments. This in turn has an influence on the inflation rate from the medium-to-long term perspective. Developments in money stock also change according to the degree of confidence in monetary policy, and even in this sense it is appropriate to say that money stock is related to price developments. The increase in money stock at the time of the first oil crisis was closely connected to the inflation at that time, and is one example of the relationship between them.

(iii) Productivity and microeconomic factor (productivity gap among sectors, etc.)

Finally, among supply-demand factors, it is necessary to examine the effects of productivity as a factor affecting supply capacity. This is because when the growth in a) macroeconomic productivity increases, supply capacity also increases and the supply-demand balance eases. While the growth in labor productivity

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conditions remains stable, the concept of the Phillips curve is maintained. Details on this point will be discussed later.

[7] The point where the expected inflation rate coincides with the actual inflation rate is the "long-run equilibrium" and the unemployment level (output gap) at this stage is called the "natural rate of unemployment (natural rate)." As a variation of the natural rate of unemployment hypothesis, the NAIRU (Non-Accelerating Inflation Rate of Unemployment) hypothesis regards the expected inflation rate as being formed adaptively from past inflation rates. The natural rate of unemployment under this assumption is called the NAIRU.

[8] There are various discussions of the causality between money stock and aggregate demand including whether this works one way or not. For discussions on money stock, see Okina [1993], and Iwata [1993].

surged during the 1960s (Chart 4), in the 1970s, even though the economic growth rate was rather low, supply-demand conditions tightened owing to sluggish growth in productivity and inflation soared as explained above. During the 1980s and 1990s, growth in productivity continued to slow. Since growth in productivity is triggered not only by accumulation of capital but also by technological innovation, this should be understood to be a trend rather than a short-term fluctuation.

Focusing on the gap among sectors from a microeconomic perspective, it can be pointed out that the gap in percentage change in each price index reflects b) the difference in productivity growth among sectors. In Japan, productivity growth in manufacturing industries has always been higher than that in nonmanufacturing industries. This, as mentioned above, is the reason that the inflation rate in domestic wholesale prices is lower on average than that of consumer prices. Even in terms of goods prices, since consumer goods prices are determined by adding the distribution margin to wholesale prices, consumer goods prices have basically moved at a higher percentage rate compared to domestic wholesale prices reflecting the productivity gap between manufacturing industries and wholesaling and retailing industries.

These gaps between consumer and domestic wholesale prices and between consumer goods prices and domestic wholesale prices, reflecting the difference in productivity growth among sectors, have also caused a gap between domestic and foreign prices. The exchange rate should level the inflation rates among countries in the long run to reflect the productivity gap in tradable goods (this is purchasing power parity regarding tradable goods). As the increase in the productivity of Japanese manufacturing firms surpassed that of other countries, the yen has appreciated in value as a trend. While international price arbitrage occurs for wholesale prices, consumer prices are still higher in Japan compared to other countries due to low productivity in the services and distribution sectors, which are difficult to trade. However, as globalization of economies intensifies and transactions and price arbitrage become briskly, streamlining of distribution channels occurs and distribution margins narrow as foreign firms enter the market.

This will diminish the gap between domestic and foreign consumer goods prices. Moreover, as the range of tradable goods expands and price arbitrage intensifies and widens in services such as communications and financial service, the pressure to diminish the gap between domestic and foreign prices will also be exerted. These developments became especially prominent in the 1990s, which will be discussed below.

2. Price Developments in the 1990s

(1) Characteristics of price developments in the 1990s

In this chapter, we review the price developments during the 1990s. Examinations of relationships between various price indices and economic developments in Japan during the 1990s (Chart 6) shows that prices basically moved along with the supply-demand gap until 1997 (Chart 7).

In 1990, the overheated economy was in its last phase as asset prices skyrocketed. From 1991, the euphoria of future economic growth collapsed and capital stock adjustment began (Chart 4[2]). Additionally, the balance sheets of firms deteriorated along with the drop in asset prices, and the Japanese economy entered a serious adjustment phase. During this period, the percentage change in wages also decreased (Chart 6). However, the growth rate of real wages was higher than that in labor productivity (Chart 4[1]), suggesting that wage adjustments were relatively slow. In these circumstances, consumer prices marked a peak of over 3 percent on a year-to-year basis in 1991, but thereafter, the inflation rate in consumer prices declined towards 1993, and domestic wholesale prices also dropped.

The economy hit bottom at the end of 1993 and a moderate economic recovery continued towards the beginning of 1997 due to an increase in business fixed investment. Money stock increased gradually. Prices basically moved in accordance with the supply-demand gap, but close examination reveals that there were phases when prices moved in the opposite direction from developments in the gap. For example,

after the rate of decline in domestic wholesale prices accelerated reflecting the appreciation of the yen, the rate of decline diminished towards 1995 as the yen depreciated. During the economic expansion in 1996, however, the rate of decline accelerated again and then decelerated gradually. Consumer prices were slightly below the previous year's level temporarily in 1995 when the recovery came to a halt and the growth rate in consumer prices rapidly approached that in domestic wholesale prices. Towards 1997, however, consumer prices increased somewhat while the supply-demand gap continued to diminish.

In fiscal 1997, amid fiscal consolidation and a drop in demand in reaction to a rise in the consumption-tax rate, the financial and economic turmoil in Asia started to exert negative effects on the Japanese economy through exports, and the temporary upward pressure on business fixed investment created by the boom in cellular phones dissipated. Furthermore, the disturbance in the financial system triggered by the failure of several major financial institutions in November 1997 induced a deterioration in corporate and household sentiment as well as a tight lending stance of financial institutions. The economy then underwent an unprecedented deterioration towards 1998 as both private consumption and business fixed investment declined.[9] Hence, the supply-demand gap expanded and immense downward pressure was exerted on prices. Towards the end of 1998, financial ratings of large firms were lowered frequently, reflecting the decline in corporate profits and worsening of balance sheets in line with economic deterioration. The lending stance of financial institutions became even more cautious. In these circumstances, downward pressure on prices became stronger as the negative link between the deterioration of the real economy and the tightening of financial conditions intensified.

From the autumn of 1997 to 1998, economic deterioration increased the credit risks of firms and the lending stance of financial institutions became tighter, thereby inducing a credit contraction. This accelerated the economic decline. Thus, in 1998, nominal

[9] For details on the influence of anxieties about the financial system on the Japanese economy, see Hayakawa and Maeda [2000].

GDP dropped to a record low since the statistics were first compiled in 1955, and corporate profits were squeezed (Chart 8). When wage adjustments are slow relative to the contraction of nominal GDP caused by a decline in output and a drop in prices, corporate profits fall further, and the repayment of debts increases in the real term. This leads to a further decline in demand. Japan was on the brink of this vicious cycle involving output and prices, the "deflationary spiral"[10] (see Box A for an explanation of the concept). It is believed that the rigidity of nominal wages will stop the decline in prices. In Japan, however, the decline in nominal wages started as a result of efforts by firms, facing a worsening in profitability, to reduce personnel expenses to reduce costs (Chart 6). This has the effect of easing the deterioration in corporate profits temporarily, while it increased the risk of triggering cumulative drops in wages and prices caused by the additional decrease in private consumption. Although the supply-demand gap at the time appeared to put significant downward pressure on prices, fortunately the cumulative drop on wages and prices did not occur. Meanwhile, growth in money stock moved at a somewhat higher level, while nominal GDP declined substantially. On the whole, it can be said that further monetary easing by and corporate finance policies of the Bank of Japan and the government's credit guarantee system reduced the downward pressure on prices and kept the economy from falling into a full-fledged deflationary spiral.

From 1999, the disturbance in the financial market that was observed during 1998 started to become stabilized. Under this condition, the implementation of the zero interest rate policy and the strong commitment to monetary easing by the Bank, and easing anxieties over the stability of the financial system, a result of measures taken by the government such as injecting public funds into private banks, had a positive impact on consumption and business fixed investment. Thus, the economy started to improve. During this process, downward pressure on consumer prices also weakened. Growth in money stock dropped slightly. In these circumstances, domestic wholesale prices recovered to the previous year's level in 2000 but this recovery was exaggerated by the

[10] For details, see Fisher [1933], Bernanke [1983], Shinkai [1995], Price Structure Policy Commission, Price Stabilization Policy Council [1999], and Akerlof and Yellen [1985] etc.

rise in crude oil prices, which bottomed out in February 1999. Still, consumer prices weakened again slightly from the end of 1999, although the economic improvement became distinct and a gradual recovery began. Thus, growth rates of domestic wholesale prices and consumer prices reversed again.

With respect to price and economic developments, the following three "price puzzles" need to be solved.

First, why did prices hardly fall from 1998 to the beginning of 1999 during economic deterioration while the supply-demand gap was extremely large? Consumer prices, in particular, should have declined if they had moved with the Phillips curve, as was predicted by use of the estimated output gap. Yet, this relationship suddenly collapsed in 1998 (Chart 7). Even the downward rigidity of the consumer price index does not fully explain why prices did not decline in total.[11]

Second, the growth rate of money stock had remained relatively stable since 1993 when the economy started to recover after the burst of the bubble economy. What effects did these developments have on prices? The correlation between money stock and nominal GDP became weak, as was observed in the two declines in the growth rate of nominal GDP, the first from 1994 to 1995, and the second from 1997 to 1998 (Chart 9). In particular, the growth rate of money stock (M_2 + CDs) accelerated from the autumn of 1997, but recently became sluggish. In contrast, during these periods, nominal GDP fell temporarily and then recovered. Thus, money stock and nominal GDP are diverging significantly. The *Marshallian k* (M_2+CDs/nominal GDP) which shows the relationship between money stock and nominal GDP was on a rapid upward trend from 1997. Here, we must examine developments in money stock, especially from 1998 to the start of 1999, considering the fact that the economy did not fall into a deflationary

[11] The consumer price index in Japan is expected to have some downward rigidity, particularly in regard to public utilities charges and regulation charges. Kasuya [1999] examined the degree of downward rigidity in the consumer price index by calculating the weights of items in which the change in price decline is slower than that of the price rise for the 580 items that constitute the consumer price index, and obtained the degree of downward rigidity (even in strict terms, about 20 percent of items have downward rigidity).

spiral.

Third, we need to consider why the inflation rate in consumer prices was declining sometimes despite the economic recovery and why the margin between the inflation rates in consumer prices and domestic wholesale prices has narrowed significantly, from the mid-1990s. More concretely, we must compare rates of change in consumer goods prices and those in corresponding domestic wholesale prices[12] (Chart 10), the former were higher until 1994, but the latter were during 1995 to 1996. Thereafter, the rate of change in consumer prices continued to be somewhat higher, although the margin was not as large as it was previously. Since the end of 1999, the situation has been reversed. Thus, it is necessary to examine the relationship between such price movements and the supply side of the economy, such as technological innovation, increase in imported products, deregulation, and streamlining of distribution channels.

The three puzzles will be addressed in the following sections.

(2) Relationship between the output gap and prices

Various monetary measures and monetary and fiscal policies prevented the Japanese economy from falling into a deflationary spiral during 1998, as mentioned before. During that time, however, many supply-demand indices showed a substantial output gap, that means the effects of the various measures and policies were not strong enough to explain the rather strong developments in the consumer price indices from the second half of 1998 to the beginning of 1999. This is the first puzzle to be solved. There are two clues for these puzzles: first, stagnant domestic supply capacity facing economic structural change, and second, the mismatch in the labor market.

[12] The composition item “consumer goods” in the domestic wholesale price index differs from that in the consumer price index. Hence, it is inappropriate to compare the subtle difference between them. To see changes at the distribution stage, it is not enough to compare import prices of consumer and wholesale stages. The WPI that corresponds to consumer prices used here is reconfigured to match the consumer price index.

(i) Measuring the output gap and potential growth

The output gap measures the supply-demand condition from a macroeconomic perspective by measuring the difference between potential GDP and real GDP. However, it is not easy to measure potential GDP, which is the supply capacity of the economy as a whole, therefore, we must be wary of large measurement errors when the "true output gap" is calculated (see Box B for details). Although there are various estimation methods, we use the following method. First, we explain Japanese GDP by using a production function that consists of three factors - labor, capital, and total factor productivity (TFP).[13] Then, we obtain the output gap by measuring the difference between real GDP and potential GDP, the maximum GDP obtained when labor and capital are fully utilized.

$$Y_t = A_t \cdot (H_t \cdot L_t)^{1-\alpha} \cdot (Om_t \cdot Km_{t-1} + Oo_t \cdot Ko_{t-1})^{\alpha}$$

Y_t: real GDP, A_t: TFP, H_t: total working hours, L_t: number of workers, α: capital share, Om_t: capacity utilization rate in manufacturing industries, Km_t: capital stock of manufacturing industries Oo_t: capacity utilization rate in nonmanufacturing industries, Ko_t: capital stock of nonmanufacturing industries

Recently, Japan's potential growth rate is sometimes considered to be around 2 percent, and it is said that to diminish the output gap, economic growth should surpass this figure. When estimating the output gap, only the capacity utilization rate in manufacturing industries is usually used as a demand factor, but this ignores the rate in nonmanufacturing industries. TFP, which explains potential growth rate not explainable by growth in capital and labor, is usually assumed to grow constantly, reflecting technological progress. Indeed, the output gap obtained by this method (the thin solid line in Chart 11[1]) expanded in the first half of the 1990s and temporarily reduced significantly from fiscal 1995 to fiscal 1996. Thereafter, the output gap was extremely large in 1997, and it continued to expand again until the end of fiscal 1999. If the output gap continued on this

[13] The TFP is a concept that captures developments in production efficiency from a macroeconomic perspective. This includes technological progress based on knowledge accumulation, changes in labor and capital qualities, and the economic efficiency of the society. See box B for details.

trend, consumer prices should have declined until the end of 1999 as prices fluctuate in correspondence to the gap level. Hence, this does not explain why consumer prices did not actually decline from 1998. Furthermore, the output gap also contradicts supply-demand gap indicators that are based on firms' perceptions, such as the Supply and Demand Conditions for Products DI, the weighted average indicators of the Production Capacity DI and the Employment Conditions DI in the *Tankan—Short-term Economic Survey of Enterprises in Japan* that have shown an upturn since the beginning of 1999.

Using such a classical method to estimate the output gap does not separate supply factors from demand factors sufficiently and thus may fail to indicate actual supply and demand conditions. So we try to capture the demand side more accurately (estimating the capacity utilization rate in nonmanufacturing industries) and we reestimate the output gap by measuring short-term supply capacity (regarding all GDP unexplainable by labor and capital as TFP and excluding the assumption that the growth rate of TFP is constant and reflects only technological progress; see Box B for details). Using this method, the rate of change in the new output gap from its peak in 1990 to the recent trough is smaller than that calculated by the classical method (the thick solid line in Chart 11[1]). In addition, this output gap began to close at the beginning of 1999. This indicates that the new output gap is moving in tandem with the supply-demand indicators based on firms' perceptions.

The output gap discussed in this paper shows the difference between actual GDP and potential GDP which is obtained when capital and labor are fully utilized. It is necessary to keep in mind that this new output gap is larger than those calculated by other methods, such as that between actual GDP and the equilibrium level of GDP where inflation is stable, and the output gap between actual GDP and the average level of GDP when capital and labor are operating on average calculated from past data[14]. The level of the output gap differs depending on

[14] This method is used in the *Economic Survey of Japan Fiscal 2000* (available in Japanese only) etc.

calculation methods.

To get a rough idea of the mechanism of price determination in Japan, we estimate a Phillips curve based on this output gap. In our estimation, a dependent variable is inflation rates in consumer prices, and explanatory variables are the output gap in the current quarter, the expected inflation rate (proxied by the percentage changes in consumer prices in the previous quarter), and the supply shock (proxied by percentage changes in import prices in the current quarter.)

$$\pi_t = const + \beta \cdot \pi_{t-1} + \gamma \cdot GAP_t + \delta \cdot WPIIM_t$$

Estimation period: 1983/Q3-1999/Q4

π_t : changes in CPI (quarter-to-quarter trend cycle annualized, %)

GAP_t : output gap

$WPIIM_t$: changes in import prices (wholesale prices, yen basis, total average, quarter-to-quarter percent change, annualized, %)

The estimation result was satisfactory (Chart 12) and the basic behavior of the inflation rate can be explained by this relationship. Through this, we can understand that the level of the output gap influences the level of the inflation rate. Also, inflationary expectations were stable due to extremely stable inflation rates during this period. (See Box C for the stability of the Phillips curve and the characteristics of inflationary expectations.)

This new estimation shows the reason why the output gap hit bottom even though the economic growth rate was low in fiscal 1999 is because TFP, which constitutes the domestic supply factor, reflects not only technological progress but also other factors and these factors cause short-term fluctuations (see Box B for details). During the 1990s in particular, the external environment has changed as observed in changes in the industrial structure due to globalization of the economy and the recent introduction of IT (Information Technology). In these circumstances, it is

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Although the level of average GDP differs from that of potential GDP, this method is used on the assumption that the two basically move in tandem in the mid-to-long-term.

likely that most of the capital stock, accumulated due to vast business fixed investment until about 1990, has become obsolete, although it exists.[15] Furthermore, in the process of such structural changes, an increasing number of firms require employees to obtain both widely applicable and highly technical skills instead of skills specific to an individual company, when workers are not ready to satisfy this requirement, it is highly probable that labor productivity is declining as a result. As the economic value of capital and labor decreases, TFP in Japan and furthermore the overall capacity growth seem to be lower than the potential growth rate would suggest when calculated by the classical method, at least in the short run.[16,17] This explains the contraction in the output gap despite the low economic growth since 1999.

Needless to say, there remain problems surrounding the concept and measurement of the potential growth rate and the output gap. The output gap should only be used to explain trends in price developments and is not expected to match the

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[15]If we evaluate capital stock of private firms in terms of market value using second-hand prices, the growth rate of capital stock has been fairly low in recent years (Chart 13; for details see Masuda [2000]). Furthermore, it may be that capital stock exists on accounts, but firms no longer consider it to be valuable equipment. In this case, the value of capital stock decreases further and the growth rate declines even more; this is highly possible in the present environment characterized by ongoing structural adjustments in the economy. The classical output gap based on the fixed capacity utilization rate in nonmanufacturing industries is likely to be overestimated as a result of this factor. In the new output gap, the TFP includes such factors as the measurement problem of capital stock to some extent.

[16] Recent growth in the domestic supply capacity remains at around 1 percent when this output gap is measured this way. The figure is smaller than the potential growth rate (just below 2 percent) obtained from the classical production function approach. It should be kept in mind that these figures are subject to measurement errors.

[17]The following two aspects should be considered when examining the influence of changes in the industrial structure symbolized by the IT revolution on potential growth. First, in the mid to long-run, if IT is to really take root in Japan, an increase in productivity may be expected as has been observed in the U.S. in recent years. Second, in this process, existing capital and human capital will become obsolete, however, and this is likely to reduce capacity growth in the short run. Even in the U.S., the effects of the IT revolution did not appear immediately in the productivity statistics until the mid-1990s and this was regarded as a "puzzles." Thus, while existing capital and labor will continue to deteriorate in the future, we must note that if IT becomes deployed throughout the economy, the mid to long-term potential growth will not decline significantly even though the prior or the present capacity growth is low.

short-term price fluctuations. Yet, if we compare the estimated values of consumer prices from the Phillips curve and actual consumer prices, especially in 1998, we find the estimated value dropped while the actual value rose. Therefore, this output gap factor cannot fully explain why prices did not fall from 1998 to 1999.

(ii) Expansion of the mismatch in the labor market

Among supply-demand gap indicators, the divergence between the unemployment rate and prices is the most conspicuous. This means that especially in the labor market, its influence on prices cannot be measured just by supply-demand gap indicators. At present, Japan's unemployment rate is 4.7 percent (as of July 2000), and remains near the highest level since the statistics were first compiled. There should be a negative relationship between vacancy rates--indicating insufficient employment--and the unemployment rate which shows excess employment when reflecting only the economic recovery and recession (Beveridge curve; Chart 14[1]). From the 1970s, however, the curve has repeatedly shifted to the right or right-upwards. Recently, the vacancy rate is increasing slightly, while the unemployment rate remains at the highest level recorded. The right shift or the right-upward shift of the relationship means that some firms perceive excess employment persists while others feel there is insufficient amount of labor. It is highly probable that there has been an increase in the structural mismatch regarding labor supply and demand.[18] This contrasts with the U.S. experience, where the relationship between the two rates shifted left-downwards from the 1990s (Chart 14[2]).

This growing mismatch in the labor market is likely to cause a decline in the equilibrium level of the output gap explained below.[19] Along with the expansion

[18] Factors explaining supply and demand in Japan's labor market are (Chart 15): (1) macroeconomic-activity shocks due to business cycles; (2) mismatch in labor supply and demand reflecting age and sex among firms and industries (redistribution shock); (3) exogenous changes in the labor force due to the enlarged participation rate by the female labor force (labor force shock); (4) hysteresis caused by these factors and long-term changes in the labor force age composition (for instance, when unemployment occurs in the labor market due to economic recession, it affects the economy by creating irreversible changes such as the loss of skills; deterministic trend).

[19] The "equilibrium level" of the output gap refers to the level of the output gap, which is analogous to the level of the natural rate of unemployment in the labor market. This level is expected to be lower than the level of potential GDP when the mismatch in the labor market is resolved and capital

of the output gap during 1998 to 1999, the equilibrium level declined. Thus, it is likely that deflationary pressure was not exerted on the economy, as is shown in the gap expansion.

If we separate the number of unemployed workers caused by business cycles from those caused by structural factors (Chart 16),[20] it seems that the impact of the economic recession is weakening recently. On the other hand, the long-term increase in unemployment continues, since it takes a long time for unemployed workers to find jobs because labor skills are lost, and the labor-force age composition changes. Furthermore, structural adjustments of industries and changes in the way of thinking about employment among younger generations seem to be increasing the number of unemployed workers since 1995. Recently, in particular, firms are taking globalization and IT into account. Under these conditions, employees need highly technical skills that are applicable for many purposes. In this sense, factors that cause capacity growth to stagnate by cutting the value of the domestic labor force may also create supply-demand mismatch in the labor market. Some of these factors can be solved in the short run, but others will not be solved until the next generation enters the labor market.[21]

There seems to be a structural shift that reflects structural changes in recent years in the relationship between the unemployment rate and the change in wages (unit labor cost) (Chart 17[1]). As for the influence of labor supply-demand conditions on prices, when a structural mismatch occurs in the labor market, the increase in the unemployment rate exerts downward pressure on prices, while the increase in the vacancy rate pushes prices upwards. Therefore, the downward

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is fully used. From the viewpoint of the Phillips curve, this corresponds to the output gap level which is price neutral.

[20] To break down the number of unemployed workers, we estimate reduced form VAR by standardizing the Beveridge curve. The impacts of the hysteresis are extracted. Furthermore, structural parameters are estimated on errors to identify the macroeconomic activities shock, redistribution shock, and the labor force shock. For details, see Nishizaki [2000], for examples in the U.S., Blanchard and Diamond [1989].

[21] Furthermore, the structural increase in unemployed workers partly reflects female workers entering the labor market aggressively during these years.

pressure on prices is weaker in this case than when the economic recession pushes prices downwards by reducing the vacancy rate and increasing the unemployment rate.[22] The increase in the number of unemployed workers from 1998 was apparently due not only to economic deterioration; other structural factors contributed. Hence, downward pressure on prices from 1998 to early 1999 was not as strong as indicated by the increase in the unemployment rate or by the expansion in the output gap.

We have presented two hypotheses which should explain why consumer prices did not decrease as much as predicted by the output gap from 1998 to early 1999. The argument is as follows: Although the output gap was large in 1998, it was smaller than calculations based on the potential growth rate usually imagined. Furthermore, the equilibrium level of the gap also declined, and therefore, downward pressure on prices became somewhat moderate. Nonetheless, considering the fact that firms started to intensify efforts to reduce personnel expenses from 1998 (Chart 6), it seems that the decline in prices could not have been halted by these factors alone. During this period, firms maintained prices as a result of putting more importance on the current rate of profits since they did not expect the market to expand while the economy deteriorated. These factors can also acted as constraints on price declines (see Box D for details). The slow decline in prices due to all these factors interconnected gave time for the Japanese economy from falling into a deflationary spiral in which a price decline causes reductions in corporate profits and this creates a further economic deterioration. When the decline in prices slowed, concerns about a deflationary spiral were dispelled as will be described in the following chapter.

[22] In fact, there exists a negative correlation for unit labor cost in relation to the unemployment rate based on shocks from macroeconomic activities such as economic recovery and recession (Chart 17[2]). When estimating the Phillips curve, which shows the relationship between the unemployment rate and wages, and differentiates between the effect of unemployment owing to macroeconomic activity shocks and that of unemployment due to structural factors (Chart 18), the decline in unit labor costs up until recently basically matched the economic deterioration.

(3) Relationship between money stock and nominal GDP

To understand why the Japanese economy did not fall into a deflationary spiral from 1998 to 1999, we need to examine the impacts not only on the real side of economy, but also on the financial side. During this period, an unusual phenomenon seems to have occurred: money stock continued to grow at a high rate in contrast to nominal GDP. In fact, relationships among money stock (M_2+CDs), the economy (real GDP), prices (GDP deflator), and others show that in 1998, the actual growth rates of money stock always exceeded forecast values which were decreasing through the year (Chart 19). This implies that some missing variables for money demand played an important role to move money stock during this period. This is the second puzzle we must explore.

The rise in the money stock seems to have been influenced by the rapid increase in the demand for precautionary holdings of money (precautionary demand) as a consequence of firms and households becoming anxious about future fund-raising or income-securing, as a result of the concern over the financial system from autumn 1997 to 1998. On the other hand, there was a possibility that if financial institutions could not supply sufficient liquidity, firms could obtain liquidity by selling products and inventories and household could suppress their consumption further. In other words, although the relationship between money and the economy is loose in normal situations, where the quantity of money firms and households went to hold would move in a certain range, the interaction between lack of liquidity and price decline becomes apparent when the demand for liquidity increases drastically, as was seen during this period.

Taking this into consideration, we offer the following chronological interpretations on money stock and nominal GDP. After all, a deflationary spiral did not occur as various monetary measures and policies taken by the Bank of Japan and the government eliminated the anxieties of firms and households about liquidity.

(i) From the autumn of 1997 to 1998

The Japanese economy falling into a full-fledged deterioration in 1997 was largely

affected by the disturbance in the financial system caused by the failures of large financial institutions in November 1997 (Sanyo Securities, Hokkaido Takushoku Bank, Yamaichi Securities etc.). This disturbance in the financial system rapidly added concern about corporate finance and many risk premiums were added to interest rates for fund-raising (Chart 20). This phenomenon deteriorated further due to a drop in corporate profits from the second half of 1998.

In these circumstances, an increasing number of firms and households not only refrained from spending to secure liquidity, but also increased precautionary fund-raising. There is a high possibility that the latter caused the increase in money. In fact, money stock continued to grow and the *Marshallian k* (M_2+CDs/nominal GDP) increased. If firms and households continued to seek liquidity further when financial institutions cannot supply liquidity effectively, the risk of a deflationary spiral may have increased while money stock grew to some extent.

(ii) From 1999 and onwards

In autumn 1998, the Bank of Japan further eased monetary policy, lowering the target rate of the uncollateralized overnight call rate. In response to a credit crunch, the Bank expanded CP repo operations and established a temporary lending facility to support firms' financing activities. The Bank also announced to consider the establishment of a new market operation scheme, which would utilize corporate debt obligations as eligible collateral, and lent loans directly or through the Deposit Insurance Corp. for bankrupt financial institutions to continue business until final disposal was completed. In addition, the government implemented measures such as enhancing the credit guarantee system (Chart 21). These measures eased anxieties about liquidity and the risk of further deflation triggered by selling goods was avoided.

From the beginning of 1999, liquidity risk reduced significantly and the economy started to pick up, due to the Bank of Japan's introduction of the zero interest rate policy and easing financial anxieties led by the government's injection of public funds into private banks. On the other hand, the growth of money stock became rather slow as precautionary demand for liquidity by firms and households

decreased.

Here, we summarize conceptually the relationship between prices, the output gap, corporate behavior that leaves prices unchanged (see Box D), and the increase in precautionary demand for money.[23]

Assume monopolistic competition where corporate behavior that leaves prices unchanged is the most effective. Firms would not cut product prices at first to prevent profits from deteriorating, despite considerable expansion of the output gap. However, mounting anxieties over the financial system and the rapid increase in demand for money (liquidity) cause firms to sell products to obtain money, resulting in an overall decline of prices. Thus, even though each firm aims to maintain prices, mounting anxieties over liquidity make it difficult to stop the price declines as a whole even under monopolistic competition. Although firms subsequently adopt strategies in order not to cut prices, it is still difficult for them to maintain prices, due to further expansion of the output gap caused by economic deterioration and the persisting precautionary demand for money. If this situation continues, firms begin to cut wages in view of the economic deterioration, and this causes a decline in overall prices. Consequently, firms gradually decrease expected prices of their products. In Japan, there was the possibility that firms would fall into this deflationary situation because they have already begun to cut wages, while firms' willingness to hold money intensified, as seen in the rapid increases in CPs and corporate bond issuance in 1998. In reaction to this, as the Bank of Japan and the government satisfied the demand for liquidity in time, the precautionary demand for money lessened. As a result, incentive by both firms and households to sell goods and products was reduced and these sectors partly regained the desire to invest and consume. Through this process, the Japanese economy retreated from the brink of a deflationary spiral.

[23] The following discussions apply Solow [1998], and Hahn and Solow [1995].

(4) Relationship between changes on the supply side of the economy and prices

The third puzzle could be solved by understanding how structural change in the supply side such as technological innovation, increasing import penetration, deregulation, and the streamlining of distribution channels have affected prices throughout the 1990s.

(i) Technological innovation

There are discussions whether the enhancement of productivity led by IT has suppressed the rise in prices in the U.S., and whether the UK is following the same path.[24] In Japan, however, stagnant business fixed investment throughout the 1990s led to a decrease in capacity growth (Chart 4[2]), and as mentioned, capacity growth recently at least seems to be sluggish in the short term. From these facts, it is thought that currently, downward pressure on prices caused by technological innovation is not accelerating as much as before. (See Box E for details on the relationship between technological innovation and prices.)

However, the impact of the enhancement of productivity on the manufacturers' side, mainly in electronics equipment, is clearly observed in price indices. For instance, the domestic wholesale price index was on a decreasing trend even during the expansionary phase of the 1980s and 1990s, except during the so-called bubble economy era in the second half of the 1980s (Chart 1[2]). This is because electronic machinery-related technological innovation exerted downward pressure on domestic wholesale prices through price declines in products such as semiconductors and personal computers. When technological innovation occurs in electronic machinery-related industrial products, usually new products are introduced to the market. Then, the performance and quality of products improve more than the nominal price decline suggests. When aggregating domestic wholesale prices, the production cost method or the hedonic regression method is used to estimate the degree of price change, taking into account the improvement

[24] See Julius [1999], Vickers [2000], Wadhwani [2000], and Greenspan [2000-a, b] for discussions of these aspects of prices.

in quality of the new items.[25] As an attempt to grasp to what degree technological innovation pushes prices down, on domestic wholesale price decline, we calculate the contribution of items whose prices tend to be reduced as items change to reflect technological innovation. This method focuses on the situation when technological innovation occurs, this not only cuts various fixed costs of products, which leads to a price decline, but in many cases it decreases prices in the real term due to an increase in the added value of products, even when prices appear to be constant.

The results are shown in Chart 22. Of course, it should be noted that this does not necessarily correspond to the tempo of technological innovation from the macroeconomic perspective since this method only partially captures the impact of technological innovation on prices. Furthermore, looking at price developments in the 1990s, we see that the contribution of technological innovation to price declines has recently become small after a large temporary decline from 1995 to 1996, which may have been influenced by the increase in quality of semiconductors. As a whole, however, it is apparent that technological innovation has made a firm and constant contribution to the decline in domestic wholesale prices or final goods prices. Except for this factor, recent domestic wholesale prices have already increased somewhat since the second half of 1999 compared to the previous year, partly reflecting the rise in crude oil prices.[26]

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[25] The domestic wholesale price index aggregates prices of specific items in which the quality is fixed. When items change, the production cost method, which regards the difference in production costs between new and old items mainly as price differences that correspond to quality differences, and the hedonic regression method, which estimates quantitatively price changes that reflect qualitative differences between new and old items, are employed. These methods incorporate the effects of technological innovation on prices in the actual discount. In this paper, since a price decline with an item-change is totally regarded as technological innovation, the impact of technological innovation might be overestimated. On the other hand, it is underestimated because these methods cannot capture both cases in which actual price declines reflect the progress of production technology without the change of items and a user's utility increases although costs do not change.

[26] Apart from this, corporate service prices have been decreasing since 1993 on a year-to-year basis. This is partly caused by a decline in leasing prices due to the improved quality of personal computers.

Further price cuts are expected to occur if more industries introduce new technology, thereby increasing economic productivity as a whole. Although this has not been widespread yet, it seems to have prompted structural changes in distribution sectors, as will be discussed later.

(ii) Industrialization in Asian countries and the increase in reverse imports

One of the factors that influenced import prices in the 1990s was the appreciation of the yen. From 1993 and also from 1998 (Chart 23), prices of intermediate goods in wholesale prices decreased in parallel with the appreciation of the yen; after a while, prices of final goods in wholesale prices started to decline. Prices of imported/import competitive goods in consumer prices[27] also decreased slightly after the decline in the wholesale prices of final goods. Besides, apart from intermediate goods, while the yen depreciated since the second half of 1995, the pace of decline of final goods slowed down but prices did not rise.

This is not only because the appreciation of the yen pushes down prices of imported/import competitive goods, but also because an expansion of inexpensive imported goods that is more rapid than the increase in final demand (Chart 24) indirectly pushes down the prices of import competing goods. Basically behind this lies the price gap between Japan and Asian economies. In addition to the large price gap created by the appreciation of the yen in the 1990s, progress in the industrialization in Asian economies, where personnel expenses and intermediate input costs are much less inexpensive than in Japan, has significantly increased their supply capacity, resulting in a massive inflow of inexpensive final goods to Japan.

It should be noted that a shift in production from Japan to Asia was a driving force

[27] This index is composed of imported/import competitive items in the consumer price index. Specifically, items are aggregated that are regarded as import prices in wholesale prices, and also those that are not included at the wholesaling stage, but obviously have such a characteristic. Since there is a high possibility that petroleum product prices move differently compared with other items, reflecting market conditions of crude oil, disturbance factors including petroleum products are excluded here.

behind industrialization in Asian economies during the 1990s. Since 1993, the shift of production to Asia gained steam. In the mid-1990s, the system of international division of labor between Japan and Asia was established, in which parts of IT-related equipment supplied by Japan are assembled in Asia to produce personal computers and audio equipment which are then exported around the world. Inexpensive products were also re-imported to Japan.

The advance of Japanese companies to Asia and the establishment of a system that re-imports products into Japan did not become full-fledged until the 1990s when the price gap between Japan and abroad expanded considerably as a result of the appreciation of the yen, because substantial costs were incurred. However, this means once imported goods entered the domestic market, inexpensive goods continue to be imported so that the prices of domestic goods that compete with imported goods are hard to rise unless depreciation of the yen in the long term eliminates the price gap.

The impact of this trend on prices can be confirmed by looking at the list of items in the consumer price index where the contribution rates of decline were the largest (top 50 items; Chart 25). The results show that the list includes many items in durable consumer goods such as audio and other electrical appliances, especially from 1995 to 1996, and many in apparel products in the first half of the 1990s.

Moreover, the expansion of supply capacity in Asian economies has two implications in terms of the impact on prices through the output gap in Japan. The first is the impact of imported goods prices from Asia on the prices of domestically produced import competitive goods from the viewpoint of the output gap. Import competitive goods are affected not only by the domestic output gap but also by foreign supply-demand conditions, especially since the beginning of the 1990s. Second, the increase in imports from Asia does not necessarily mean the domestic output gap has expanded because it induced exports of capital goods and parts to Asia by Japan through the system of international division of labor.

With respect to the import expansion phases of both from 1994 to 1996 and in 1999, industrial shipments (Chart 26) decreased due to the rise in imports while they were increased by exports. Thus, it is appropriate to understand the international division of labor has enlarged the Japanese economy as a whole rather than assuming that the increase in imports has induced the expansion of the output gap in Japan. Future trends of the output gap in Japan should be judged from the macroeconomic perspective, taking into account the movements in the whole economy including developments in imports and exports and domestic shipments.

(iii) Deregulation

Deregulation's downward pressure on prices has been observed from the beginning of the 1990s. In 1991, restrictions on beef imports were abolished and large-scale retailers started to open new stores one after another following the phased deregulation of the Large-Scale Retail Store Law. Moreover, the Foodstuff Control Law and Provisional Measures Law on the Importation of Specific Petroleum Refined Products were abolished in 1995 and 1996 respectively. Impact of deregulation appears to be ongoing. If we look at the list of items in the consumer price index whose prices declined quickly (Chart 25), the impact of deregulation can be observed constantly for instance on petroleum products and rice. In addition, the decrease in corporate service prices has been influenced by the declines in communications fees and damage insurance premiums. In the immediate future, deregulation in electricity charges and communications fees is expected to affect prices.

(iv) Streamlining of distribution channels

Streamlining of distribution channels will reduce distribution margins by cutting excess profits or distribution costs, especially at the distribution stage. While this reflects changes in the supply structure already mentioned, i.e., an increase in the supply of inexpensive imported goods from Asia, it also includes an increase in productivity in the distribution sector.

This phenomenon of streamlining of distribution channels is typically seen in the rapid rise in inexpensive imported apparel products made in China in the first half of the 1990s. These Chinese products were imported rapidly roughly at the time when chain stores on the roadside and discount stores started to increase. Afterwards, this boom seemed to have ended. However, since 1999, new emerging firms in retailing gained power by improving the quality of goods such as guiding manufacturing skills in China and the technique to import a lot of inexpensive imported goods, aided by the appreciation of the yen. This movement has steadily taken root and an increasing number of volume sellers is beginning to cut prices to compete with inexpensive imported goods. These points are, once again, confirmed by looking at the list of items in the consumer price index, whose prices declined quickly (Chart 25). The number of items in apparel products in the top 50 has gradually increased again since fiscal 1998 after items such as suits and women's dresses made up the majority of such goods in fiscal 1993.

Furthermore, the private brand boom that has occurred in a wide range of areas, including apparel and food industrial products, has revived since 1992. In this process, inexpensive products are provided with the use of globally inexpensive raw materials and productive factors. This phenomenon has been exerting downward pressure on prices.[28]

Recent developments of consumer goods from the supply side (on the quantity base) indicate that both domestic shipments and import goods have increased. They differ to some extent from sales at department stores and supermarkets, which make up traditional sales statistics and have been slowing or decreasing (Chart 27[29]). Moreover, survey results of sales at specialty stores, which include

[28] The consumer price index does not necessarily capture the actual price movements of private brand goods. However, private brand goods indirectly suppress prices of existing national brand goods through competition.

[29] It should be noted that even this estimation does not necessarily pinpoint the actual developments in goods consumption because these methods do not include fluctuation of inventories in

newly emerging firms and are not covered perfectly in existing statistics, show that sales mainly of electric appliances and furniture have increased and even those of apparel products have not declined. This implies that consumption has not decreased as much as traditional sales statistics indicate (Chart 28). Recent activities of new emerging firms in retailing seem to promote reorganization in Japan's distribution sector, which has been criticized for its inefficiency. In fact, the ratio of sales in wholesaling to sales in retailing, and the ratio of total sales in wholesaling to sales in wholesaling for retailing and final demand have continued to decrease from the beginning of the 1990s (Chart 29). Recent survey results show that prices of goods per unit in retailing seems to be decreasing more than consumer prices (Chart 30). Based on the previous analysis, we can say that in addition to sluggish consumption demand, this is the result of a further streamlining of distribution channels.

Among the four points cited as supply-side factors, factors (ii), (iii), and (iv) became prominent in the 1990s and can be understood as part of the adjustment process of the price level through revisions of high domestic prices and narrowing of the price gap between Japan and abroad. In Japan, the cost of living is expensive due to relatively high service prices and distribution costs while industrial products that are exposed to world competition are inexpensive. These revisions of high prices did not progress as much until the first half of the 1990s, but thereafter the price gap has been gradually reduced (Chart 31). This is because transactions aiming for arbitration of prices have expanded, which was triggered by an expansion of the gap between Japanese and overseas prices caused by the appreciation of the yen, and because global business relationships in the world economy have become widespread. In recent years, the introduction of the globally used business models that provide inexpensive and high quality products has partly adjusted the price gap between Japan and abroad as a result. Furthermore, intensified global business relationships expand the range of tradable

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consumption goods and force us to make various assumptions.

goods and partly have arbitrage effects between Japan and abroad on service prices in the form of deregulation.[30] These phenomena are often referred to as "price destruction," and they should be regarded in positive terms such as the "globalization of prices."

The "globalization of prices" eventually enhances economic efficiency and purchasing power of customers in the Japanese economy. Through this process, however, domestic demand partly leaks overseas and profits of specific industries may be squeezed due to a decline in competitive power and the narrowing of margins in existing conventional industries and wholesalers or retailers protected by regulations. This process also has deflationary effects in the short term, and therefore needs careful monitoring.

3. Points to Consider regarding Future Price Developments in Japan

In the 1990s, the inflation rate in Japan was roughly determined by developments in the output gap. The recent output gap has been large due to economic deterioration in 1998, but it is smaller than expected from the potential growth rate generally imaged. Also, if measured from the equilibrium level, the gap seems to be even smaller. Moreover, the output gap is on a moderately diminishing trend, reflecting the economic improvements since spring 1999.

Since it is difficult to measure real deflationary pressures from the output gap, and some price indices remain somewhat weak, it is necessary to carefully examine the factors behind movements in each price index, including supply-side factors. In the following, each price index is explained in detail. After examining the details of price indices and observing the trend of the output gap, the conclusion for Japanese price developments is

[30] With regard to service prices, communications fees have been decreasing, reflecting deregulation etc. This phenomenon may possibly shrink the gap between Japanese and overseas prices in the long term (Chart 32).

that the "downward pressure on prices stemming from weak demand" seems to be declining significantly.

(a) Domestic wholesale prices (Chart 33[1])

Domestic wholesale prices have increased slightly. This seems to somewhat reflect recovery in the corporate sector caused by the rapid rise in worldwide IT-related demand and the reorganization of industries, but the main influence is the rise in crude oil prices. Overall domestic wholesale prices seem to be steady, disregarding the effects of both the rise in crude oil prices and qualitative improvements caused by technological innovation.

(b) Consumer prices (Chart 33[2])

Consumer prices (excluding perishables) remain somewhat weak. This is probably the result of the recent revival of the streamlining of distribution channels. It is also possibly because weak recovery of private consumption partly influences consumer prices, as many firms compete in a market that is slowly expanding.

(c) Corporate service prices (Chart 34)

As a whole, corporate service prices have been weak, reflecting the reduction of expenditures resulting from corporate restructuring. Although a recovery has been observed in areas such as advertising, the declining rates compared to the previous year has not narrowed as much due to effects from technological innovation and especially deregulation.

(d) GDP deflator (Chart 35)

The GDP deflator has remained weak. This is not just because the GDP deflator reflects developments in domestic wholesale prices and consumer prices, but because passing on the increase in import prices (which is excluded in the deflator), crude oil prices in particular, takes more time than usual, given the deregulation, pressures to narrow the price gap between Japan and abroad, and intensifying competition. In addition, wages, mainly of government employees, tend to

suppress the GDP deflator.

However, in the current situation where various factors affect each price index, it is difficult to measure how much of the change in each index comes from "downward pressure on prices stemming from weak demand." Furthermore, it is difficult to evaluate price declines, such as those induced by the closing of the gap between domestic and foreign prices, even though they do not stem from weak demand, because price declines contain negative impacts in the short-run under the circumstances where the growth of productivity in Japan is low from a macroeconomic perspective. One way of judging whether the Japanese economy as a whole is under deflationary pressures is examining the background of price behavior from the distributive side. As mentioned, deflation has a negative influence on the real economy through the channel where an adjustment lag in nominal wages and the increase in the real debt burden lead to a deterioration in corporate profits. Therefore, it is natural to focus on corporate profits first to evaluate deflationary risks. A rise in corporate profits, if achieved by a decrease in compensation of employees, may not last as a result of discouraging household expenditure. Hence, if corporate profits increase without a decrease in compensation of employees, the situation is not so severe as to worry about deflationary risks. From this perspective, it can be concluded that the current Japanese economy is in a situation where deflationary pressure reflecting the imbalance between supply and demand is almost dispelling (Chart 8).

Of course, long-term price declines may have harmful effects whatever the cause of the price decline. If the actual price decline makes deflationary expectations persist and intensifies deflationary trends through a decline in nominal wages, it could cause various costs such as by squeezing corporate profits more than observed due to the rise in the real debt burden. However, it is difficult to argue that deflationary expectations would accelerate compared with when demand is weak because price declines stemming from economic efficiency and productivity improvement accompany an increase in corporate profits. In fact, the estimation result shows that deflationary

expectations have not been accelerating recently (Chart 36[31]) although there are measurement errors to a large extent. Moreover, the fact that wages seem to have stopped declining (Chart 6) indicates that deflationary trends of the economy will not intensify further. A small price decline at the current degree is thought to have a negligible effect on the real debt burden in contrast to the Great Depression in the US. The ability to pay back debts has been enhanced by the rise in corporate profits, overtaking the increase in the burden created by price declines (Chart 37).

Next, we take up some important points regarding future price developments in Japan. First, suppose that capacity growth in the Japanese economy continues to be sluggish, mostly due to the obsolescence of capital and labor at least in the short term. If the economy is to follow a self-sustaining recovery, the output gap follows a diminishing trend even though the economic growth rate is lower than that of past recoveries. Under these circumstances, downward pressure from the balance between supply and demand is more or less unlikely to be exerted on consumer prices. Given the large level of the output gap, however, the possibilities of a substantial increase in consumer prices are low, unless the economy continues to grow at a very high pace.

The impact of supply-side shocks on Japan's economy on future prices needs to be taken into consideration. First, as for the effects from the recent rise in crude oil prices, so far the upward pressure on prices is not a threat for the time being since Japanese firms are saving energy compared to the 1970s. Future trends in crude oil prices still require careful monitoring, however. Next, if investment in IT is spread over the economy and enhances total productivity, or if the large number of unemployed workers created by the mismatch of supply and demand in the labor market are smoothly absorbed, an

[31] Both the expected inflation rate calculated from surveys conducted on households and the theoretical values of the Phillips curve used in this paper are presented as examples, although it is difficult to measure. Since the latter uses the inflation rate in the previous term as the expected inflation rate, it should be noted that the measures also reflect the inertia of inflation and deflation. In addition, the latter is shown as a range, the upper limit of which is calculated by adding a constant term to the inflation rate parameter of the previous term. The upper limit may be overestimated because the effects of the differences between the deviation of output gap from the maximum level and from the equilibrium level are included in the range. Thus, the expected inflation rate should be below this upper limit value to some extent.

economic efficiency increases, then the price rise is likely to be constrained. This will be discussed when the use of IT becomes widespread in Japan. However, no clear evidence shows that IT stimulates total productivity of the economy at present, except for the enhancement of productivity among IT manufacturers, especially that of the electric machinery industry. In terms of efficient labor distribution, unemployed workers, who do not have the high skills that are required, have been increasing, unlike the U.S. Therefore, downward pressure on prices stemming from technological innovation has not yet accelerated.

The streamlining of distribution channels, which has been gradually observed since the beginning of the 1990s, is expected to continue. While firms which newly entered the retail market are increasing productivity by refining techniques to import inexpensive yet high-quality goods from overseas, existing stores are intensifying their stance in reaction to such movements. In addition, as a movement utilizing IT, retail marketing through the Internet is expected to spread (Chart 38[1]). Domestic direct investment by foreign firms, including the distribution sector, has increased and it may increase further (Chart 38[2]). If this become widespread, existing rents at the distribution stage will be reduced through a shortening of distribution channels and severe competition in retailing. This also helps customers reduce the cost of searching for goods and promotes the worldwide price arbitration. In addition, a reduction in various fees as a result of deregulation is also expected to continue. It is likely that the developments of the streamlining of distribution channels and deregulation may weaken consumer prices, even though the economy is on a moderate recovery trend.

BOX A

Deflationary Spiral

A deflationary spiral, a vicious cycle consisting of a decline in prices and a decrease in demand, is caused by various channels. (Refer to Chart A-1 for a theoretical background of the mechanism). For the Japanese economy, channels that presume long-term contracts like nominal wages or contracts fixed by nominal values like debt, seem to be important.

The first mechanism is a decrease in prices and demand causes a decline in corporate profits and household income and this in turn decreases prices and demand even further. Theoretically, this occurs from both firms and households. In Japan, however, it is highly possible that a squeeze in corporate profits is the cause of a deflationary spiral because corporate expenditure always leads the business cycle. This is because firms, facing a decrease in product prices, cannot adjust wage levels smoothly in reaction to the decline in product prices, and investment and other expenditures tend to be reduced further as a result of the squeeze in corporate profits. A deflationary spiral is different from an ordinary recession in two ways. First, wages decrease significantly. Second, corporate profits continue to decline because the decrease in wages is always slower than that of prices. Once this mechanism goes to work, prices continue to fall not only due to the decline in corporate expenditure but also because of the decline in demand induced by the wage decrease. In an ordinary recession, the end of the recession can be observed in two ways. First, we can anticipate to what extent personal expenses should be reduced to finish employment adjustment. Second, the end of the adjustment in inventories and business fixed investment can be predicted from the viewpoint of stock adjustments. However, when the economy is undergoing a deflationary spiral, it is difficult to tell when the economic deterioration will end. In 1998, the typical signs of an economy falling into a deflationary spiral--such as the substantial decline in corporate profits caused by the decrease in demand followed by the decrease in wages--were observed.

The second mechanism is a decrease in prices (more precisely, decrease in the expected inflation rate) increases the real debt burden. As the increase in the burden for debtors caused by the decline in prices is originally the same as the increase in real income for creditors, a comparison of the propensity to spend between debtors and creditors is not appropriate because empirical analyses do not always give a clear comparison. Rather, another channel seems to be more important: The increase in the debt burden raises the possibility of debtors' bankruptcy and makes it difficult to raise funds from financial institutions. As a result, the economy contracts through the decrease in firms' ability to take risks or as a result of the decline in expected compensation of employees. In this channel, as bankruptcies cause the loss of firms' value as "going concerns," the net effects of the price decline on debtors and creditors become negative. Furthermore, while price declines create an increase in existing real debt burden, the deterioration in corporate profits and household income through a decline in sales, and a decline in the collateral value through a fall in asset prices, occurs simultaneously. In fact, the latter channel seems to work more strongly than does the former. Moreover, as was clearly observed in Japan during the period after the burst of the bubble economy, negative effects caused by a loss of credibility in the financial system become distinct after the rapid increase in asset prices because large adjustments of asset prices occurred in addition to the price decline.

The risks of a deflationary spiral can be confirmed to some extent not only from the supply-demand gap but also from the following trends. In 1998, these trends were observed in the Japanese economy. From this viewpoint, the following factors have halted and thus the risks of a deflationary spiral have almost dispelled recently.

(1) Decrease in nominal GDP (Chart 8)

When a deflationary spiral occurs, both GDP deflator (prices) and real GDP (quantity or real income) decrease. As a decrease in nominal income causes difficulties in the payment of wages and the repayment of debts, which are generally contracted on a nominal basis, demand declines further through the channel described above. On the other hand, when prices decline from a downward shift of the supply curve due to technological innovation and a

decline in input costs, nominal GDP does not necessarily decrease because real GDP (real income) increases (see Box E for further details).

(2) Decrease in corporate profits and increase in labor share (Chart 8)

When a deflationary spiral occurs, compensation of employees decreases in line with the decline in corporate profits. As the pace of adjustment in compensation of employees is slow, unit labor cost (compensation of employees/real GDP) temporarily increases, resulting in a decrease in unit profit (operating surplus/real GDP) and an increase in labor share. A decline in unit profit leads to a reduction in firms' investment and an increase in unit labor cost enhances the pressure to cut labor costs.

(3) Increase in corporate credit risks (Chart 20)

An increase in firms' credit risks is one of the factors that led the economy into a deflationary spiral. Firms' credibility decreases when their ability to pay debts (such as the real debt outstanding, the ratio of net debt outstanding to cash flow, interest coverage ratio, etc.) gets worse or the real capital ratio decreases. In detail, the risk premium (such as the difference in yield between corporate bonds or CP, and long-or short-term government bonds, difference in yield between interbank open market-interest rates and short-term government bond yields, and the Japan premium) becomes substantial, when firms and financial institutions raise funds. Consequently, the demand for expenditure decreases largely because firms face difficulties in raising funds.

BOX B

Measuring the Output Gap

(Measurement method for the output gap)

There are various methods to measure the output gap. For instance, it can be measured by taking the difference between GDP and its trend based on statistical methods such as filtering, or it can be extracted by the time-series analysis method based on the Phillips curve using observed real GDP and price developments (state-space model[32]). Among these methods, one that calculates the difference between real GDP and potential supply capacity estimated by the production function is considered to enable us to understand the economic background of the developments in the output gap and is commonly used. In this paper, we calculate the output gap using the production function approach.

(Measurement errors of the output gap using production function)

It is well known that the Cobb-Douglas production function, which consists of labor, capital, and total factor productivity (TFP), can explain the behavior of the Japanese economy. In the production function approach, the output gap is defined as the difference between actual GDP and GDP obtained when labor and capital are fully utilized.

To actually estimate the production function, we need to estimate the capacity utilization rate of capital and make certain assumptions about TFP. Usually, the capacity utilization rate of capital of manufacturers alone is taken into account because of data availability, while that of the nonmanufacturers is always assumed to be 100 percent. Moreover, it is generally assumed that TFP grows at a constant rate, reflecting technological progress.

It should be noticed that when this estimated output gap is used, there are large measurement errors in the output gap estimation. To explore the causes of these errors, we first verify to what degree the output gap estimates change by data revision. The

[32] See Kuttner [1994] etc.

results (Chart B-1) show that the errors generated by the revision of GDP data (the differences between real time gap and semi-real time gap and between the semi-real time gap and semi-final gap in the Chart) are always observed. The errors, however, became larger especially from the 1990s and exceeded 2 percent during 1995 to 1998.

Even excluding errors generated by data revision, large measurement errors remain in the production function estimated by the above method. Two reasons can be considered. First, the actual estimates of the TFP trend change according to data accumulation. This can be confirmed by the fact that (Chart B-1) errors caused by this (the difference between semi-final gap and final gap in the Chart) exceeded 1 percent in the first half of the 1980s and were around 1 percent in the second half of the 1980s.[33,34] Although errors caused by this are small in the second half of the 1990s, there is a high possibility that errors will become larger again if the data accumulate hereafter. Second, if we estimate the production function by this method, the *Solow residual* obtained by subtracting contributions of capital and labor from GDP has reduced largely in recent years. As TFP is assumed to grow smoothly at a constant rate, residuals that cannot be explained by the time trend in the *Solow residual* are included in components of the output gap which is generated by demand fluctuations. This implies that estimated residuals are all supposed to arise from the fluctuations of the capacity utilization rate (especially that of nonmanufacturers) which cannot be captured statistically. Against the background that this paper shows that the output gap estimated by this classical method continue to expand during 1999, estimated errors fluctuate largely at random and have been extremely large recently. However, it is questionable to think that the capacity utilization rate of nonmanufacturers fluctuates so largely in the short-term. In other words, these unrealistic movements of the output gap is caused by the assumption that TFP follows a linear time trend and the capacity utilization rate of nonmanufacturers is obtained as residuals.

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[33] In this estimation, we assume that the rate of technological progress rose temporarily during the period of the bubble economy. Unless these shifts are not assumed at that time, the difference between the final gap and semi-real time gap would have expanded further.

[34] Similar research for the U.S. economy also reports large measurement errors of productivity trends. See Orphanides [1999] for further details.

(The output gap adjusted by the capacity utilization rate of nonmanufacturers [35])

The problem generated by the estimation of TFP trend can be solved by changing the estimation method of the output gap. We estimate the capacity utilization rate of nonmanufacturers that has always been assumed to be 100 percent for convenience. Also removing the assumption of the linear trend of TFP, we regard the *Solow residual* (which cannot be explained by the fluctuations of capital and labor in the GDP) per se as the TFP (hereafter, we call this "the output gap adjusted by the capacity utilization rate of nonmanufacturers").

The functional form used is shown in Chart B-2. Since the capacity utilization rate of nonmanufacturers cannot be observed directly, the production capacity judgement BSI of nonmanufacturers (from the Business Outlook Survey of the Ministry of Finance) and the unit of electric power for business use (ratio of electric consumption for business use to electric power contracted for business use) are used to estimate capacity utilization rates indirectly as proxy variables. Although the former is a survey, it is acceptable as a proxy for the capacity utilization rate of nonmanufacturers. This can be inferred from the fact that in manufacturing industries, the production capacity D.I. in the *Tankan* moves in tandem with the capacity utilization rate of industrial production and that in the nonmanufacturing industries, the production capacity judgement BSI and the production capacity D.I. in the *Tankan* basically move in the same direction. Also, the unit of electric power for business use can be directly regarded as a proxy for the capacity utilization rate. In fact, they have actually followed similar trends and these variables are useful for estimating the capacity utilization rate of nonmanufacturers. Here, the BSI is used to capture developments in the capacity utilization rate in detail while unit of electric power for business use supplements the information regarding the level of the capacity utilization rate. More concretely, parameters are estimated by regressing the unit of electric power on the BSI and then the estimate obtained by substituting the BSI data is considered to be the capacity utilization rate of nonmanufacturers (Chart B-3).

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[35] See Kamada and Masuda [2000] for further research on the idea.

TFP calculated in this way fluctuates randomly instead of moving at a constant rate. Intrinsically, TFP is considered as the mid-to-long run trend of technological progress and is affected by changes in qualities of capital and labor, efficiency of resource allocation, and social system factors such as regulation and deregulation by the government and mobility of labor.[36]

The estimated output gap is seen in Chart 11(1). The rate of decline of the output gap adjusted by the capacity utilization rate of nonmanufacturers has been moderate from 1990 up until the spring of 1999 and it has been narrowing gradually since then. This trend is similar to other supply-demand indicators.

[36] Based on arguments on TFP in the U.S., TFP includes (1) technological progress, which is intrinsically a quality change of labor but cannot be captured as labor, (2) technological progress which is a quality change of capital but cannot be captured as capital, (3) factors created in compiling data, and (4) other factors. Jorgenson and Griliches [1967] take the view that TFP basically does not move if noises are all removed. This is because if measurement of the input and output data becomes extremely accurate, then technological progress will be reflected in factors such as capital prices. This implies that if there is a problem in the accuracy of measurement, it will also affect TFP. On the other hand, Denison [1979] shows the following four factors as the factors of TFP decline in the U.S. after 1973: (1) declines in R&D and stock of knowledge; (2) regulation by the government to allocate capital, labor, and land to activities except for production, or inefficiency of resource allocation by other regulations and taxation system; (3) drop in willingness to work among the young generation and declines of competitive pressure and quality of management; (4) errors caused when compiling data. Moreover, Kendrick and Grossman [1980] indicate the following seven factors as component elements of TFP: (1) accumulation of knowledge; (2) changes in quality of labor; (3) changes in quality of land; (4) the effects of resource reallocation among industries; (5) volume-related factors such as economies of scale; (6) government services; (7) others such as changes in legal, institutional, and social environment.

BOX C

Stability of Phillips Curve and Characteristics of Inflationary Expectations

From the perspective of monetary policy, it is important to understand the characteristics of prices strictly. In terms of the relationship between business cycle and prices, it is crucial not only to understand the characteristics of inflationary expectations of the Japanese economy, but also to know to what extent the Phillips curve explained in this paper is stable.

(Inflationary Expectations)

First, we explain characteristics of inflationary expectations in Japan. As described in [1. (2) Several Factors Affecting Price Developments], the NAIRU (Non-Accelerating Inflation Rate of Unemployment) hypothesis suggests that, as a variation of the natural rate of unemployment (unemployment rate or supply-demand gap level when the expected inflation rate is equal to the actual inflation rate in the long run), the expected inflation rate is formed based on past inflation rates (adaptive expectations). According to this hypothesis, when the supply-demand gap (unemployment rate) diminishes beyond a particular level (NAIRU), the inflation rate accelerates even though the supply-demand gap remains at a certain level. On the other hand, when the supply-demand gap expands beyond the NAIRU, the inflation rate decelerates or the deflation rate accelerates. If this is true, the level of the supply-demand gap influences the acceleration of the inflation rate.

As explained above, whether the level of the supply-demand gap affects the level of the inflation rate or acceleration of the inflation rate depends on whether the expected inflation rate changes according to past changes in the inflation rate. The former case occurs when the expected inflation rate is stable. In this case, the supply-demand gap has a negative correlation with the actual inflation rate because the actual inflation rate changes according to the difference between the supply-demand gap and the natural rate of unemployment. On the other hand, the latter case is realized when the expected inflation rate fluctuates rapidly in reaction to a change in past inflation rates. Even in

the latter case, influence on the acceleration of the inflation rate depends on the speed of change in the expected inflation rate. When the expected inflation rate changes only gradually in accordance with past changes in the inflation rate, the characteristics of the latter case become closer to that of the former case.

The sufficient condition for the NAIRU hypothesis is that the parameter of past inflation rates, representing inflationary expectations, becomes 1 in the Phillips curve.[37] However, it is difficult to test the NAIRU hypothesis empirically from this perspective for Japan. For example, in the Phillips curve used in this paper, the parameter of the inflation rate of the previous quarter is well below 1 (see coefficient β in Chart 12). From the viewpoint of the parameter which represents inflationary expectation, it can be concluded that the NAIRU hypothesis in the narrow sense is rejected. However, we should consider that we cannot judge whether the parameter of inflationary expectation is statistically significantly below 1, only from samples after the 1980s, a low inflation period.[38] This is because monetary policy suppressed inflationary expectations during this period and the short-run Phillips curve does not shift up or down largely when credibility of price-stabilization is maintained. Hence, inflationary expectations were extremely stable during this period.

Rough examination of the long-run relationship between developments in consumer prices and the unemployment rate (Chart 7[1]) shows that the slope became steeper during periods when inflationary expectations shifted substantially upwards in the 1970s. Some empirical analyses also show that the parameter of inflationary

[37] The NAIRU hypothesis, which is the most simplified among formations of adaptive expectations, adds an assumption that "the expected inflation rate is equal to the inflation rate of the previous period (static expectation)" to the natural rate of unemployment hypothesis. Even if static expectations are not assumed, it is sufficient to support the NAIRU hypothesis on the assumption that expectations change gradually in line with lagged values of past inflation. In this NAIRU hypothesis, the sum of weights of inflation rates of the past several periods, which represent the expected inflation rate, is 1. If the time lag of past inflation rates that affect the expected inflation rate is long, the acceleration of the inflation (or deflation) rate becomes moderate. This parameter constraint is a sufficient condition for the NAIRU hypothesis. However, the NAIRU hypothesis cannot be practically rejected for reasons explained below even though this condition is not satisfied.

[38] See Sargent [1971] for this point.

expectations became larger during that time.[39] However, it should be noted that actual developments of the inflation rate include temporary fluctuations and that it is difficult to specify the functional form of expectation. As a result, although the existence of NAIRU in Japan cannot be rejected, it seems difficult to extract NAIRU from the Phillips curve in practical terms.[40]

(Stability of the Phillips Curve)

Next, we examine two points on the Phillips curve based on the output gap adjusted by the capacity utilization rate of nonmanufacturers. First is whether the trade-off relationship between the supply-demand gap and the inflation rate is stable in the long run. Second is whether the Phillips curve can shift in the short run. We first assume the "long-run" Phillips curve in the limited sense that the central bank does not change its stance on price stability.[41] As this differs from the ordinary long-run Phillips curve, which allows the central bank to change its stance on prices, we call it the "middle-run" for convenience. In our model, prices are determined by the short-run Phillips curve which has shifted from the middle-run Phillips curve to reflect past developments in the actual output gap (see Chart C-1[42] for the outline of the model). If a short-run deviation of the Phillips curve is confirmed, the rate of change in the supply-demand

[39] For example, Phillips curves (the traditional output gap is used because of data availability) similar to the one used in this paper are estimated. All curves have the same end period fixed at present, but they have different starting periods. The parameter of inflationary expectations is 0.6 mark when the starting period is from fiscal 1985 and almost reaches 0.9 when the starting period is fiscal 1975.

[40] See Matsukawa [1991]. For empirical analysis of the expected inflation rate including the 1970s, see Toyoda [1987] etc. In some developed countries, the NAIRU hypothesis is accepted when the inflation period of the 1970s is included in the analysis.

[41] As long as the Bank of Japan keeps its stance on price stability, it is technically difficult to capture the slope of the real long-run Phillips curve from data after the 1980s, which is a low inflation period. The middle-run Phillips curve defined here has a slope rather than being vertical because a large shift of inflationary expectation does not occur.

[42] From the reason explained in footnote 41, we test removing the assumption that the parameter of inflationary expectations is 1, which is based on the NAIRU hypothesis. Specifically, based on the idea of time-varying NAIRU developed by Gordon [1989] [1997] [1998], Roberts and Morin [1999], only the NAIRU constraint was removed when formulating the Phillips curve that fluctuates according to the hysteresis generated by the actual gap.

gap affects the inflation rate as shown in the formula in Chart C-1.

For the first point, we test whether the fixed Phillips curve exists regardless of the past levels of the output gap (Chart C-2). The null hypothesis that the Phillips curve is stable in the middle-run cannot be rejected with any high confidence.[43] This implies two results. First, a stable Phillips curve exists in the middle-run. Second, the Phillips curve returns autonomously to the middle-run Phillips curve even when it departs from that norm in the short run. However, as mentioned above, this occurs only when the public believes in the credibility of monetary policy as suppressing inflation. If the central bank changes policy and loses credibility, the results no longer hold.

In terms of the second point, we test whether the short-run Phillips curve departs from the middle-run Phillips curve (Chart C-2). The results show that the null hypothesis--that the short-run Phillips curve is stable--cannot be rejected when estimated for the longest period (1984 to 1999).[44] As a result, the Phillips curve seems to be quite stable statistically even in the short run. However, when we carry out similar tests and extend the ending point to 1991, 1994, and 1997 without changing the starting point as the 1980s, the results show that the short-run Phillips curve gradually becomes unstable when 1997 included (Chart C-2). The results imply the possibility that the Phillips curve has recently become unstable; the various reasons are examined in the text and Box D.[45]

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[43] The null hypothesis that the Phillips curve in Chart C-2 is stable in the middle-run cannot be rejected, judged from the high P-value.

[44] The null hypothesis that the Phillips curve in Chart C-2 is stable in the short-run cannot be rejected, judged from the P-value of the Wald test at the one-sided 5% significance level.

[45] We carried out similar tests moving the starting point gradually forward to 1990, 1987, and 1984 without changing the ending point of 1999. The results show that the P-value generated by data of the 1990s is higher than that generated by data that includes the 1980s. Thus, the short-run Phillips curve in the 1990s seems to be stable. The following reasons may explain this phenomenon. (1) The short-run Phillips curve became unstable in the 1990s, reflecting the change of expectations in the private sector, and became unstable again in a different direction from 1998 to 1999. (2) These caused unstable parameters in the explanatory variables during the 1990s and prevented rejection of the null hypothesis for the stability of the system when the parameter is equal to zero. This implies that the short-run price expectation mechanism of economic units might change drastically at least in the first half of the 1990s and from 1998 to 1999.

BOX D

Corporate Incentive to Leave Prices Unchanged

This paper presents two hypotheses to explain why prices fell only slightly compared to the output gap from 1998 to the beginning of 1999. Another explanation is that firms, at lease temporarily, set product prices against downward pressure on prices. In the past, mainly in manufacturing, economic recovery led to a reduction in fixed costs and an increase in product margins (markup) as a result of strong demand, but a recession has caused the margins to decrease. As long as the economy follows these relationships, we can discuss prices in terms of the output gap. However, during the depressed phase of the economy--from autumn of 1997 to the beginning of 1999--the rates of decline in both operating profit and adjusted profit (which adjusts capital cost), which can be considered to be proxies for corporate margins, remained relatively small despite a large expansion of the output gap (Chart D-1).[46] This tendency can be observed in industries such as manufacturing and retailing, indicating that firms facing a drop in demand from the macroeconomic perspective did not cut product prices during this period as much as they had before.

To investigate this point, the Bank of Japan conducted a survey of companies listed on the First Section of the Tokyo Stock Exchange (Chart D-2).[47] In fact, firms try to put importance on the current rate of return because of expectations of decreasing growth in product markets. As a result, there is a growing tendency among firms, through particularly manufacturers, to not cut prices as much as they did before through product differentiation. It seems that the corporate incentive to leave prices unchanged intensified temporarily as the market was not as attractive for new firms in 1998 due to the deterioration of the economy and tight financing. Hence, an aggressive pricing stance that put priority on capturing market share by cutting prices has become less important. One of the characteristic results of this survey is that to increase the rate of

[46] See Baba [1995a] [1995b], Ariga and Okusa [1996], and Fernald and Basu [1999] etc. for the argument about markup.

[47] See Research and Statistics Department, Bank of Japan [2000b] for details.

return, companies seem to set prices at the upper limit permitted by the market, taking into account the supply-demand conditions in the entire market, the behavior of rival firms and business relationships with customers (Chart D-3).

Against this background, the following factors seem to be interacting, although clear conclusions are not yet available.[48] First, firms no longer expected the market to expand as before (Chart D-4[1]). Especially, given their pessimistic expectations, it was rational for large manufacturing firms, facing monopolistic competition, to maximize profits by putting importance on the current rate of return rather than market share and to put priority on maintaining margins without cutting prices. At that time, aggressive promotion of inventory adjustments among manufacturers was a sign that they were pessimistic about future market expansion. A second characteristic of this period was that the reduction in labor and capital costs could not keep up with the pace of the decline in demand (Chart D-4[2]).[49] As a result, some firms had temporary difficulties in cutting prices.

As long as firms are conscious of global standards for corporate governance, it will be difficult for them to return to the strategy that focuses on market share instead of the rate of return. However, it is unlikely that this change in the corporate price-setting stance will keep prices from deviating from levels determined by supply-demand conditions in the long term. Also, firms seem to become optimistic to some extent about future market expansion (Chart D-4[1]). Moreover, the situation is changing, since competition has been severe in industries such as distribution due to an improvement in the fund-raising environment and the globalization of economic activity.[50]

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[48] As for each factor, if firms become much more pessimistic about market expansion in the future and think that negative growth will continue, it is rational for them to leave the market even if they have to dump their products. At that time, firms did not expect such a catastrophic situation.

[49] This can be seen in Chart D-1, which shows that operating profit rates, including capital cost in economic terms, remains at a considerably low level from the macroeconomic perspective, even if not in terms of accounting.

[50] As for the U.S., Greenspan [2000a, b] states that “the increasing availability of labor-saving

Based on these facts, the fact that prices fell only slightly compared to a substantial ease in the supply-demand conditions as seen from 1998 to 1999 should be considered a temporary phenomenon.

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equipment and software, at declining relative prices and with improving delivery lead times, is arguably at the root of the loss of business pricing power in recent years." Even in Japan, survey results conducted by our Department show that prices tend to be set by customers in nonmanufacturing industries, compared with 1996 to 1997. This tendency is now being observed in distribution industries.

BOX E

Technological Innovation and Prices

Technological innovation exerts downward pressure on prices in the short run as labor demand decreases and the potential growth rate rises through the increase in capital that correspond to new technology (see Chart E-1 for details). As the improvement in productivity of final goods such as machinery is normally large, the price decline of final goods is relatively significant, while prices of raw materials and intermediate goods are affected indirectly through the enhancement in productivity of equipment. Meanwhile, technological innovation also increases aggregate demand from the macroeconomic perspective by stimulating investment demand through the introduction of new technology as a result of competition among firms. However, aggregate demand is unlikely to increase enough to offset the decrease in prices caused by technological innovation. As a result, technological innovation leads to both a decrease in prices and an increase in income.[51]

The rise in productivity in the U.S. became distinct in the second half of the 1990s. Hence, upward pressure on prices was not exerted because of a rise in productivity from IT-triggered technological innovation even though there is strong demand and there have been discussions on this (Chart E-2). On the other hand, productivity growth rate remained low during the 1990s and an increase in the productivity growth rate has not yet been confirmed. In the U.S., distributions of the rate of return and the rate of change in prices by industry (Chart E-3) show a negative output deflator and a high rate of return in the electronics, industrial machinery, and communications industries in the second half of the 1990s. This distribution confirms an increasing number of industries that can increase productivity while prices decline as a result of technological innovation. On the other hand, in Japan, while the electronics industry has shown this tendency since the mid-1980s, other industries have not and this continues to be the case even in the late 1990s. Therefore, we can say that data do not show evidence that

[51] When technological innovation occurs only among some firms rather than all firms, it also causes a deterioration in corporate profits among existing firms without technological skills and the transfer of business resources, temporarily creating both upward and downward pressures on the economy.

technological innovation increases the number of industries that make profits while decreasing their prices even more in Japan.

Business fixed investment related to IT has recently begun to increase also in Japan. However, while IT manufacturers are increasing their fixed investment, active investment in IT among users has not yet been observed. If IT investment including those by users increases, a rise in productivity growth from technological innovation can be expected. However, even in the U.S., the remarkable growth in productivity indicators was observed for the first time only in the mid-1990s, although IT investment began at the start of the 1990s.[52] Thus, it may take time for productivity indicators to show actual growth in Japan. The next question is how technological innovation affects price indices. We present two cases. First, technological innovation decreases the prices of products. Second, the prices of new products introduced to the market remain unchanged although the quality of products improves. In the first case, we can say that the effects of technological innovation are already included in the price changes of products. In the second case, efforts are made to incorporate the actual reduction of prices into price indices because nominal prices do not change. However, since the method of adjusting quality differs according to the price index such as domestic wholesale price index, corporate service price index, and consumer price index, the extent of impact of technological innovation on each index is also different.[53]

Whichever method is adopted, it is difficult to completely account for the influence of technological innovation on prices. Moreover, the influence of technological innovation on each price index depends on how many items that reflect technological progress are incorporated into the price index.

These results imply that the extent of influence of technological innovation on prices should be captured from various aspects and allowed some latitude. These include

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[52] Such a lag in productivity growth is likely to result partly from statistical problems so that the value added of nonmanufacturing industries is not measured completely.

[53] See Research and Statistics Department, Bank of Japan [2000a] on how quality is adjusted in each

observing the developments of corporate profits and compensation of employees, focusing on the income distribution side, and measuring the reaction of prices to productivity growth from the macroeconomic perspective.

price index.

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Price Developments in Japan

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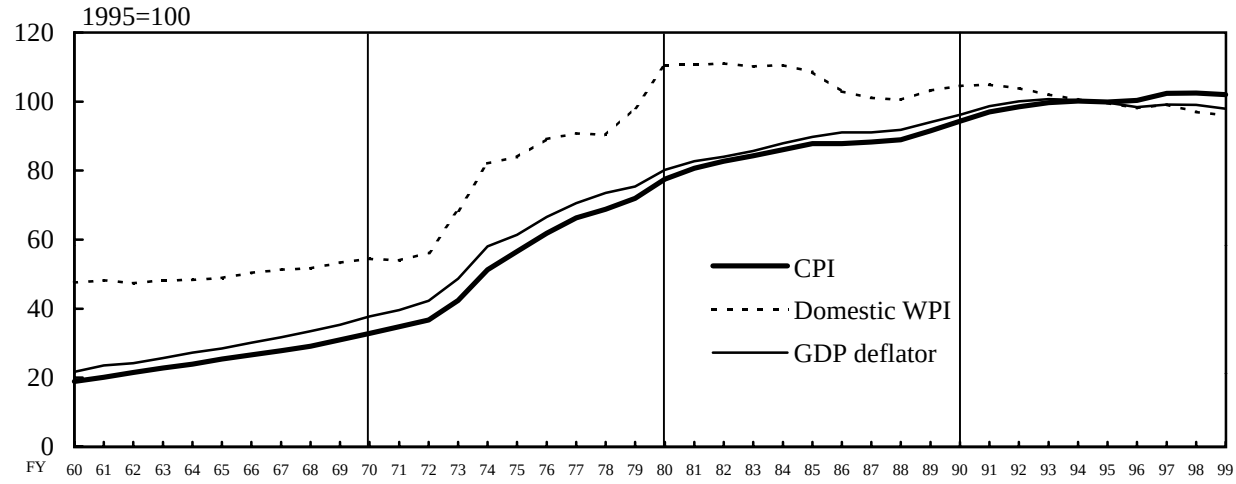
Environment Surrounding Prices (Mid-to-Long Term)

(1) Environment Surrounding Prices (in terms of each decade)

average of y/y % chg.

	FY 1960-1969	FY 1970-1979	FY1980-1989	FY 1990-1999
Consumer prices (CPI)	5.5	8.9	2.4	1.1
Domestic wholesale prices (WPI)	average from FY's 1961 to 1969 1.3	6.6	0.6	-0.7
GDP deflator	5.7	8.0	2.2	0.4
Real GDP	10.4	5.0	3.8	1.6
Crude oil prices	average from FY's 1966 to 1969 -2.2	35.2	1.2	4.7
Exchange rate (yen/US$)	0.0	-3.9	-3.9	-2.0
M_2+CDs (average amount outstanding)	18.6	16.1	9.1	3.4

(2) Price index (level)



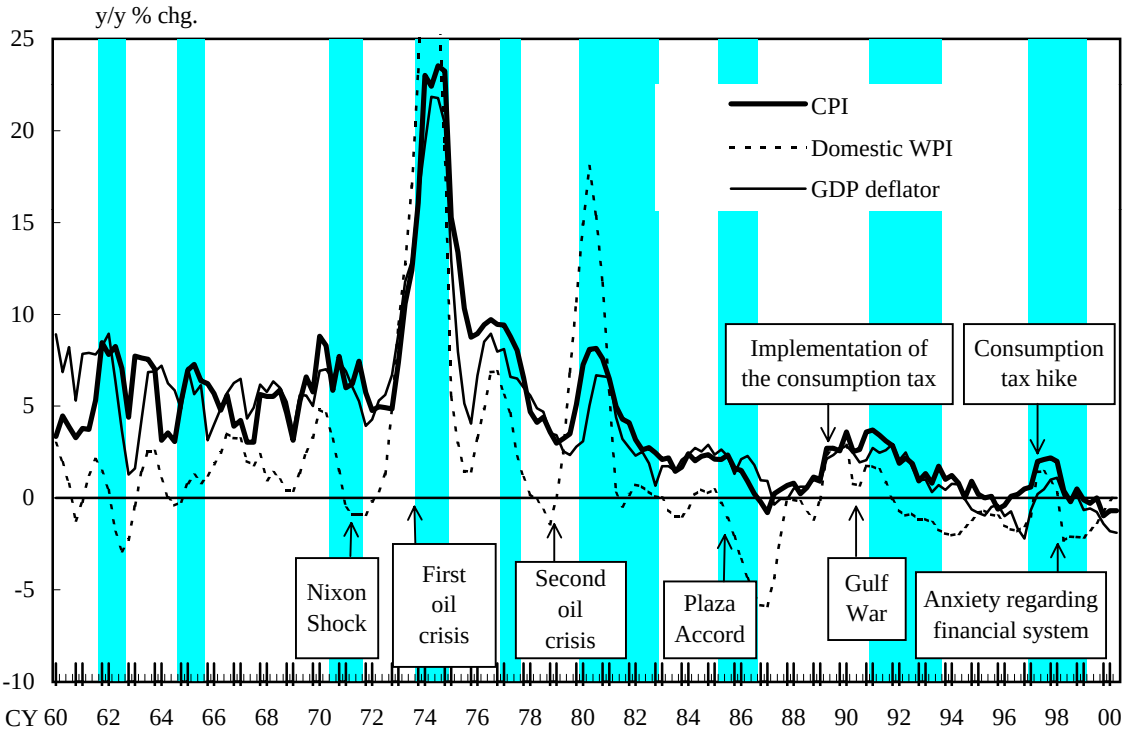
Notes: 1.(1)CPI (FY1960-1964): General, excluding imputed rent (all cities)
(2) (FY1965-1969):General, excluding imputed rent (Japan)
(3) (FY1970-):General (Japan)
2.Domestic WPI (FY1960): Prewar Base Overall Wholesale Price Indexes.
3.Crude oil prices : customs-clearance basis (U.S. dollars).
4.Exchange rate: "+" indicates yen depreciation, "-" indicates yen appreciation.
5. For money stock data, data from FY1960 - FY1967 are connected using the 3-month-average of end-of-month amount outstanding. Figures from FY 1999 are on the new basis.

Sources: Economic Planning Agency, "National Income Statistics";
Management and Coordination Agency, "Consumer Price Index";
Bank of Japan, "Wholesale Price Indexes," "Financial and Economic Statistics Monthly";
Ministry of Finance, "The Summary Report on Trade of Japan."

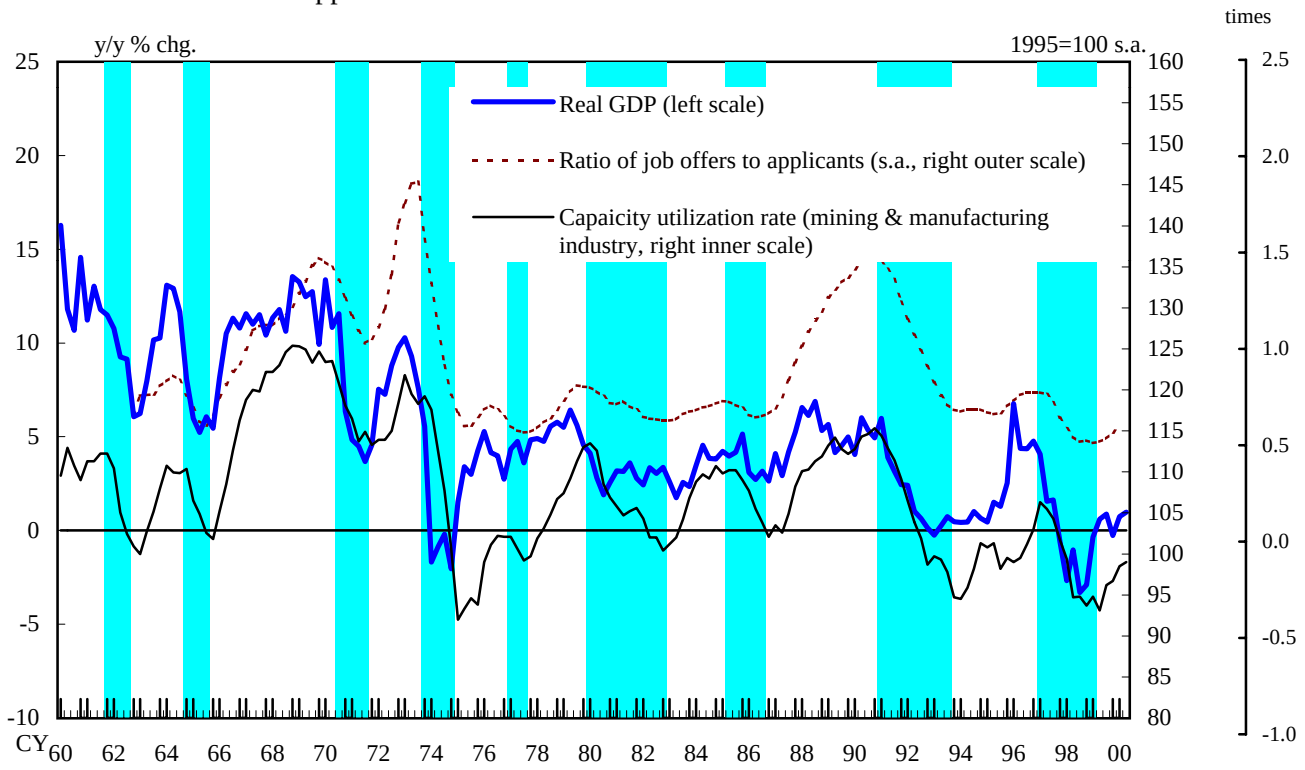
Chart 2

Price Indexes and Economic Growth Rate

(1) Prices



(2) Real GDP and Capacity Utilization Rate (mining and manufacturing industry), and Ratio of Job Offers to Applicants

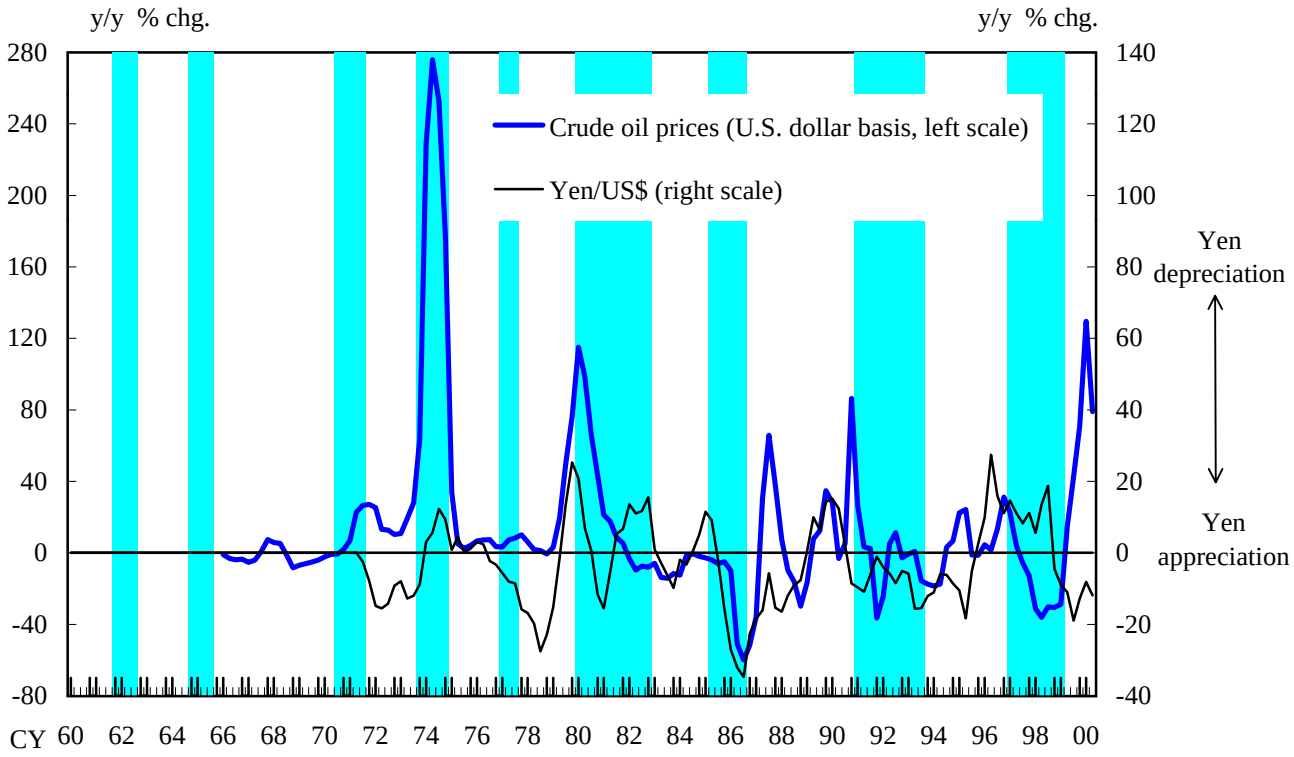


Notes: 1.Shaded areas indicate recession.
2.Domestic WPI (CY1960): Prewar Base Overall Wholesale Price Indexes.
3.(1)CPI (CY1960-1964): General, excluding imputed rent (all cities)
(2) (CY1965-1969): General, excluding imputed rent (Japan)
(3) (CY1970-): General (Japan)

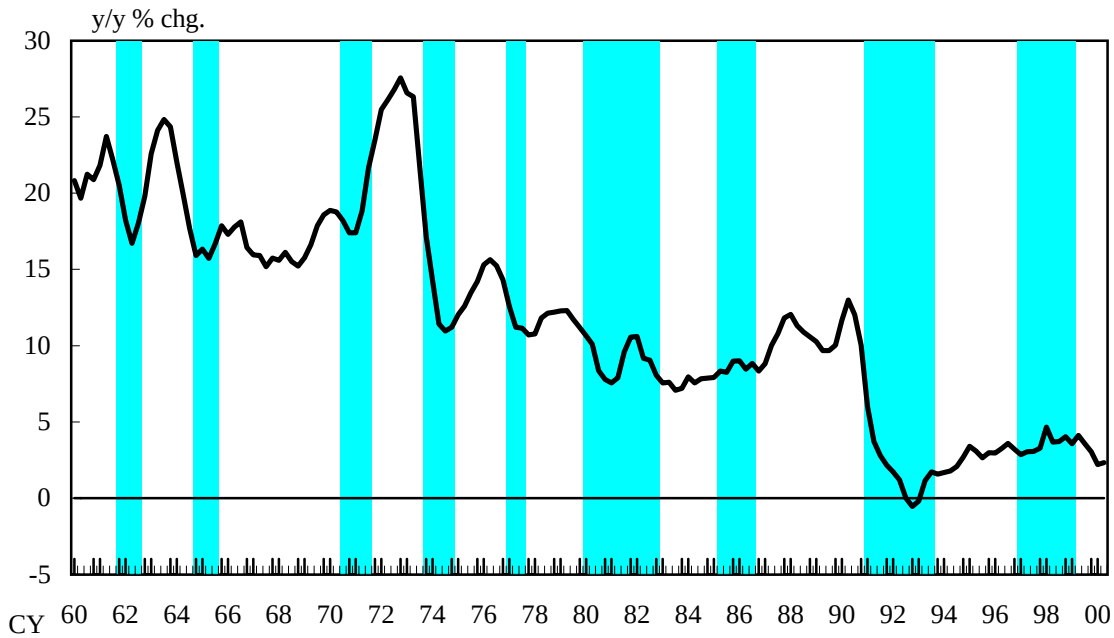
Sources: Economic Planning Agency, "National Income Statistics"; Management and Coordination Agency, "Consumer Price Index"; Ministry of Labor, "Employment Security Statistics"; Ministry of International Trade and Industry, "Indices of Industrial Production"; Bank of Japan, "Wholesale Price Indexes."

Import Prices and Money Stock

(1) Crude oil prices and the exchange rate



(2) M_2+CDs (average amount outstanding)



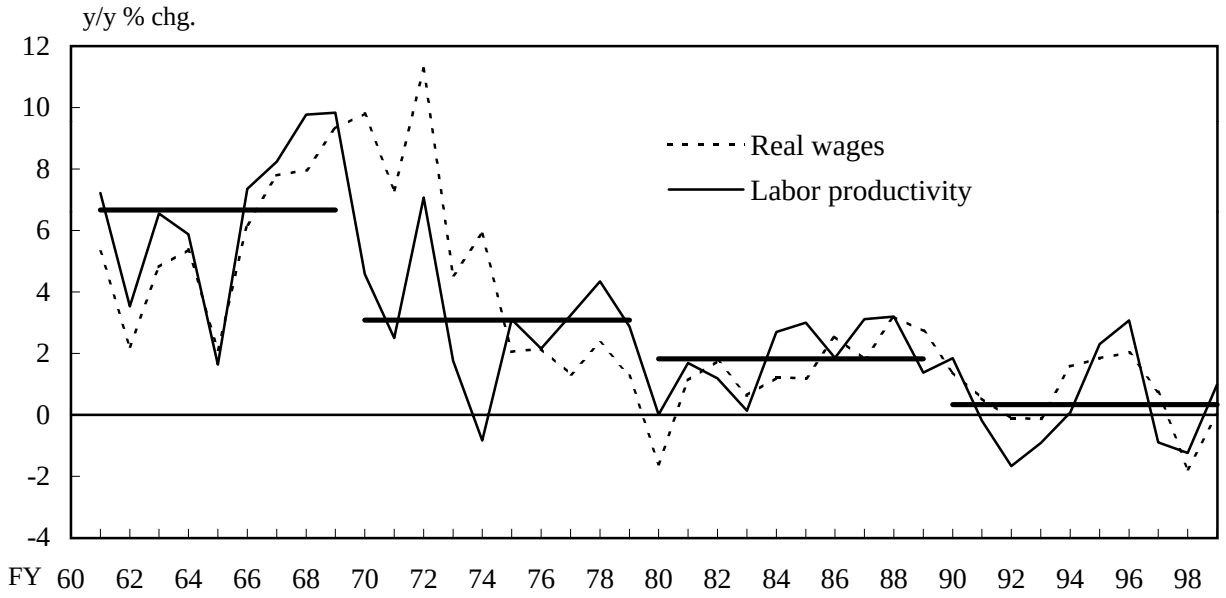
Notes 1.Shaded areas indicate recession.
2.Crude oil prices : customs-clearance basis
3. For money stock data, figures prior to 1967/Q4 are connected using the 3-month-average of end-of-month amount outstanding. Figures from 1999/Q2 are on the new basis.

Sources: Ministry of Finance, "The Summary Report on Trade of Japan";
Bank of Japan, "Financial and Economics Statistics Monthly."

Chart 4

Environment Surrounding Productivity

(1) Real wages and labor productivity



(2) Business fixed investment / capital stock (I/K ratio)

Note: Real wages
=cash earnings per capita/CPI (general, excluding imputed rent; adjusted for effects from the consumption tax)
Labor productivity=real GDP/number of employees
-Data for cash earnings per capita excludes the services industry prior to FY 1969.
-Data for the number of employees excludes Okinawa prior to FY 1973.
-The bold lines in (1) each show the 10-year-average of the year-to-year percent change of labor productivity.

Sources: Economic Planning Agency, "National Income Statistics,"
"Gross Capital Stock of Private Enterprises" ; Ministry of Labour, "Monthly Labour Survey";
Management and Coordination Agency, "Consumer Price Index," "Labour Force Survey."

The Phillips Curve and the Natural Rate of Unemployment

(Excluding the expected inflation rate)

Percentage change in nominal wages = $\alpha - \beta \times$ unemployment rate

↓

Prices = nominal wages + margin (markup principle) + import prices

↓

Inflation rate = $\alpha - \beta \times$ unemployment rate + percentage change in margin
+ percentage change in import prices

↓

Inflation rate = $\alpha' - \beta' \times$ output gap + percentage change in margin
+ percentage change in import prices

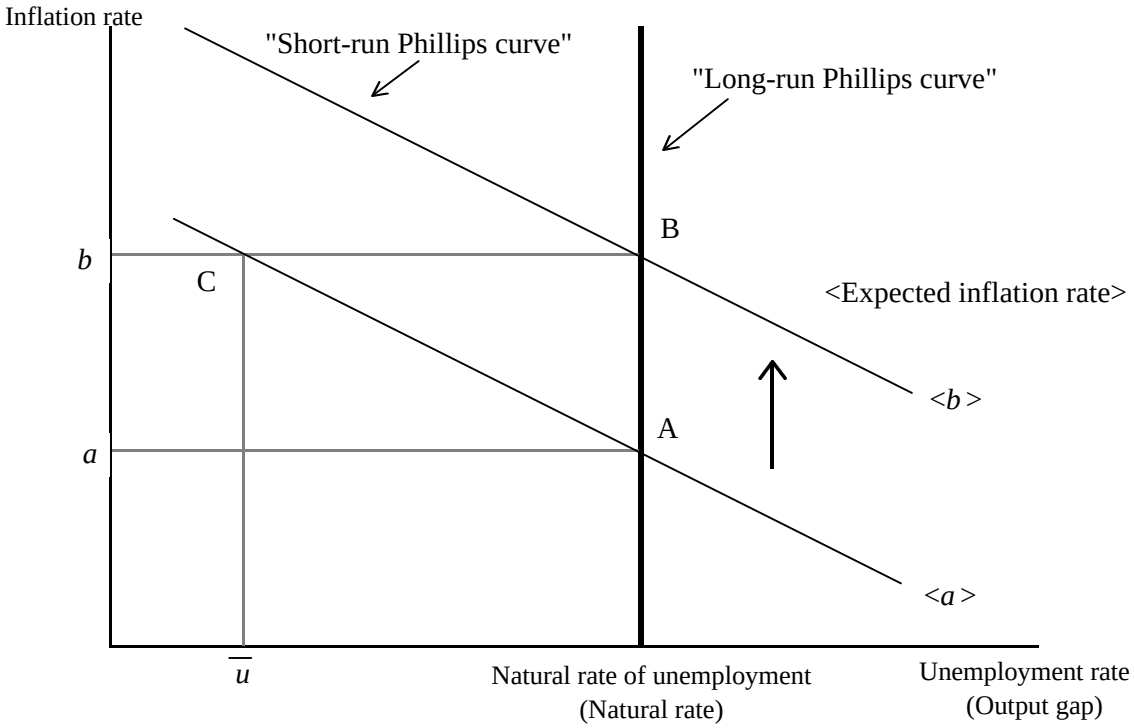
(Including the expected inflation rate)

Inflation rate = expected inflation rate + $\beta \times$ (natural rate of unemployment - unemployment rate) + percentage change in margin + percentage change in import prices

Inflation rate = expected inflation rate + $\beta' \times$ (natural rate - output gap) + percentage change in margin + percentage change in import prices

When inflation rate = expected inflation rate, under the assumption of constant exogenous variable

unemployment rate = natural rate of unemployment
(output gap) (natural rate)



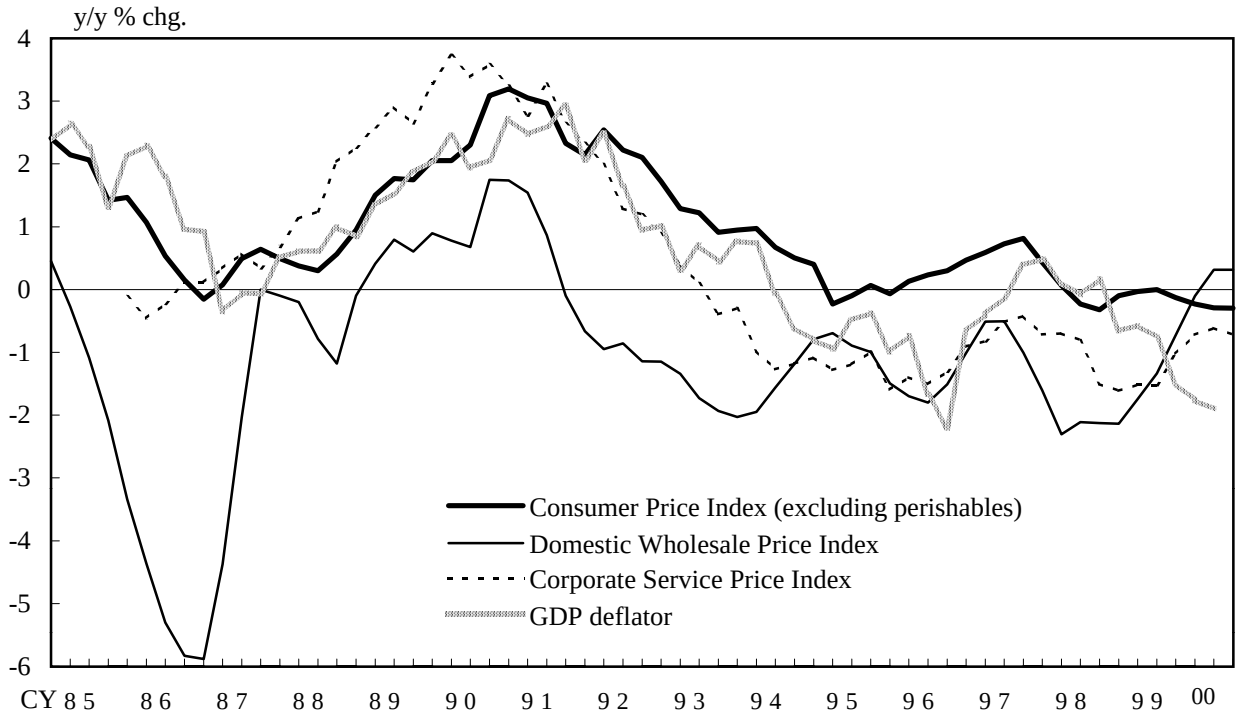
Reference:

* Under expected inflation rate *a* , the unemployment rate decreases (contraction of the output gap), and the inflation rate rises A➔C when an accommodative monetary policy is implemented.
* When expected inflation shifts from *a* ➔ *b* along with economic stimulus, the unemployment rate remains unchanged (the output gap unchanged), and the inflation rate rises<A ➔B>.

Note: Here, the output gap is the gap between the actual GDP and the potential GDP when capital and labor are fully utilized. In this case, the level of the output gap corresponding to the natural rate of unemployment is constant but not zero (natural rate).

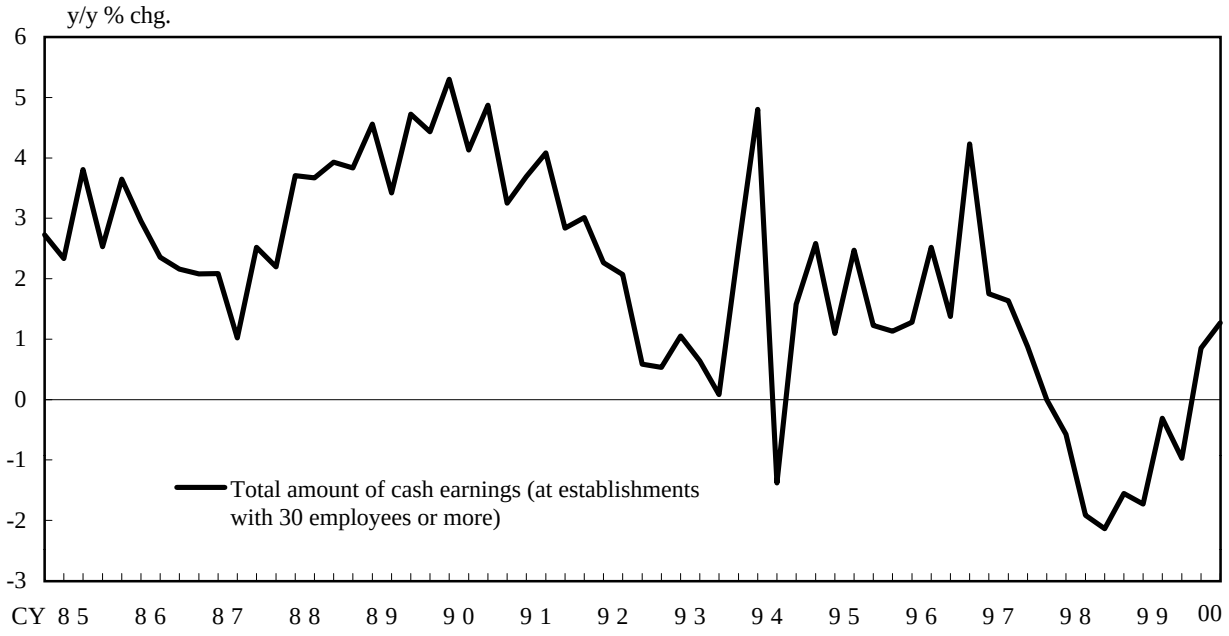
Chart 6

Various Price Indexes



Notes: 1. Adjustments for the effects of the consumption tax of April 1989 are made using the level-shift dummy of X-12-ARIMA and consumption tax hike of April 1997 use the theoretical value on the assumption that prices of all taxable goods fully reflect the rise in the tax rate. (However, the GDP deflator is adjusted using the level-shift dummy for both April 1989 and April 1997.)
2. Data for CPI, Domestic WPI, and CSPI of 2000/3Q are those of July.

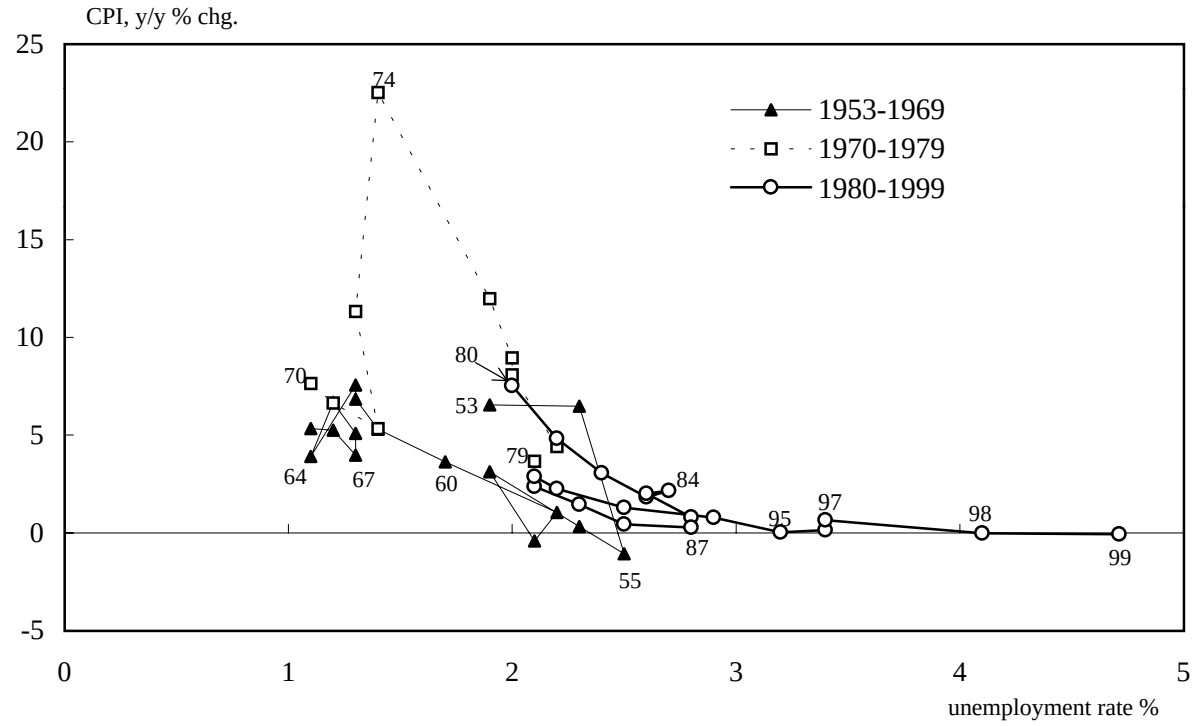
Reference: Nominal wages (total amount of cash earnings)



Sources: Management and Coordination Agency, "Consumer Price Index";
Bank of Japan, "Wholesale Price Indexes"; Economic Planning Agency, "National Income Statistics";
Ministry of Labour, "Monthly Labour Survey."

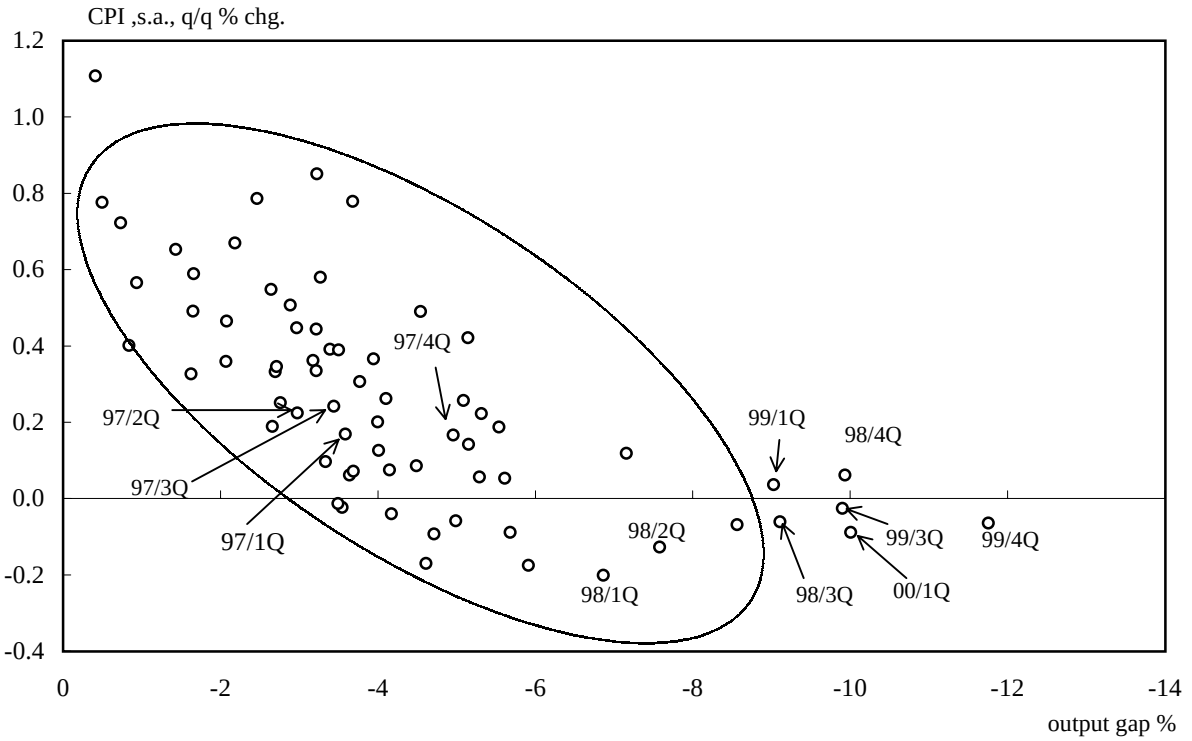
Supply-Demand Gap and Prices

(1) Phillips curve of the labor market



Note: General CPI 1953-1970 = excluding inputed rent
1971-1999 = excluding perishables (adjusted for effects from consumption tax)

(2) Output gap and inflation rate

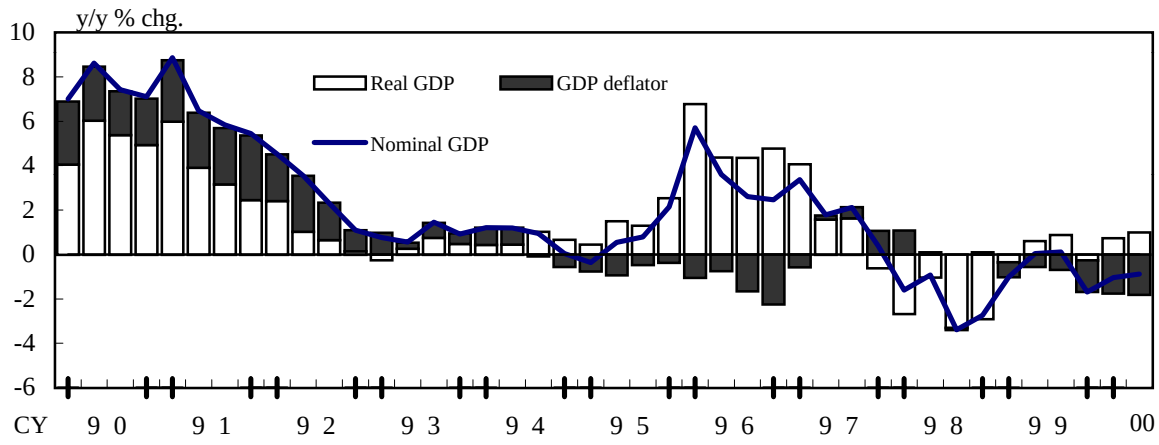


Notes: 1. Period : 1983/2Q - 2000/1Q
2. Output gap = classical output gap by fixing the capacity utilization rate of nonmanufacturers (estimated by the Research and Statistics Department, Bank of Japan)
3. CPI = General, excluding perishables (adjusted for effects from consumption tax)

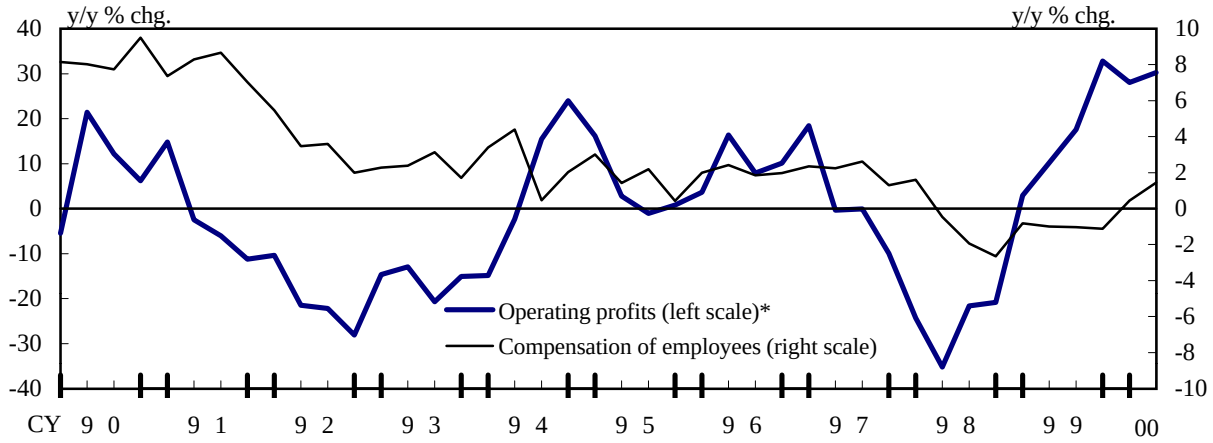
Sources: Management and Coordination Agency, "Consumer Price Index," "Labour Force Survey."

Nominal GDP and Profit / Employment

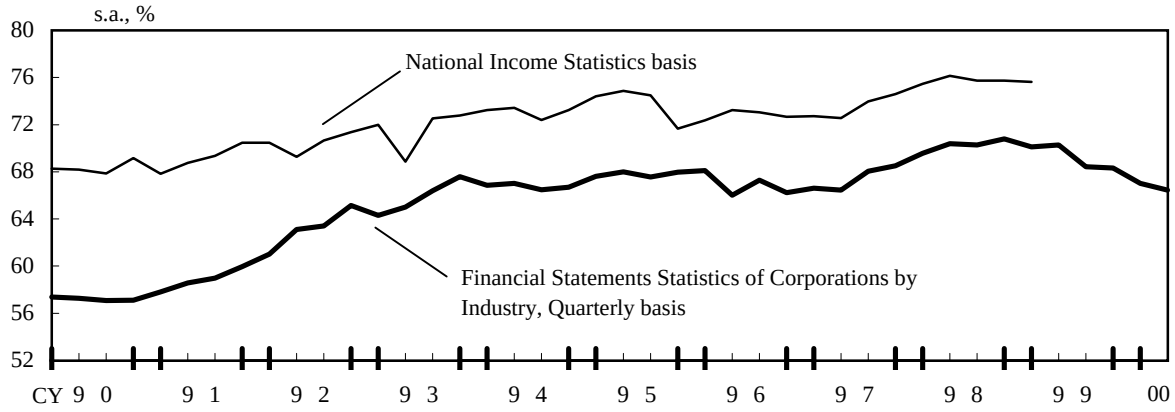
(1) Nominal GDP



(2) Operating profits and compensation of employees



(3) Labor share



Notes:* Operating profits; *Financial Statements Statistics of Corporations by Industry, Quarterly* basis

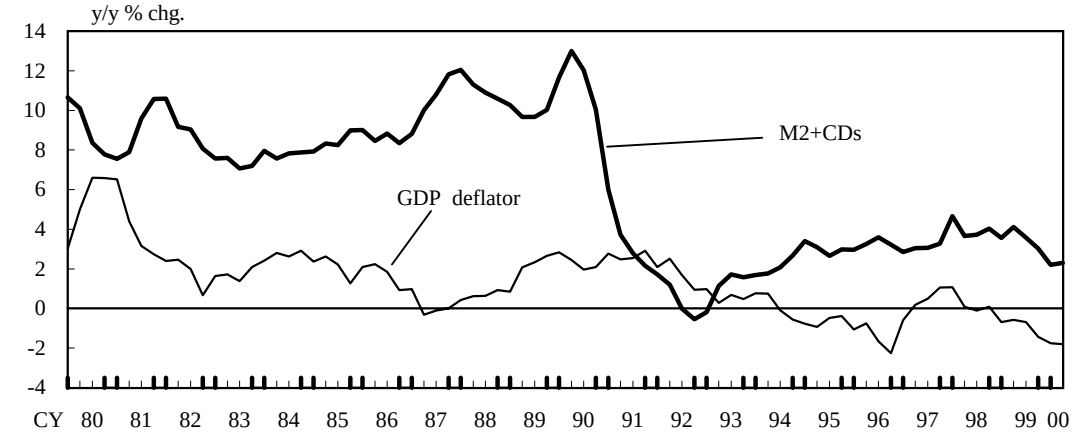
1. Figures of the *Financial Statements Statistics of Corporations by Industry, Quarterly* are based on all industries of all scales (excluding large firms in medical and other services which include holding companies). Adjusted for discontinuity of data.
2. From 1999/1Q, data for compensation of employees are based on quarterly estimates.
3. Labor Share (*National Income Statistics* basis) =
   Compensation of Employees / (Compensation of Employees + Operating Profits) × 100
4. Labor Share (*Financial Statements Statistics of Corporations by Industry, Quarterly* basis) =
   Personnel Expenses / (Personnel Expenses+Current Profits+Interest expense paid+Depreciation) × 100

Sources: Economic Planning Agency, "National Accounts";
Ministry of Finance, "Financial Statements Statistics of Corporations by Industry, Quarterly."

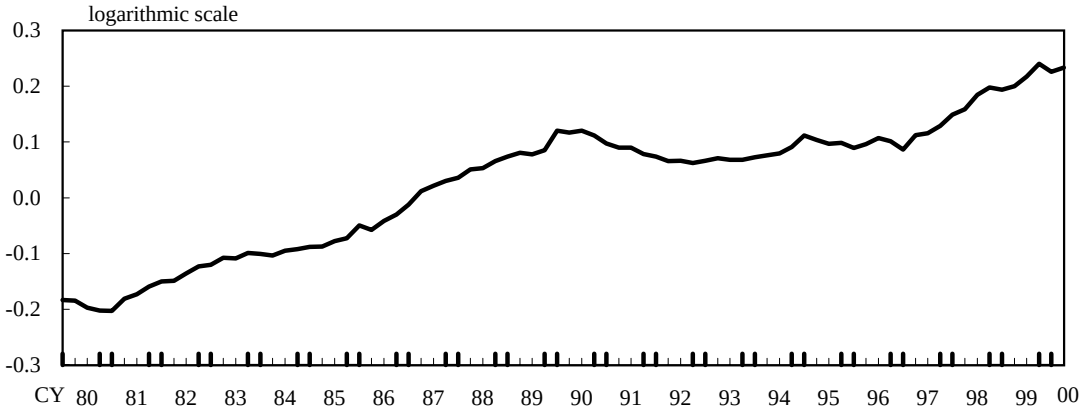
Money Stock, Prices, and GDP

(1) M_2+CDs, Nominal GDP

(2) M_2+CDs, GDP deflator



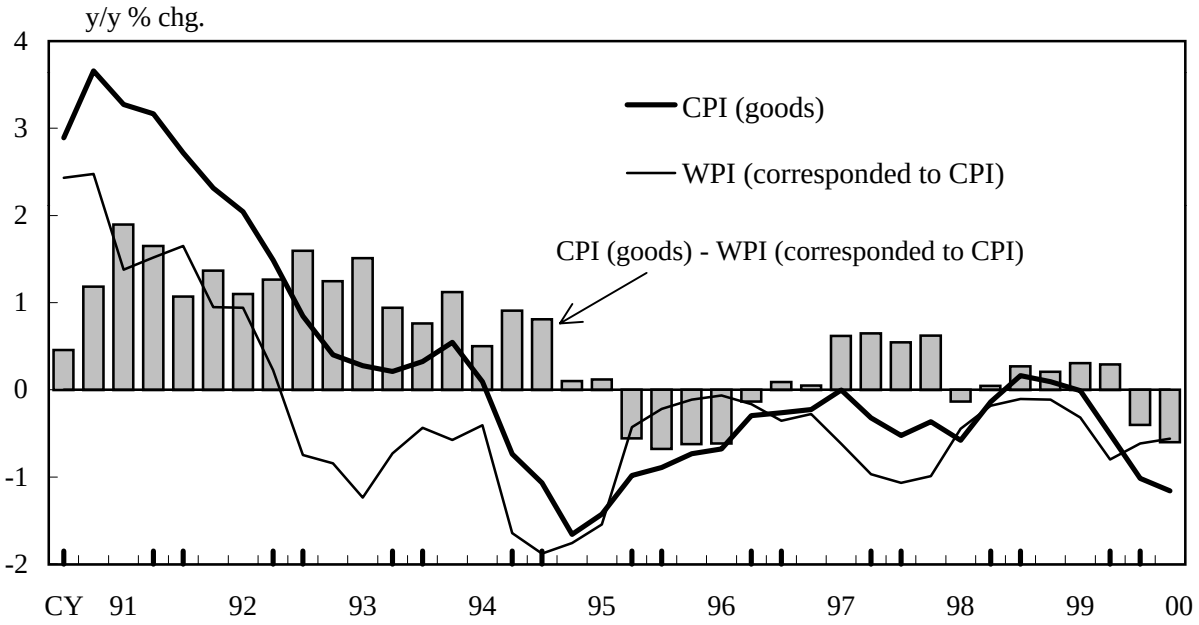
(3) Marshallian K (M_2+CDs/Nominal GDP)



Sources: Economic Planning Agency, "National Accounts";
Bank of Japan, "Financial and Economic Statistics Monthly."

Chart 10

CPI (goods) and WPI (corresponded to CPI)

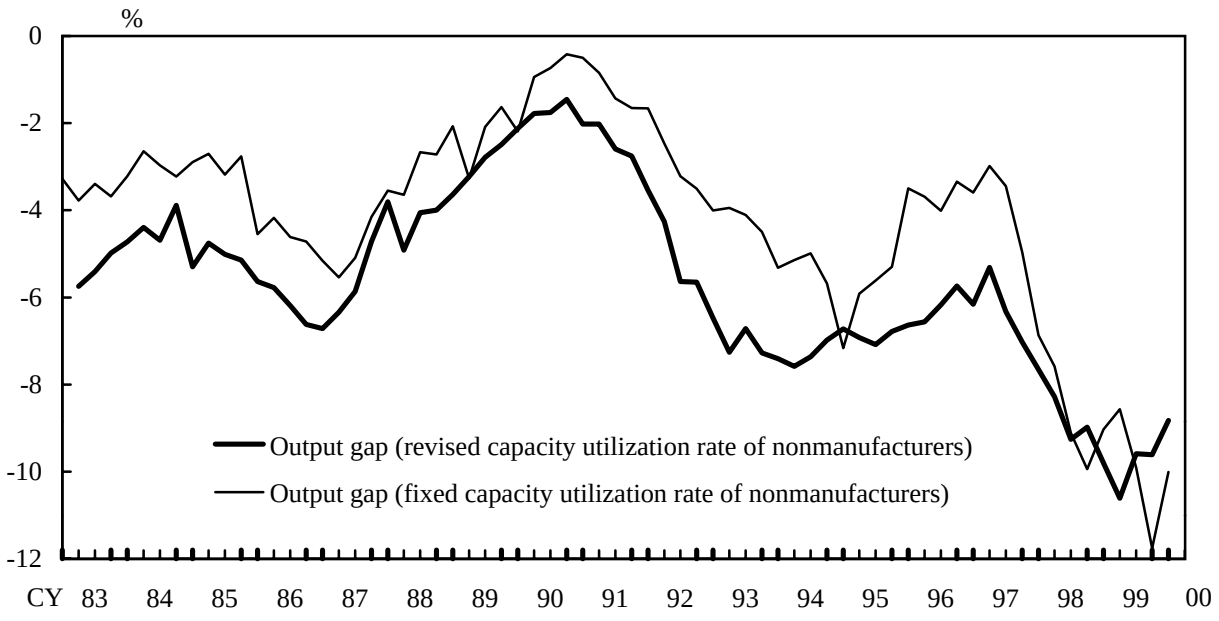


Notes: 1. WPI (corresponded to CPI) = items in WPI that correspond to items included in CPI (goods) are weighted average based on CPI weights.
2. Goods exclude perishables, electricity, gas, and water charges, and petroleum products.
3. Adjusted to exclude the effects of the consumption tax hike in April 1997.

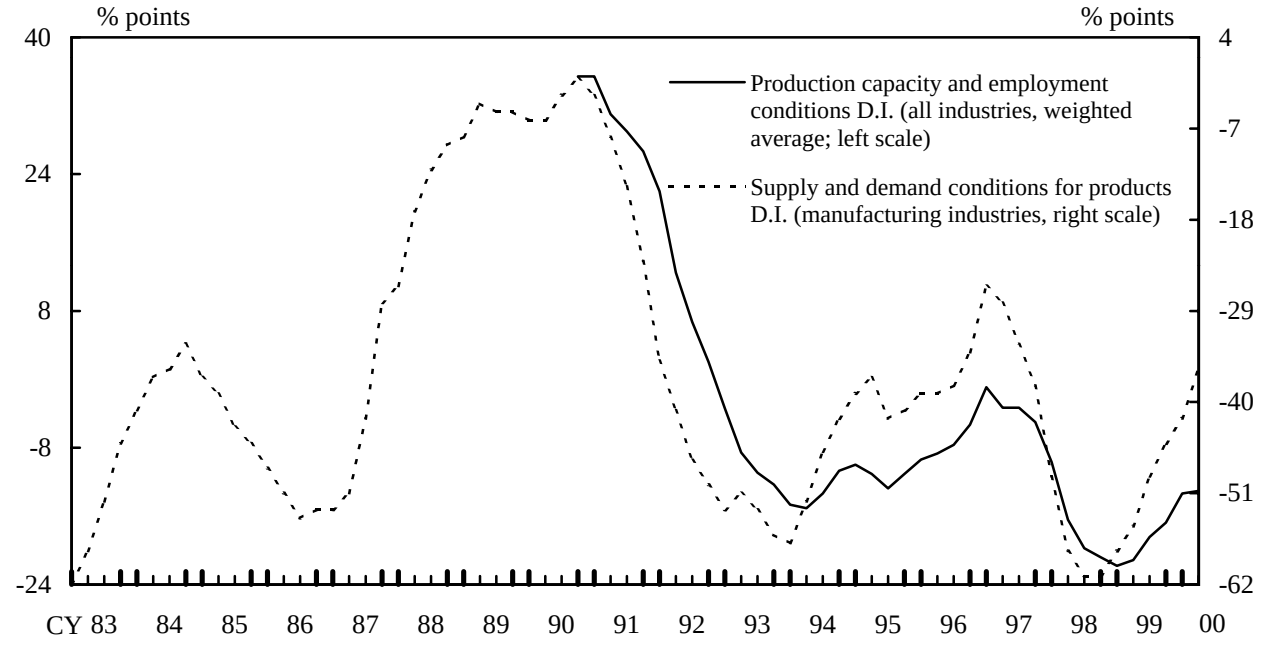
Sources: Bank of Japan, "Wholesale Price Indexes";
Management and Coordination Agency, "Consumer Price Index."

Supply-Demand Gap

(1) Output gap



(2) Supply-demand gap indicators (from the *Short-Term Economic Survey of All Enterprises in Japan*)



Sources: Ministry of Finance, "Business Outlook Survey of the Ministry of Finance";
Economic Planning Agency, "National Accounts," "Capital Stock of Private Enterprises," etc.;
The Federation of Electric Power Companies Japan, "Electricity Demand";
Bank of Japan, "Short-term Economic Survey of Enterprises in Japan."

Estimation of the Phillips Curve Using the Output Gap

Estimation

$$\pi_t = \mu + \beta * \pi_{t-1} + \lambda * GAP_t + \delta * WPIIM_t$$

Estimation period : 1983/3Q-1999/4Q

π_t : quarter-to-quarter trend cycle of the CPI (annualized)

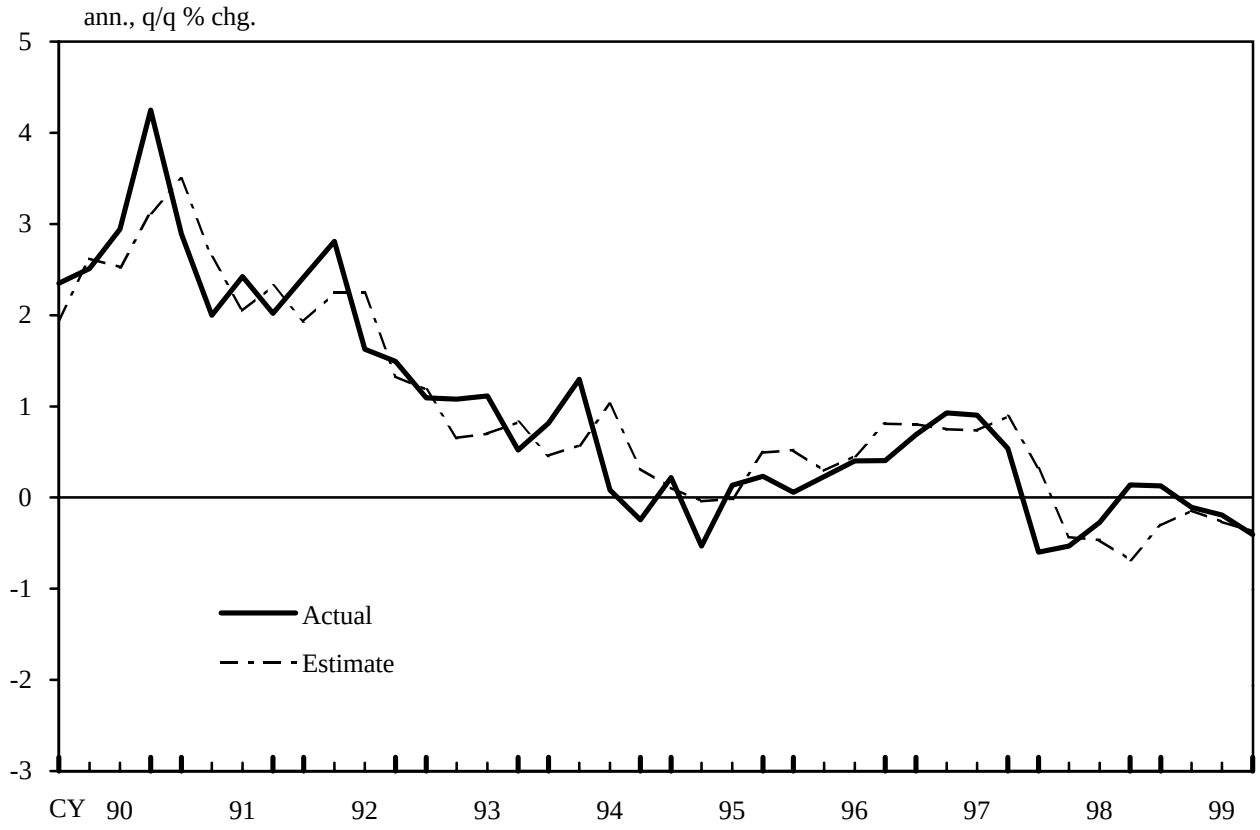
GAP_t : output gap (revised version incorporating the capacity utilization rate of nonmanufacturers)

$WPIIMt$: import prices (wholesale prices, yen basis, total average); q/q % chg. (annualized)

Estimation result

μ	β	λ	δ	Adj-R^2	Durbin's h
1.172	0.672	0.143	0.010	0.801	0.596
(3.89)	(8.19)	(3.52)	(3.38)		

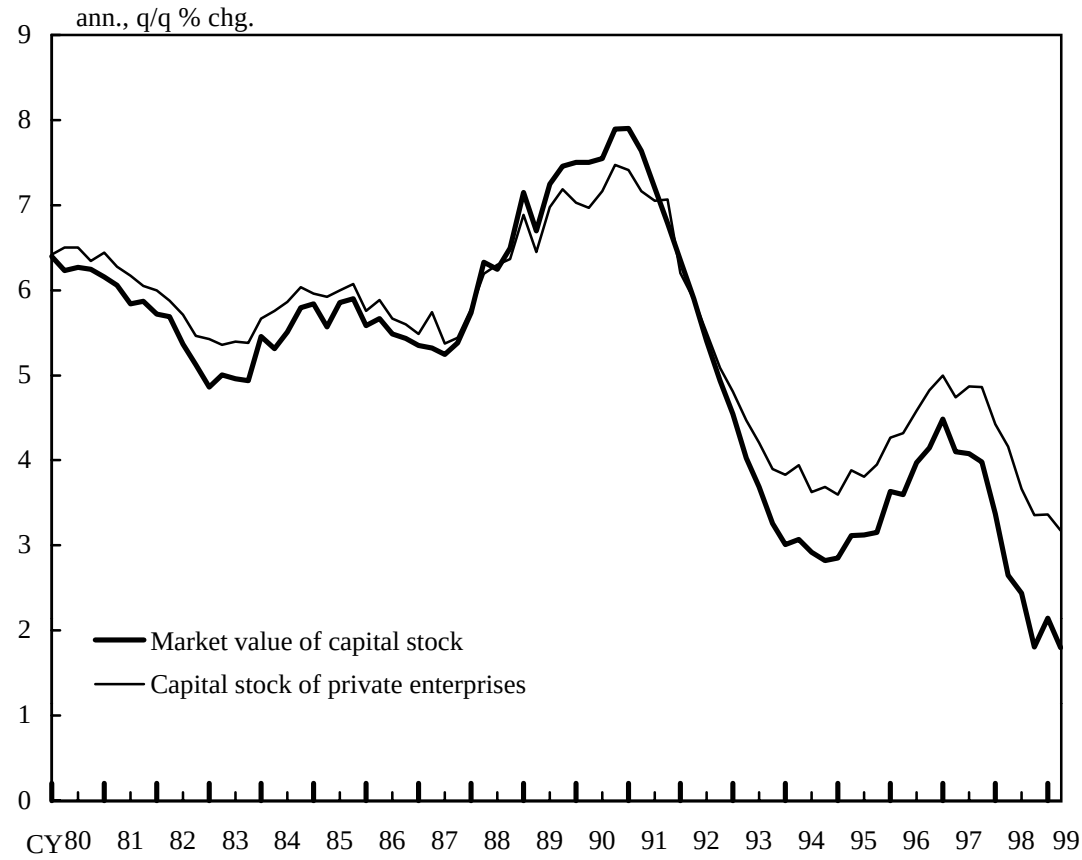
Note: figures in brackets are t-value.



Sources: Economic Planning Agency, "National Accounts,"
"Gross Capital Stock of Private Enterprises," etc.;
Management and Coordination Agency, "Consumer Price Index";
Bank of Japan, "Wholesale Price Indexes."

Chart 13

Capital Stock Growth Rate

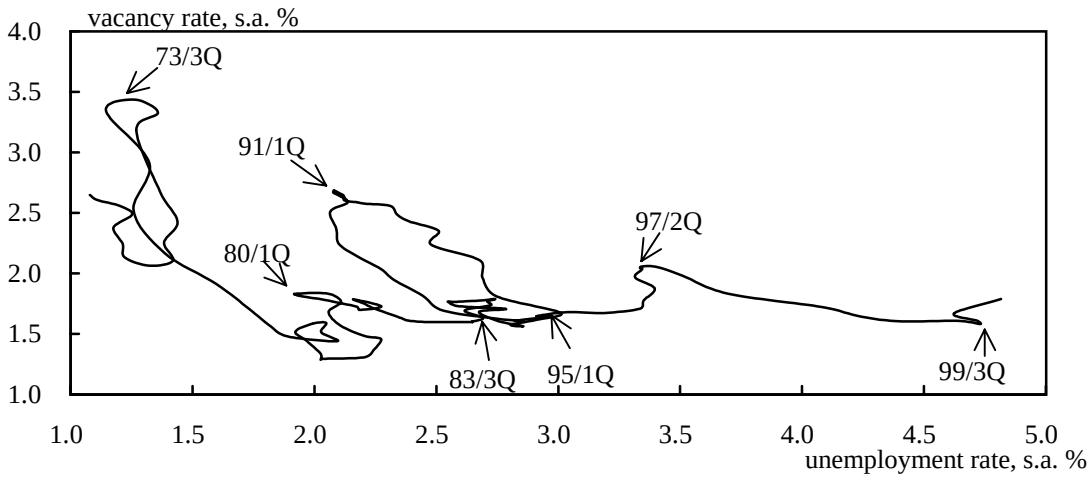


Notes: Market value of capital stock = capital stock reflecting the extent of capital consumption evaluated in terms of the market value using the capital consumption ratio extracted from second-hand prices.

Sources: Economic Planning Agency, "Gross Capital Stock of Private Enterprises," "National Wealth Survey"; Masuda (2000), "*Shihon sutokku toukei no mikata- shijou hyouka shihon sutokku no shisan* (A View on Capital Stock Statistics, available in Japanese only)," Research and Statistics Department, Bank of Japan, *Working Paper Series 00-5*, February 2000.

Beveridge Curve

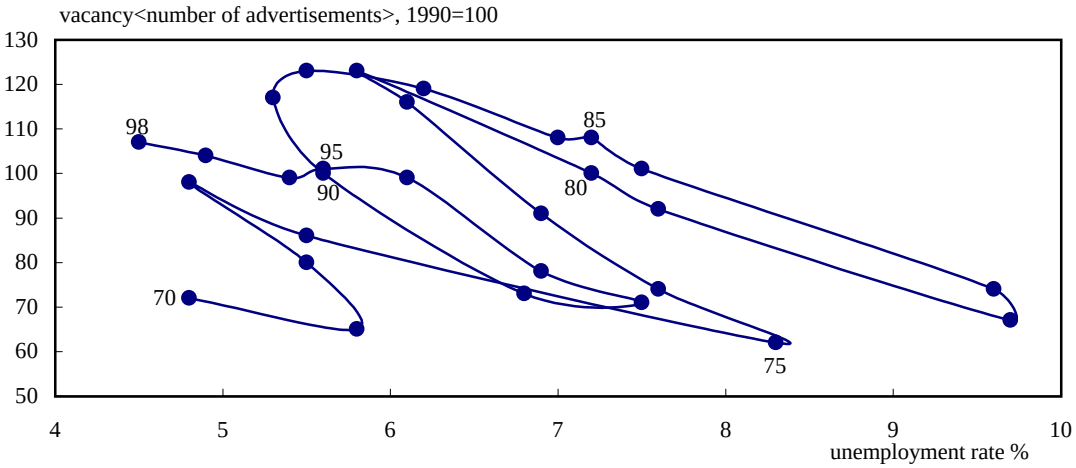
(1) Beveridge curve (Japan)



Notes 1. Period: 1970/1Q-2000/1Q

2. Vacancy rate = 100 × (number of job offers - number of placements)/
(number of job offers - number of placements + number of workers employed)

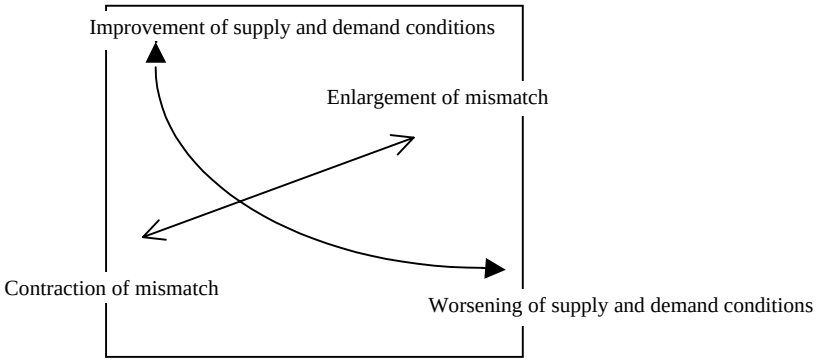
(2) Beveridge curve (U.S.)



Notes 1. Period: CY1970-CY1998

2. Unemployment rate is the "standardized unemployment rate"(compiled by the OECD).

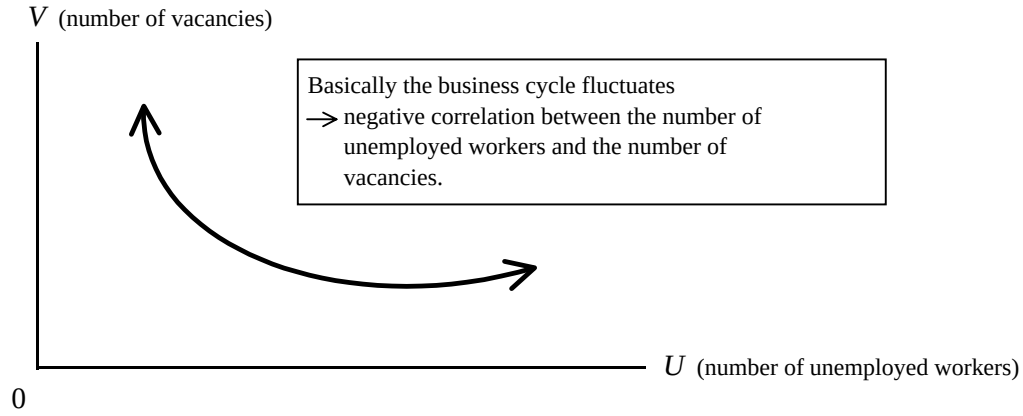
Reference: Beveridge curve



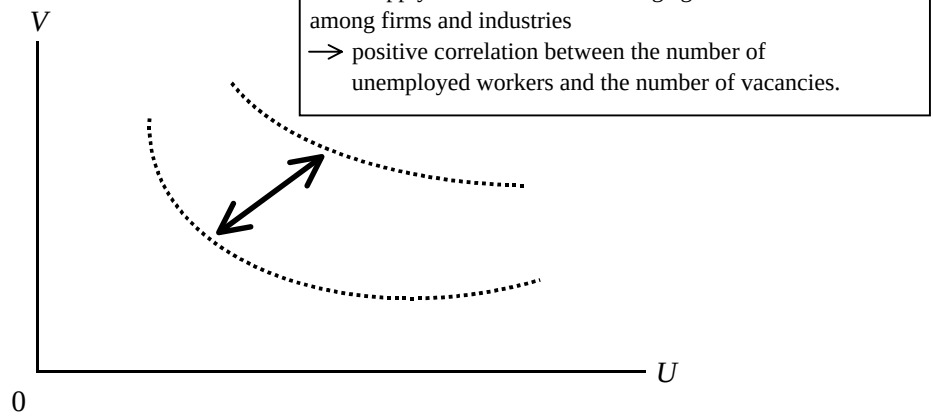
Sources: Management and Coordination Agency, "Labour Force Survey";
Ministry of Labour, "Report on Employment Service," "White Paper on Labour 1999."

Shocks (by type) to the Labor Market

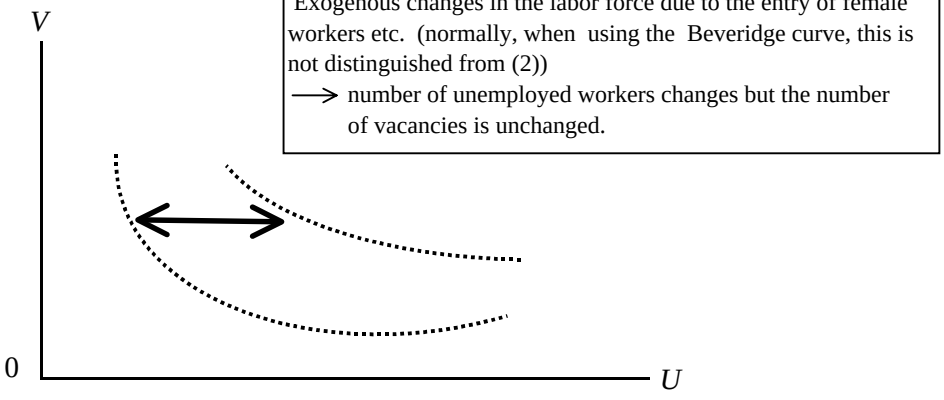
(1) Shocks from macroeconomic activities



(2) Shocks from redistribution



(3) Shocks from labor force



(4)Deterministic trend (Long-run Hysteresis)

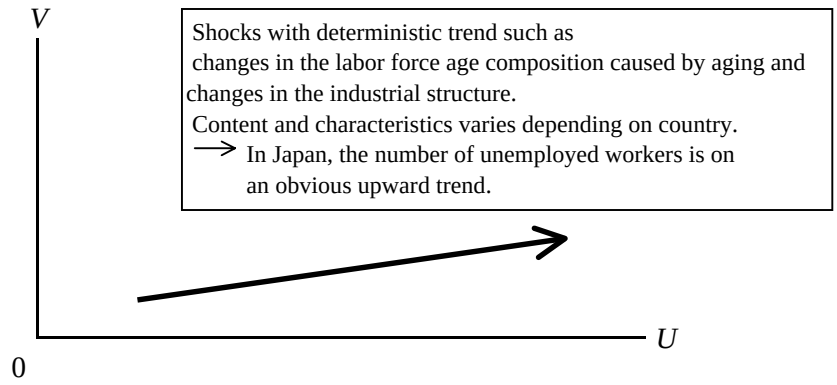
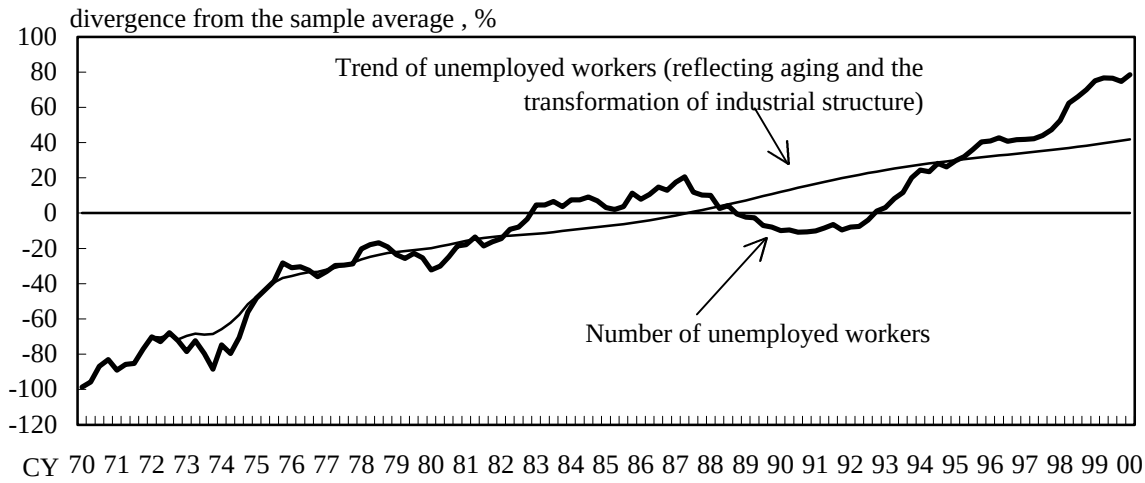


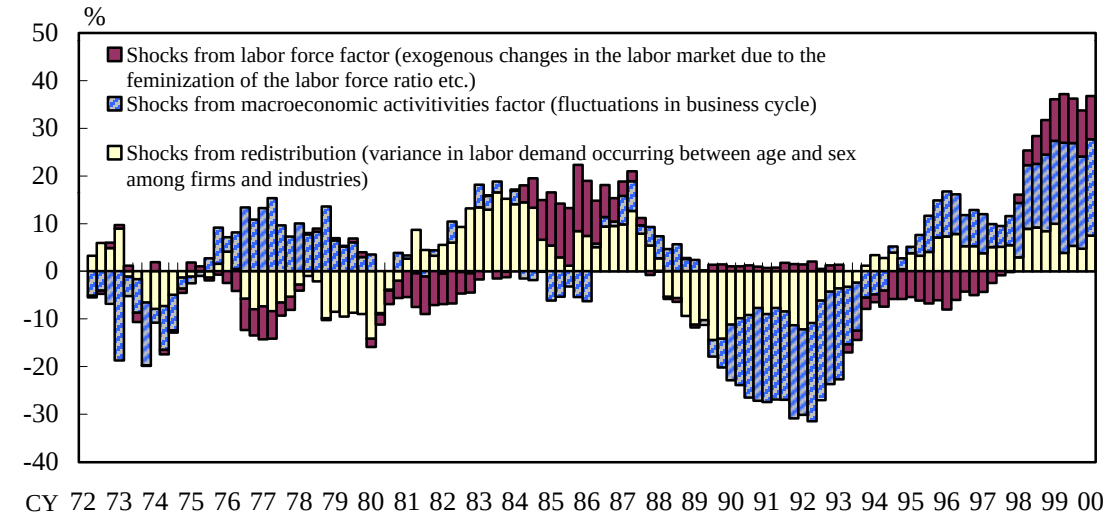
Chart 16

Breakdown of Changes in the Number of Unemployed Workers

(1) Standardized number of unemployed workers and the trend



(2) Breakdown of divergence of unemployed workers from the trend



Notes: 1. In order to simplify the analysis, the numbers of unemployed workers, employed workers, and vacancies are standardized by dividing them with the sample average and by taking the natural logarithm.

2. The breakdown method is:

(1) The reduced form VAR of the standardized numbers of unemployed workers, vacancies, and employed workers using the method in note 1 is estimated. The answer obtained is the deterministic trend (long-run hysteresis) reflecting aging and the transformation of the industrial structure.

(2) The random shock to the labor market is divided into three types:

Shocks from macroeconomic activities<negative correlation between the number of unemployed workers and the number of vacancies>

Shocks from redistribution<positive correlation between the number of unemployed workers and the number of vacancies>

Shocks from the labor force<number of unemployed workers changes but the number of vacancies is unchanged>

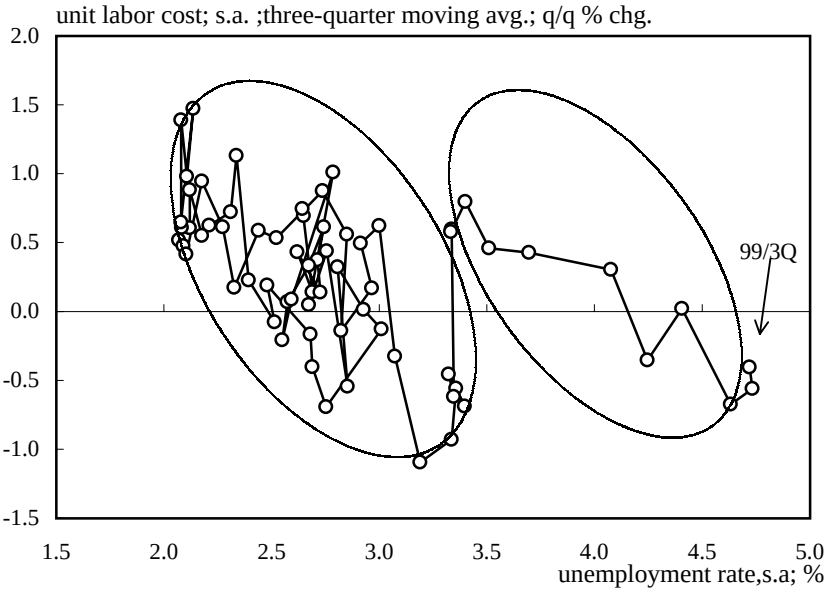
By using the divergence (residual) from the trend obtained in (1), the following two constraints are added: "each shock satisfies the characteristics in the square brackets and does not correlate to each other", and "the unemployment rate and the vacancy rate both move in the same direction from the redistribution shock for at least nine months." Then each shock is broken down.

(3) Assume each shock as 0 and obtain the divergence between the actual value and the value calculated from the assumption. The divergence gap is the contribution to each shock.

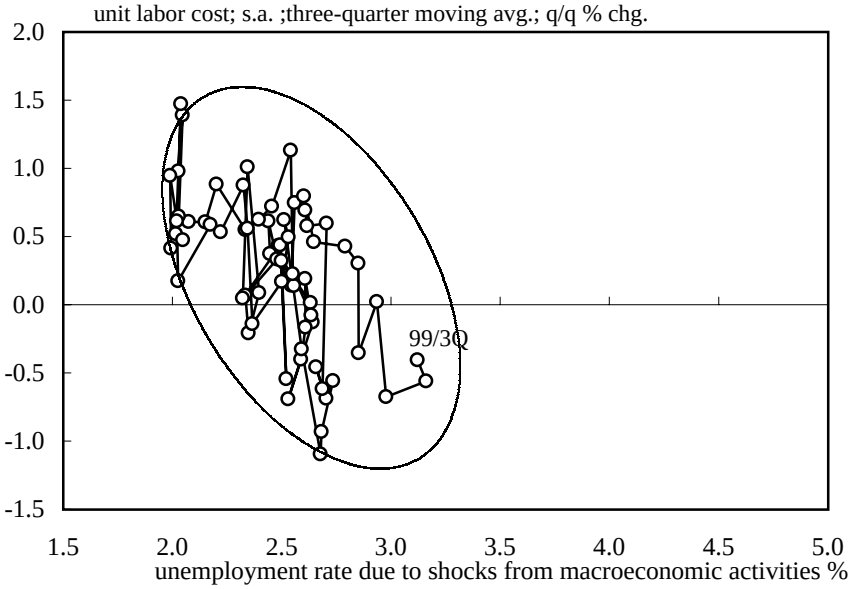
Sources: Management and Coordination Agency, "Labor Force Survey"; Ministry of Labor, "Report on Employment Service"; Nishizaki (2000) "*Waga kuni no bebarijji kyokusen ni tsuite* (The Beveridge Curve in Japan)," Research and Statistics Department, Bank of Japan Working Paper Series, Forthcoming.

Relationship between Unemployment Rate and Wages (Unit Labor Cost)

(1) Relationship between unemployment rate and unit labor cost



(2) Relationship between unemployment rate and unit labor cost due to shocks from macroeconomic activities



Notes: 1. Unit labor cost = compensation of employees / real GDP
2. Unemployment rate due to shocks from macroeconomic activities
= number of unemployed workers due to shocks from macroeconomic activities / number of employed workers due to shocks from macroeconomic activities.
3. The numbers of unemployed workers and employed workers due to shocks from macroeconomic activities are calculated by using the method in note 2 of Chart 16 and converting the contribution to macroeconomic activities into the number of people.
4. Period: 1983/1Q-1999/3Q.

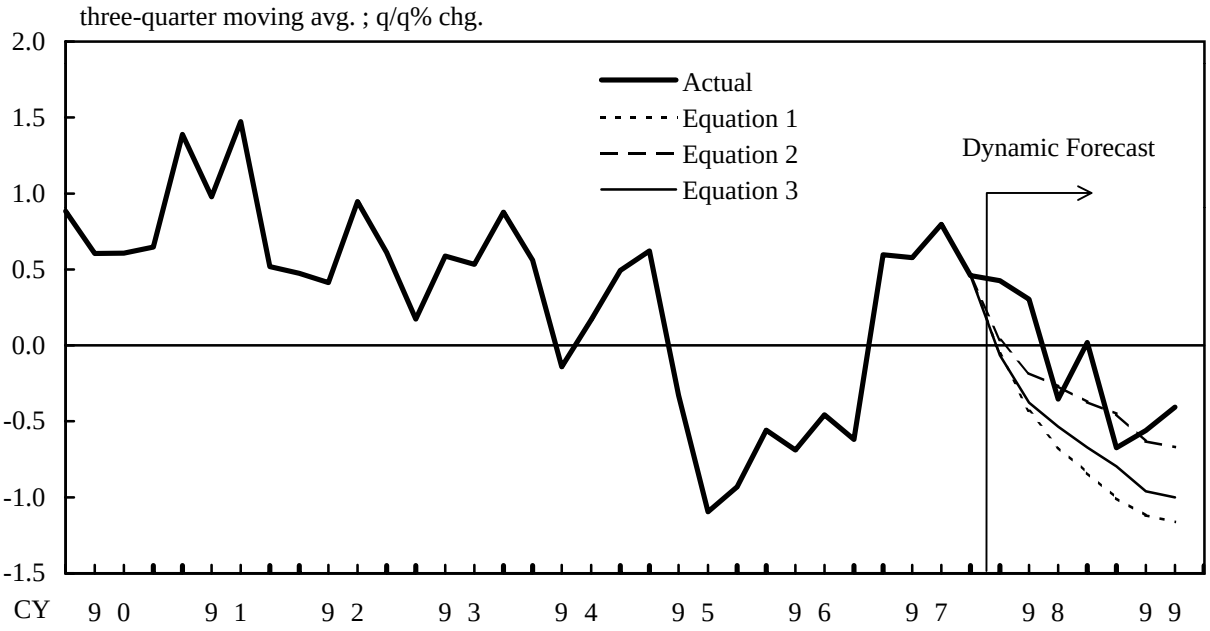
Sources: Management and Coordination Agency, "Labor Force Survey,"; Ministry of Labor, "Report on Employment Service"; Economic Planning Agency, "National Income Statistics"; Nishizaki (2000) "*Waga kuni no bebarijji kyokusen ni tsuite* (The Beveridge Curve in Japan)," Research and Statistics Department, Bank of Japan, Working Paper Series, forthcoming.

Wage (ULC) Function Using the Unemployment Rate

Dependent variable: Unit labor cost three-quarter moving average, quarter-to-quarter change <seasonally adjusted> (π_w)

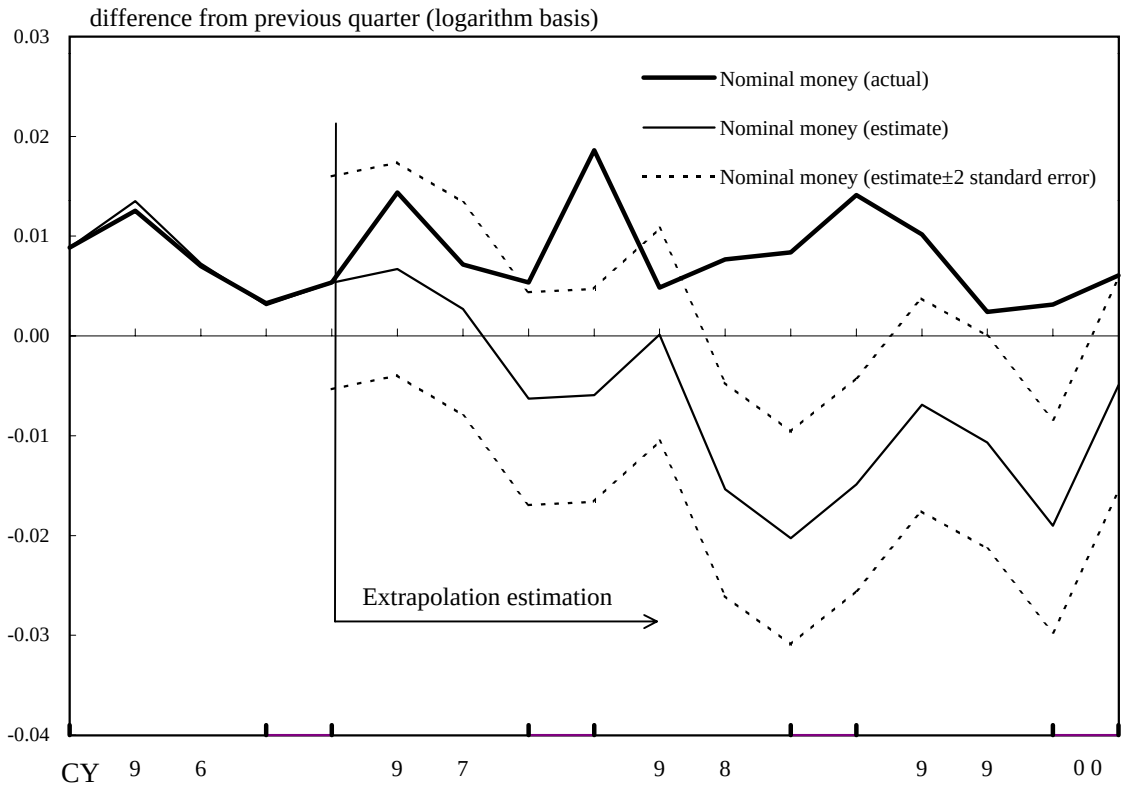
	constant term	$\pi_w(-1)$	u	u_d	u_o	Adj.R^2	Durbin's h
Equation 1	0.84	0.47	-0.25			0.45	-0.76
	(3.07)	(4.46)	(-2.86)				
Equation 2	1.93	0.40		-0.72		0.46	-0.23
	(3.23)	(3.46)		(-3.12)			
Equation 3	1.71	0.41		-0.62	-0.08	0.45	-0.47
	(2.28)	(3.47)		(-2.01)	(-0.48)		

Notes: 1. Estimation period:1983/3Q-1999/3Q
2. Figures in parentheses are t-value.
3. Definitions and signs indicate as follows (seasonally adjusted):
Unit labor cost=compensation of employees/real GDP
U=unemployment rate
U_d=unemployment rate due to shocks from macroeconomic activities (see notes in Chart 16)
U_o=unemployment rate - unemployment rate due to shocks from macroeconomic activities
(reflecting the "trend," "shocks from redistribution," and "shocks from the labor force" in notes to Chart 16)



Note: The final quarter of estimation is 1997/Q4.
Source: Nishizaki (2000), "*Waga kuni no bebarijji kyokusen ni tsuite* (The Beveridge Curve in Japan)," Research and Statistics Department, Bank of Japan, *Working Paper Series* , forthcoming.

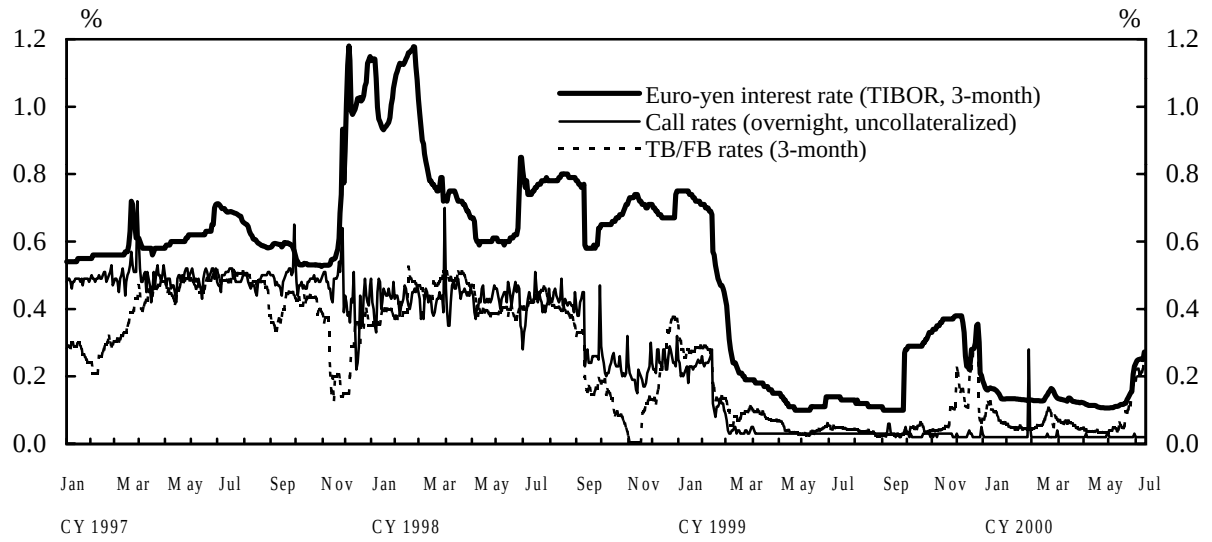
Projections on Money Using Five Variables VECM



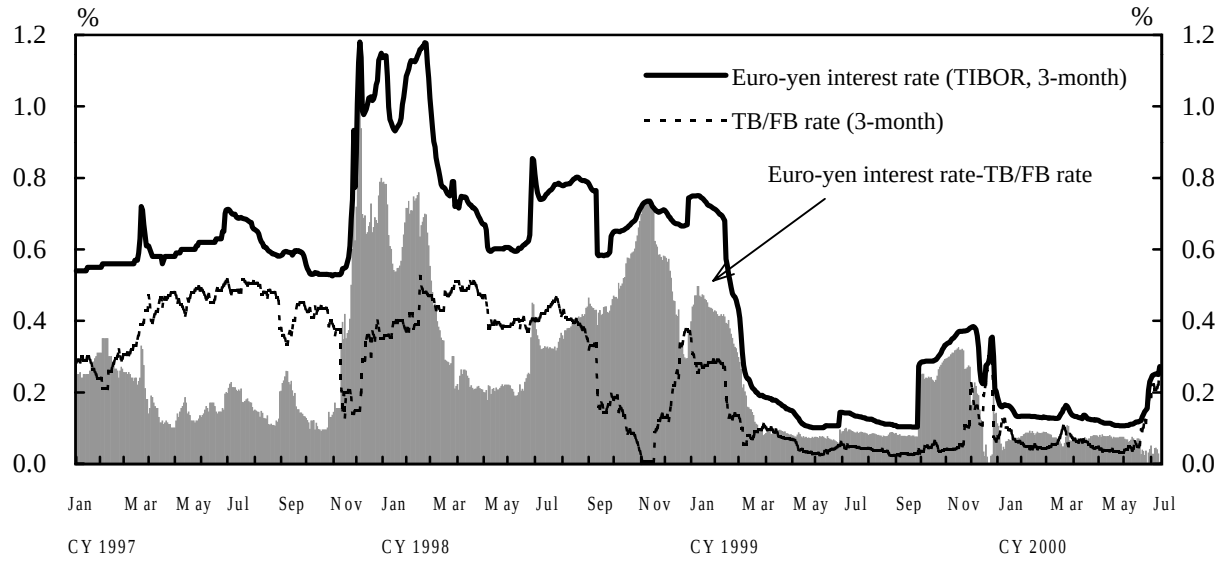
Note: Five variables are nominal money (M_2+CDs), real GDP, GDP deflator, real stock prices (deflate Tokyo Stock Price Index by GDP deflator), real long-term government bond yield (10-year). Using these five variables VECM (sample period: 1972/1Q-1996/4Q), and results obtained by the extrapolation estimation(1997/1Q-2000/1Q), the changes in nominal money are plotted. Figures used are original series and estimated by putting a seasonal dummy. (Number of lags is set as eight.)

Short-term Money Market and Anxiety Over Fund Management

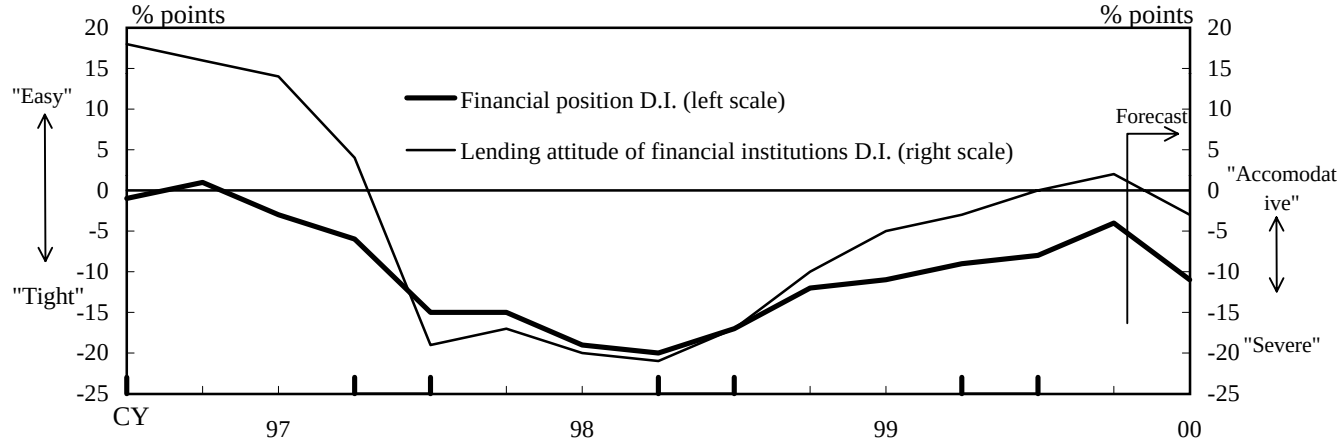
(1) Interest rate on term instruments



(2) Spread of euro-yen interest rate and TB rate



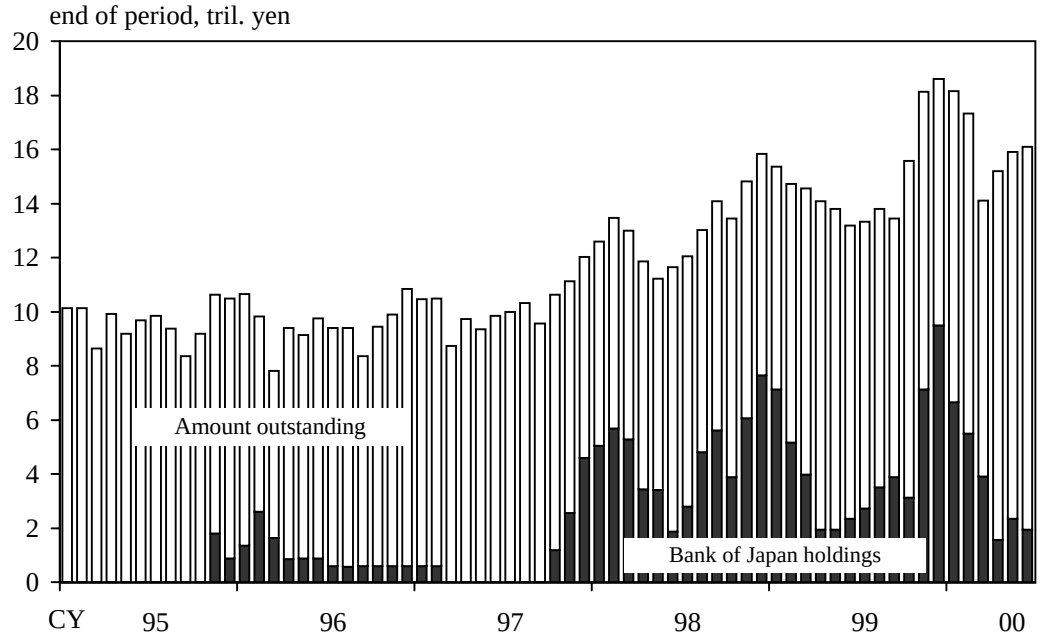
(3) Financial position D.I. and lending attitude of financial institutions D.I. (All firms, all industries)



Sources: Bank of Japan, "*Tankan* Short-Term Economic Survey of Enterprises in Japan";
Japanese Bankers Association; Japan Bond Trading Co., Ltd.

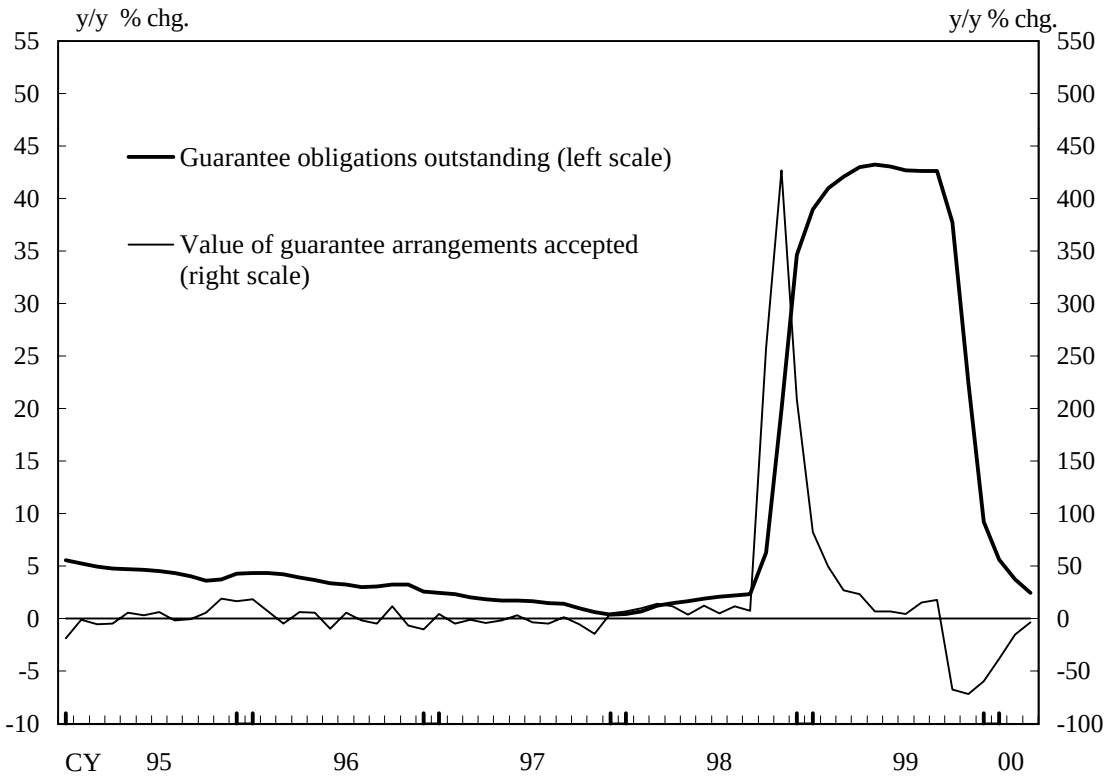
CP Operation and Credit Guarantee

(1) Amount outstanding of commercial paper



Note: Figures are those of client financial institutions of the Bank of Japan.
Excludes those issued by banks.

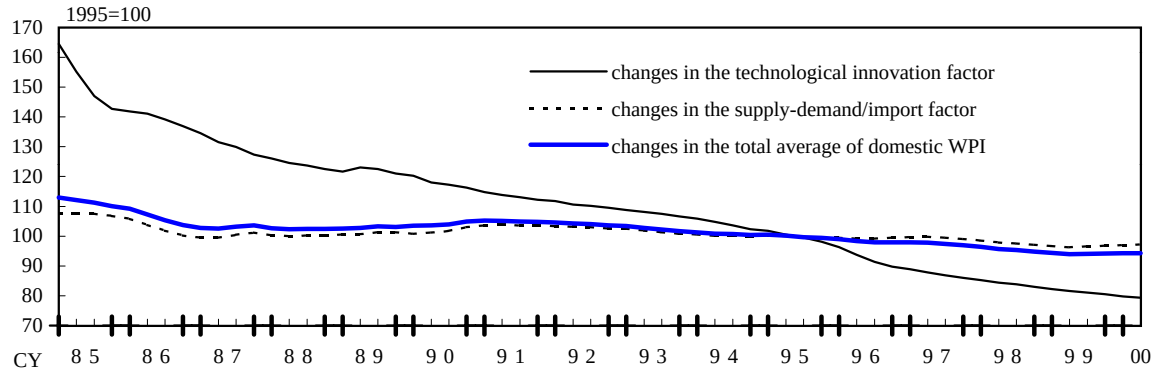
(2) Credit guarantees outstanding



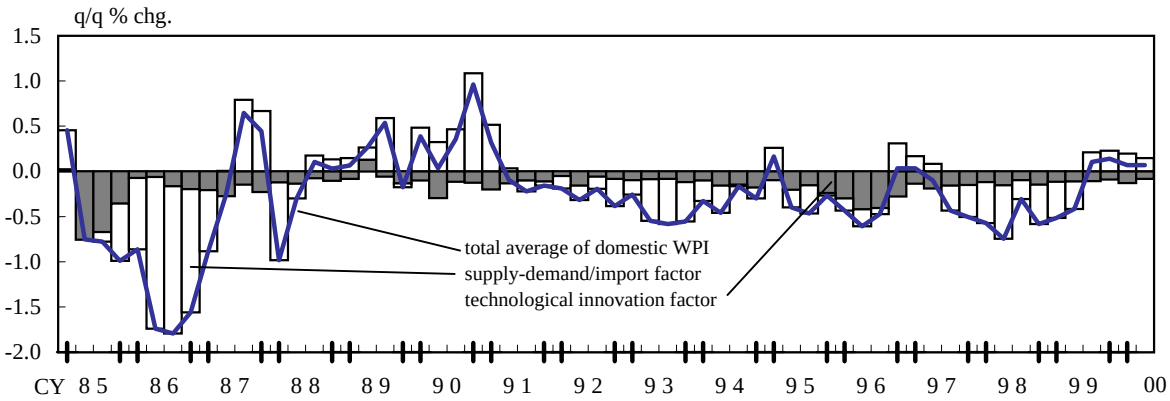
Sources: National Federation of Credit Guarantee Corporations, "Activities of Credit Guarantee Corporations"; Bank of Japan, "Financial and Economic Statistics Monthly."

Wholesale Price Index (Technological Innovation Factor)

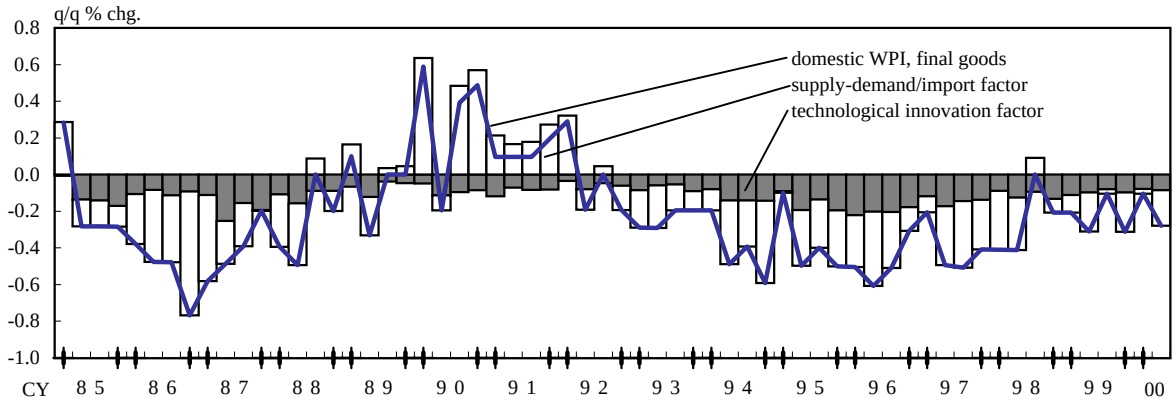
(1) Technological innovation and supply-demand factor



(2) Breakdown of fluctuations in the wholesale price index



(3) Breakdown of fluctuations in final goods of the wholesale price index



Calculation method:

(1) Among domestic WPI, items are chosen of which price fluctuations are mainly due to adjustments reflecting the enhancement of the quality of the item at the time the item is changed (production cost method or hedonic regression approach).
-- 72 items on the 1995 base and the weight is 164.3 (1/1000). Most of the items chosen are machinery related items. As for items prior to 1994 on the previous base, similar items are chosen from the 1995 base.

(2) The overall fluctuation is calculated from the weighted average of the fluctuation in each chosen item. Then the figure converted into index (1995=100) is defined as the technological innovation factor index.

(3) Supply-demand / import factor index = domestic WPI - technological innovation factor index.

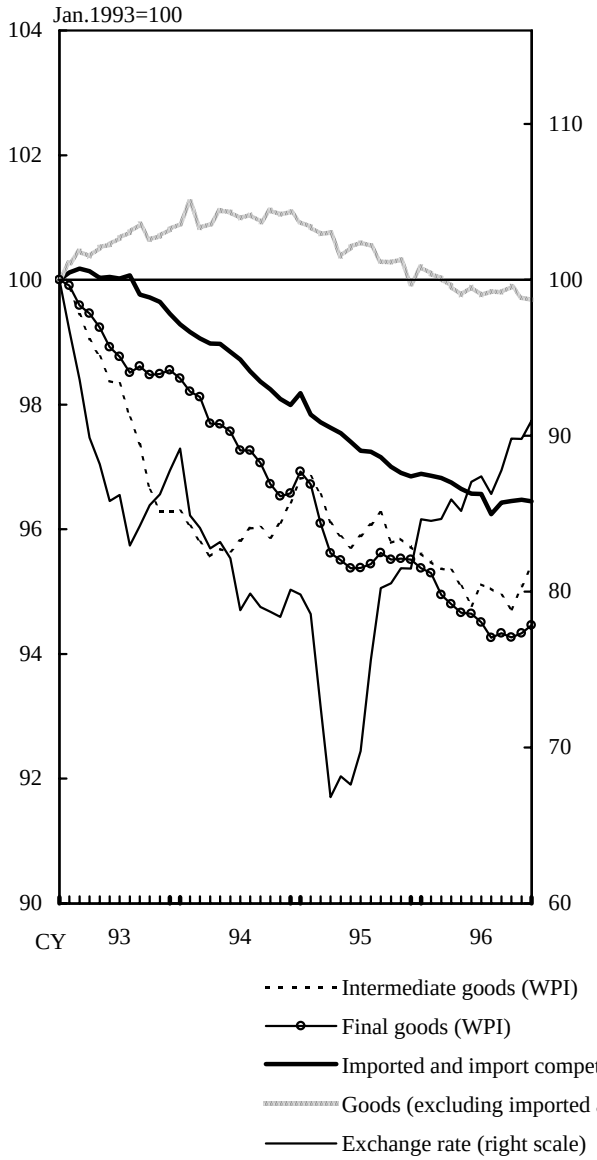
(4) Final goods of domestic WPI (69 items, weight 126.3<1/1000>) are also calculated using the same method.

Note: Domestic WPI is based on total average (excluding the effects of seasonal changes in electricity rates). Effects of the consumption tax adjusted.

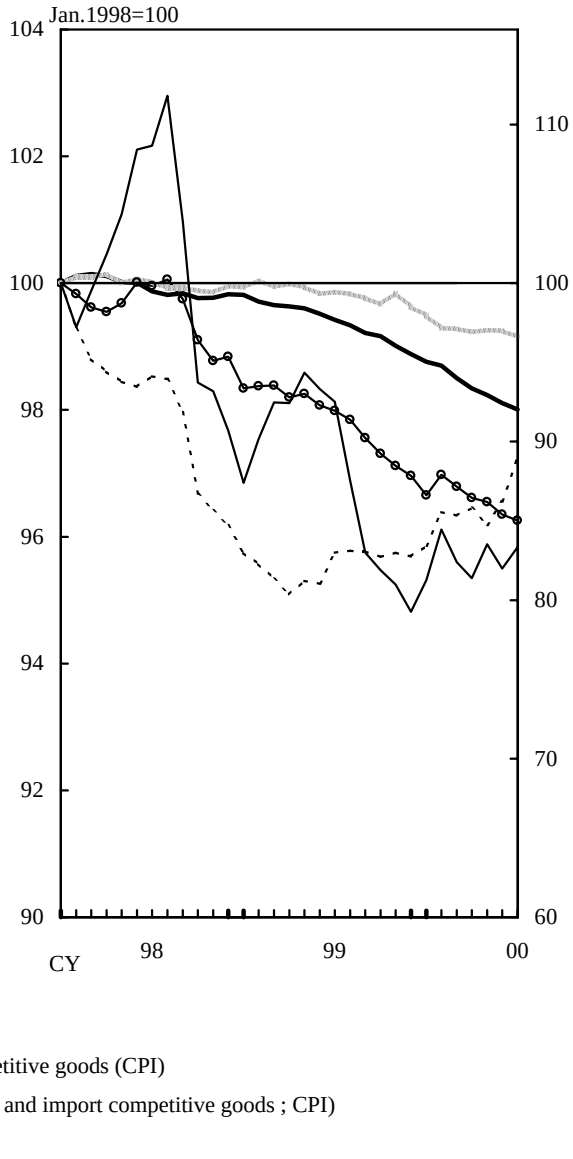
Source: Bank of Japan, "Wholesale Price Indexes."

Comparison of Prices

(1) 1993-1996



(2) 1998 and onwards



Intermediate goods (WPI)
Final goods (WPI)
Imported and import competitive goods (CPI)
Goods (excluding imported and import competitive goods ; CPI)
Exchange rate (right scale)

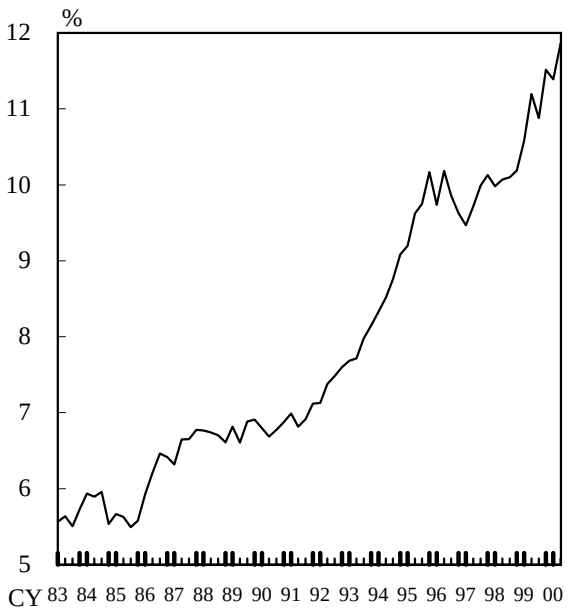
Notes: 1. The effects of the consumption tax are adjusted for both WPI and CPI. Data for CPI are seasonally adjusted.

2. Imported and import competitive goods (CPI) are goods which are defined as "imports" by the Management and Coordination Agency, or are chosen by comparing them to items of imported goods (WPI) and by using microinformation. Perishables, electricity, gas, water charges, and petroleum products are excluded. The increase in the tobacco tax from Dec.1998 has been adjusted. Meanwhile, "goods (excluding imported and import competitive goods; CPI)" are goods that are not included in the above definition. These definitions are also used in the analyses hereafter.

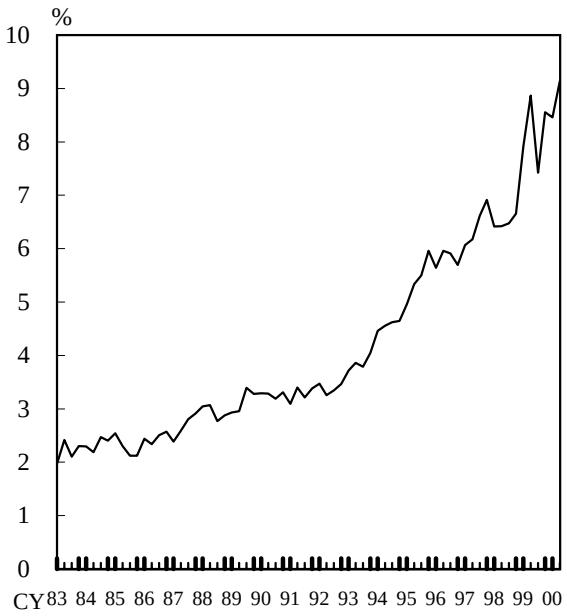
Sources : Management and Coordination Agency, "Consumer Price Index" ;
Bank of Japan, "Wholesale Price Indexes."

Import Penetration Ratio

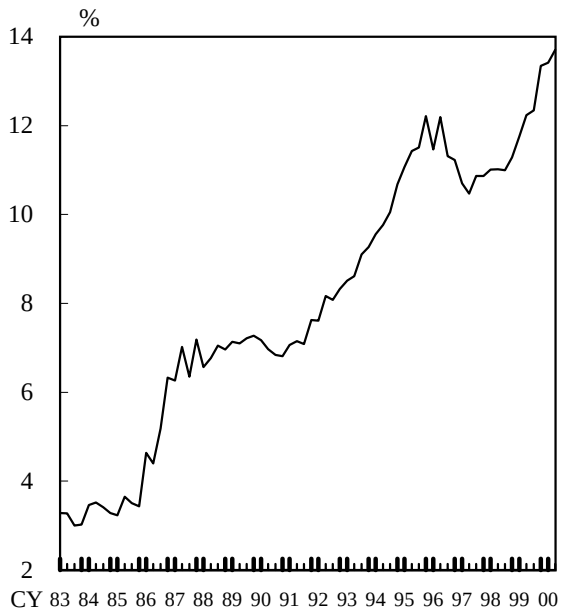
(1) Mining and Manufacturing<100.0%>



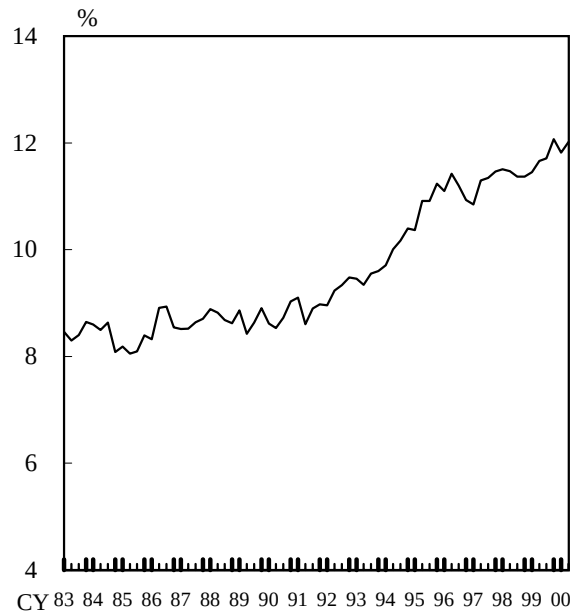
(2) Investment Goods<25.3%>



(3) Consumer Goods<29.1%>



(4) Producer Goods<45.6%>



Notes: 1. Import penetration ratio = imports / (shipments to the domestic market + imports).
2. Shares of each type of goods are shown in angle brackets.

Source: Ministry of International Trade and Industry, "Indices of Industrial Domestic Shipments and Imports."

CPI (declining rate of top items)

(1) Breakdown of the top 50 items (declining rate)

(2) Top 30 items (declining rate)

Rank	CY93	94	95	96	97	98	99
1	Monthly magazines, women's	Rice A (domestic)	Gasoline (regular)	Gasoline (regular)	Gasoline (regular)	Gasoline (regular)	Rice A (domestic)
2	Beef (imported)	**TV sets**	**Word processors**	**TV sets**	Rice A (domestic)	Kerosene	**TV sets**
3	Gasoline (regular)	Gasoline (regular)	**TV sets**	**Word processors**	**Word processors**	Gasoline (premium)	Beef (imported)
4	**Room air conditioners**	Beef (imported)	Rice A (domestic)	Computer games	Clean water equipment	"Kabayaki", broiled eels	Women's overcoats
5	Hen eggs	Standard rice	**Video tape recorders**	Tires	Gasoline (premium)	**Room air conditioners**	Chrysanthemums
6	**Word processors**	Room air conditioners	Car wax	**Room air conditioners**	Rice B (domestic)	**Word processors**	"Kabayaki", broiled eels
7	Women's overcoats	Rice B (domestic)	Kerosene	Gasoline (premium)	**Telephone set**	Women's overcoats	**Refrigerators**
8	**Refrigerators**	**Refrigerators**	**Refrigerators**	**Video tape recorders**	Hen eggs	**Refrigerators**	Handbags
9	**TV sets**	Men's suits (for winter)	Pants for exercise	**Refrigerators**	Kerosene	Car wax	Carnations
10	Kerosene	**Video tape recorders**	Rice B (domestic)	Detergent, laundry	**TV sets**	**Washing machines (full automatic type)**	**Electric rice-cookers**
11	Men's suits (for winter)	Kerosene	Detergent, laundry	Electric rice-cookers	**Video tape recorders**	**Bathtubs**	Flowerpots
12	**Video tape recorders**	Glutinous rice	Salted salmon	Instant coffee	Detergent, laundry	Women's suits (for winter)	Computer games
13	Salted salmon	Bath preparation	Women's suits (for spring & autumn)	**Telephone set**	Whisky A	Dog foods	Men's suits (for summer)
14	Women's slacks (for winter)	Men's suits(for summer)	Chrysanthemums	Car wax	Refrigerators	Sausages	**Video tape recorders**
15	Men's sweaters	Dog foods	Men's suits (for summer)	Pants for exercise	Potato chips	Fresh milk (sold in stores)	Women's suits (for summer)
16	Bath preparation	**Automobiles (1700cc-2000cc), imported**	**Room air conditioners**	Rice (imported)	**Kerosene stoves**	Women's blouses (short sleeves)	Rice B (domestic)
17	Women's sweaters (long sleeves)	Women's suits (for spring & autumn)	**Tape recorders**	Women's overcoats	**Washing machines (full automatic type)**	Fried food	Men's three-season coats
18	Quilts	Blended rice (domestic)	Handbags	**Tape recorders**	Blended rice (domestic)	Handbags	Coffee cups & saucers
19	Men's jackets	Detergent, laundry	Face cream	**Video cameras**	Chrysanthemums	Tires	Beer
20	Sausages	Salted cod roe	Yogurt	Quilts	**Microwave ovens**	**Electric shavers**	Men's sweaters
21	**Tape recorders**	**Cameras**	"Gyoza"	**Washing machines (full automatic type)**	Disposable diapers	Detergent, laundry	One-piece dresses (for summer)
22	Men's suits (for summer)	Salted salmon	Frozen croquettes	Dolls	Bath preparetion	Disposable diapers	Beef (shoulder)
23	Cream puffs	**Word processors**	Mayonnaise	Salted cod roe	Whisky C	Fluorescent lamp fittings	Women's sweaters (short sleeves)
24	**Bicycles**	**Tape recorders**	Ice cream	Clean water equipment	**Electric rice-cookers**	100% Fruit drinks	Clean water equipment
25	**Carpets**	**Video cameras**	**Bathtubs**	Fresh milk (sold in stores)	Facial tissue	Rings	Disposable diapers
26	Detergent, laundry	"Mochi", rice-cakes	Quilts	**Carpets**	Computer games	**Tape recorders**	Pickled chinese cabbage
27	Fresh milk (sold in stores)	Rolled toilet paper	**Kerosene stoves**	**Vacuum cleaners**	Whisky B	Bean-Jam buns	Fishes in soybean paste
28	Facial tissue	Fresh milk (sold in stores)	Knitted suits	**Cameras**	Tires	**Video tape recorders**	Quilts
29	Women's suits (for winter)	Men's sweaters	**Electric rice-cookers**	Facial tissue	**Video cameras**	Salted cod roe	"Shirasu-boshi", dried young sardines
30	Dog foods	Facial tissue	**Automobiles (661cc-1500cc)**	Liquid detergent, kitchen	Foundation	**Cameras**	Pork (shoulder)

Notes: 1. Year-to year percent change as of December each year (figures for Mar. 2000 is compared to the previous March) of each item is calculated and the top 50 items with large negative contribution rates are chosen. The above chart shows the number of items included in the top 50 items while the bottom chart indicates the names of the top 30 declining items.

2. The following goods are indicated as:
"Clothes" : shaded, "Durable" : bold, "imported/import competitive goods" : underlined.

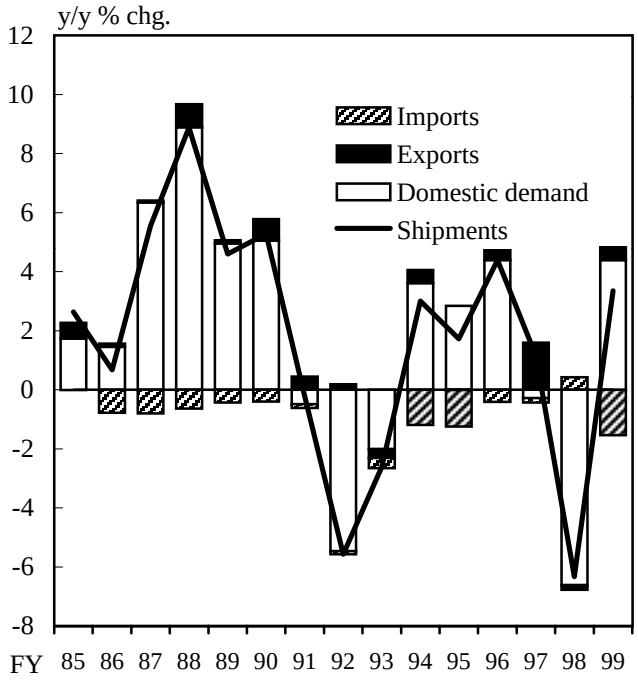
3. Deregulation - related items are petroleum products (Provisional Measures Law on the Importation of Specific Petroleum Refined Products, abolished in April 1996) and rice (Staple Food Control Act, abolished in Nov. 1995).

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

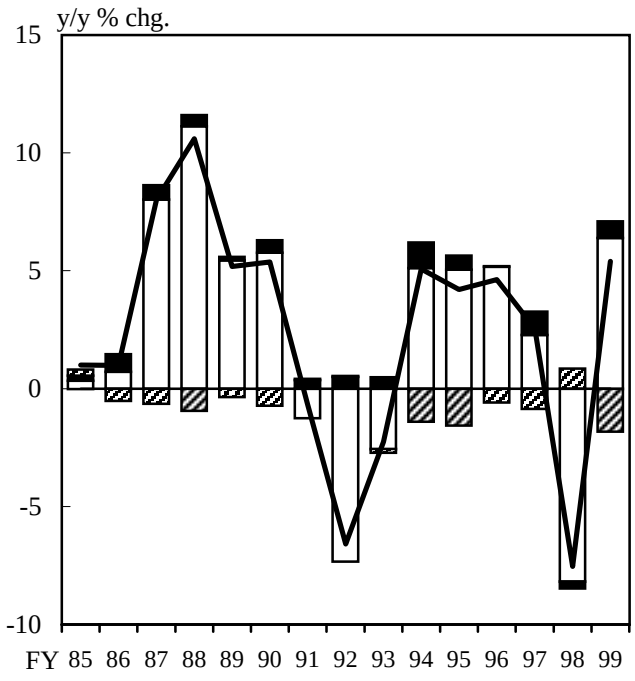
Chart 26

Shipments and Export / Import

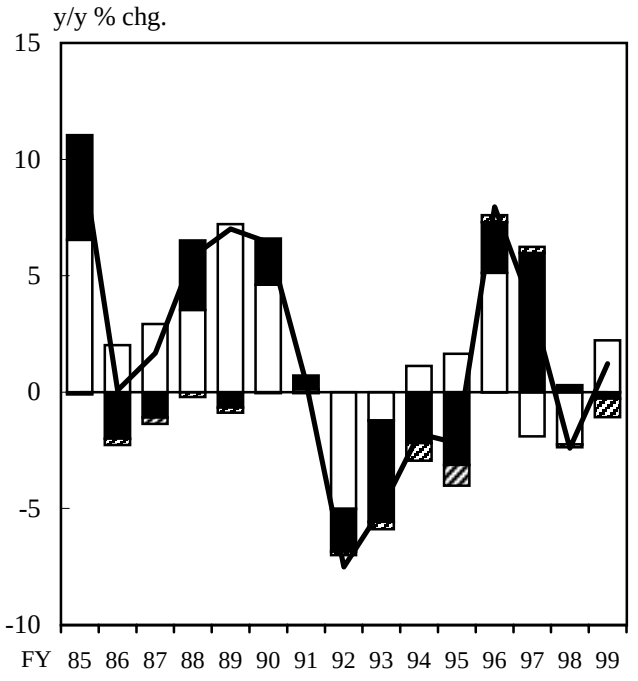
(1) Mining and Manufacturing



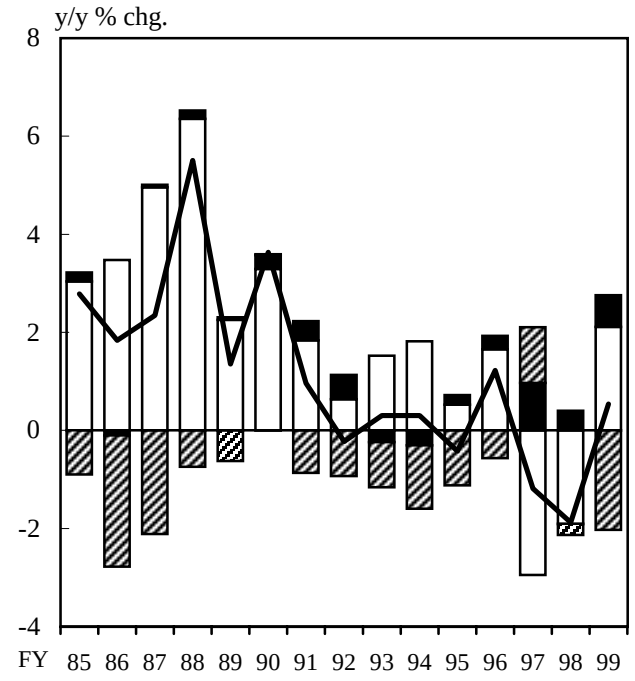
(2) Capital Goods (excluding transportation equipment) + Producer Goods



(3) Consumer Durable Goods



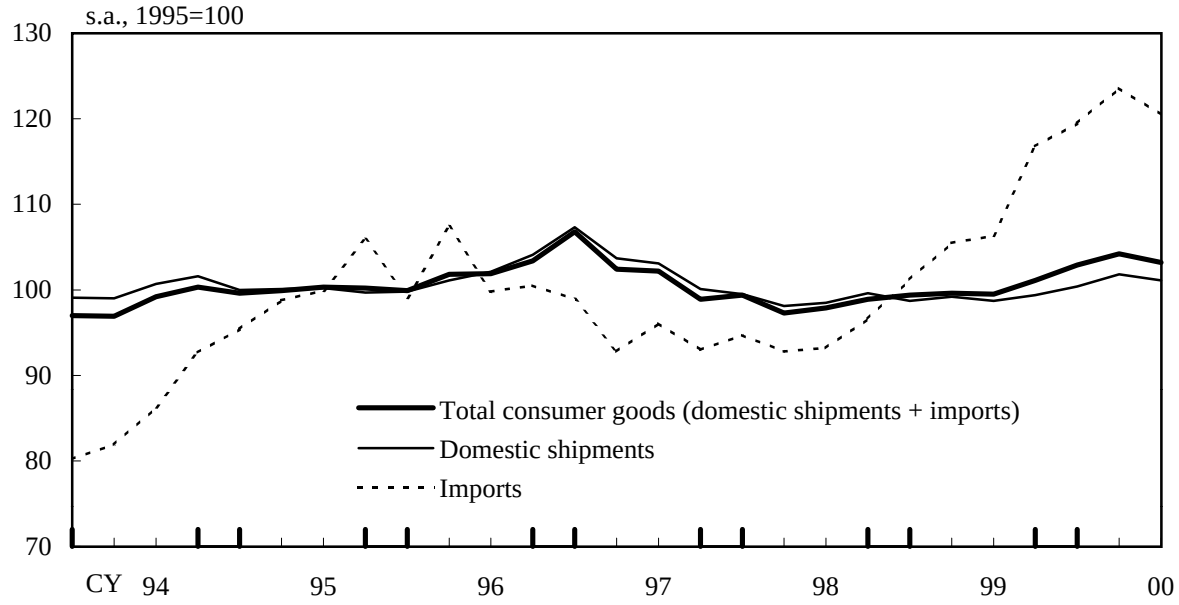
(4) Consumer Nondurable Goods



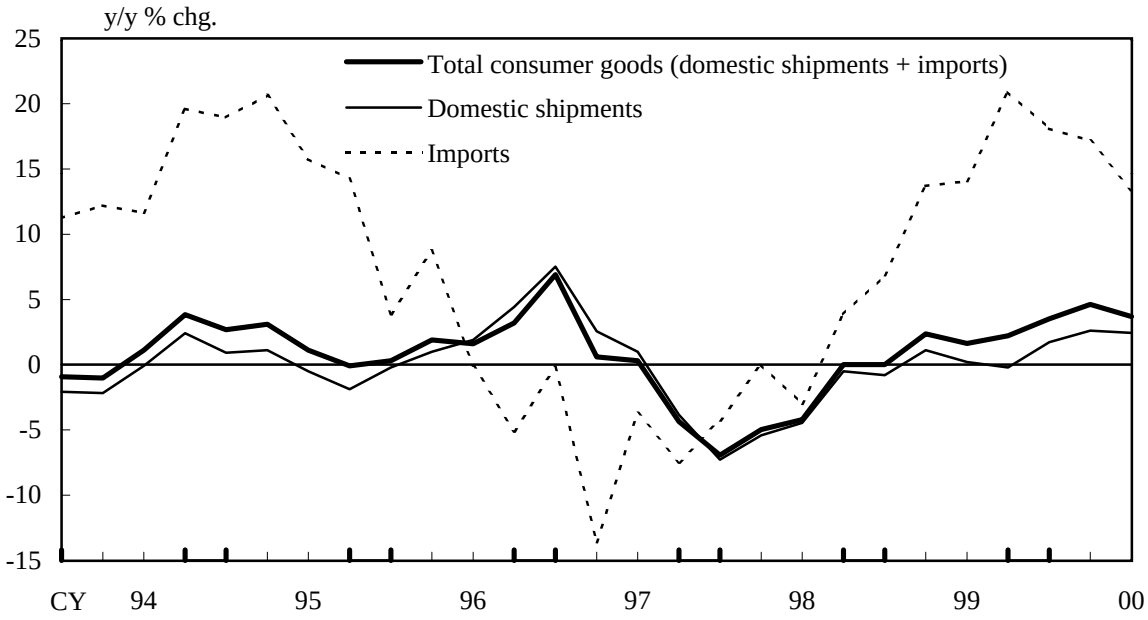
Sources: Ministry of International Trade and Industry, "Indices of Industrial Production,"
"Analysis of Mining and Manufacturing Industrial Activities."

Supply of Consumer Goods

(1) Level



(2) Year-to-year change



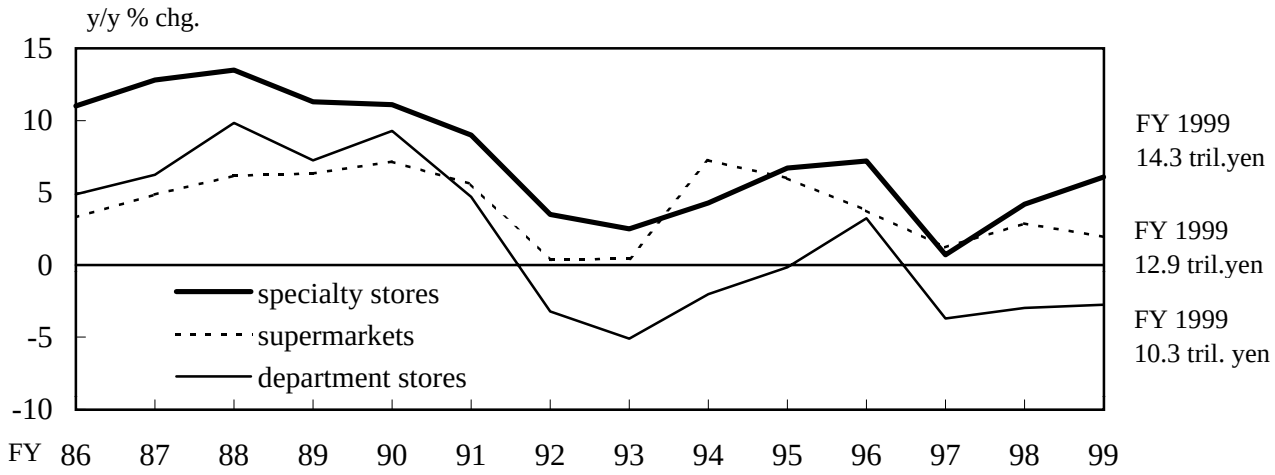
Notes: 1. "Domestic shipments" and "imports" are categories of "consumer goods" in the *Indices of Industrial Domestic Shipments and Imports* . (The definition of "consumer goods" is the same as that in the *Indices of Industrial Production* .)

2. 2000/3Q figures are July data in terms of quarterly amount.
3. Figures for 2000/Q3 of "Domestic shipments" are estimated by subtracting the contribution of exports from *Indices of Industrial Production* .
4. Figures for 2000/Q3 of "Imports" are estimated from real imports of consumer goods.
   Real imports (consumer goods) = motor vehicles + audio and visual apparatus + office machinery + foodstuffs + textiles.
5. Figures for 2000/Q3 of "Total (domestic shipments + imports)" are calculated from weighted average of "Domestic shipments" and "Imports."
6. Year-to-year percent changes are calculated using seasonally adjusted data.

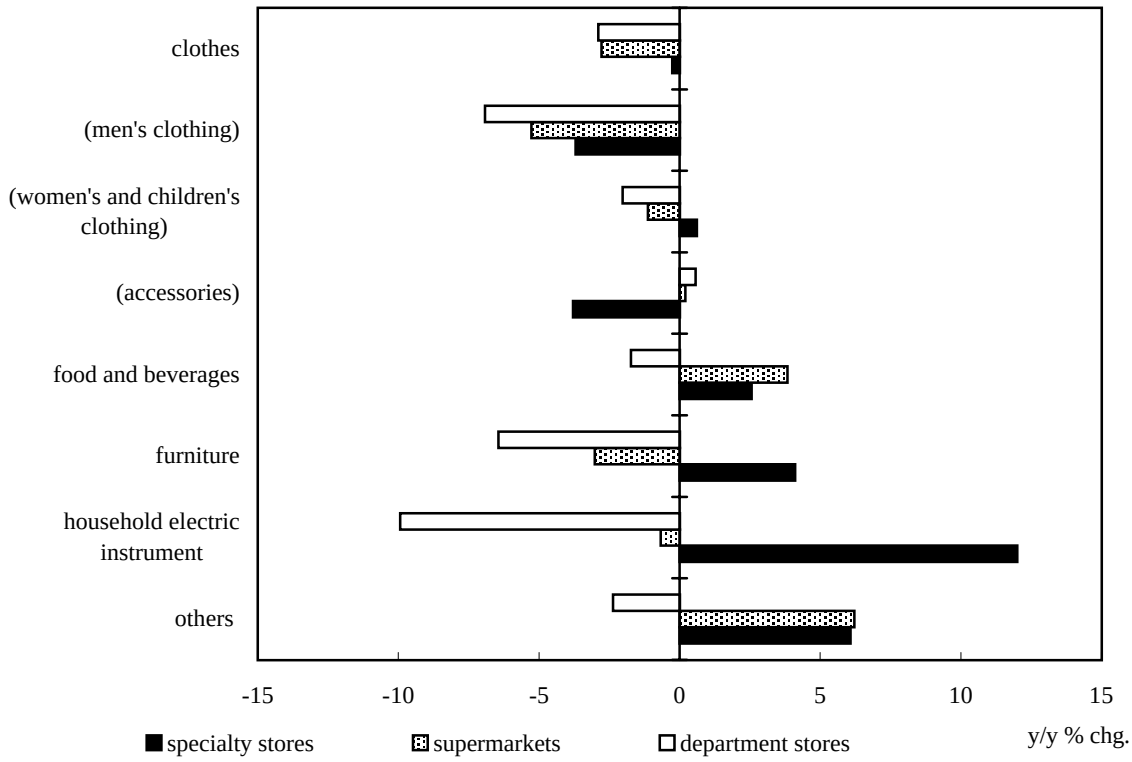
Sources: Ministry of International Trade and Industry, "Indices of Industrial Production," "Indices of Industrial Domestic Shipments and Imports"; Ministry of Finance, "The Summary Report on Trade of Japan"; Bank of Japan, "Wholesale Price Indexes."

Sales of Retail Industry (by Type of Store)

(1) Sales (year-to-year change)



(2)Sales (by type of item; FY1999)



Notes: 1. Data of department stores and supermarkets based on the "*Current Survey of Commerce.* " Data of specialty stores based on the "*Nihon no senmonten chousa* (Survey on Specialty Stores in Japan)."

2. Sales (year-to-year percent change) are not adjusted to exclude the effect of the increase in the number of stores.

3. Items of the specialty store survey are re-categorized according to the items of the *Current Survey of Commerce* .

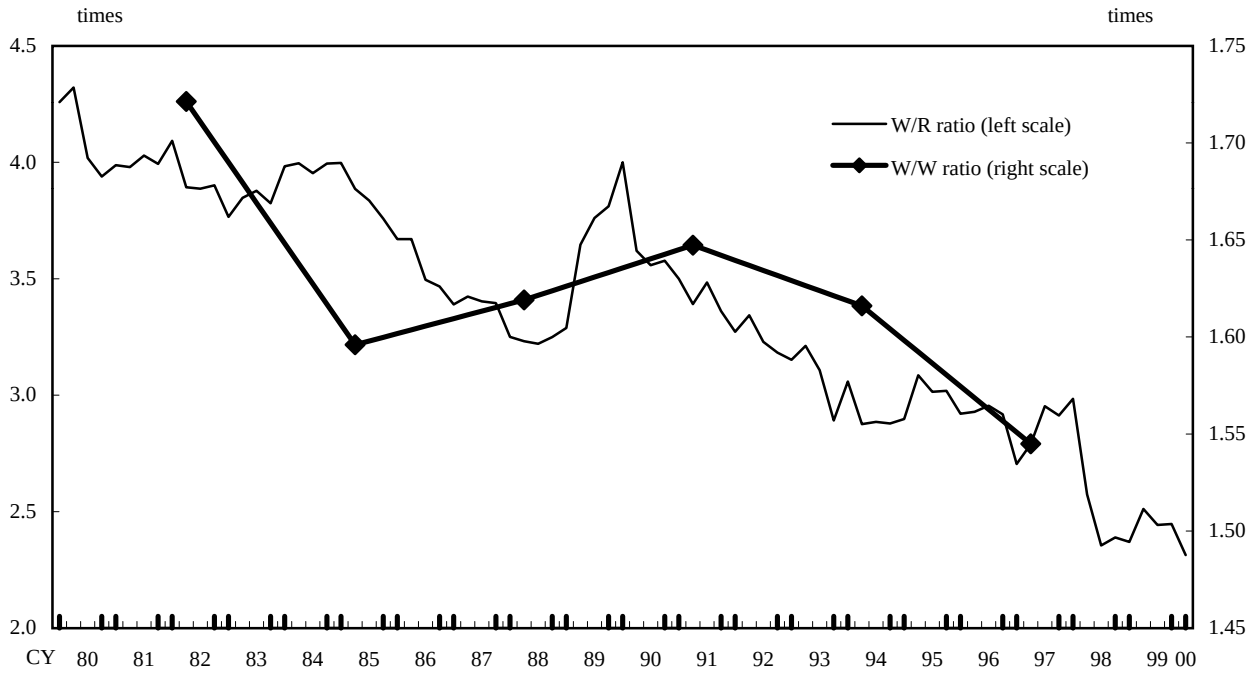
Department stores and supermarkets: "clothes" include "men's clothing," "women's and children's clothing," "accessories," and "other clothing."

Specialty stores: "clothes" include "men's clothing," "women's and children's clothing, "accessories," "casual clothing," and "kimonos."

Sources: Ministry of International Trade and Industry, "Current Survey of Commerce"; The Nihon Ryutsu *shinbun (July.13 2000).* "*Nihon no senmonten chousa* (Survey on Specialty Stores in Japan)."

Chart 29

Streamlining of Distribution Channels



<Calculation Method>

$\frac{W}{R}$ ratio= $\frac{\text{sales (wholesale industry)}}{\text{sales (retail industry)}}$

---ratio of the retail industry to the wholesale industry

$\frac{W}{W}$ ratio= $\frac{\text{total amount of sales (wholesale industry) - inter-office transaction}}{\text{sales to retailers + sales to industries other than wholesale and retail + sales to overseas + sales to consumers}}$

=sales of wholesale industry/sales of wholesale industry to users

--- Presence of primary and secondary wholesalers within the wholesale industry.

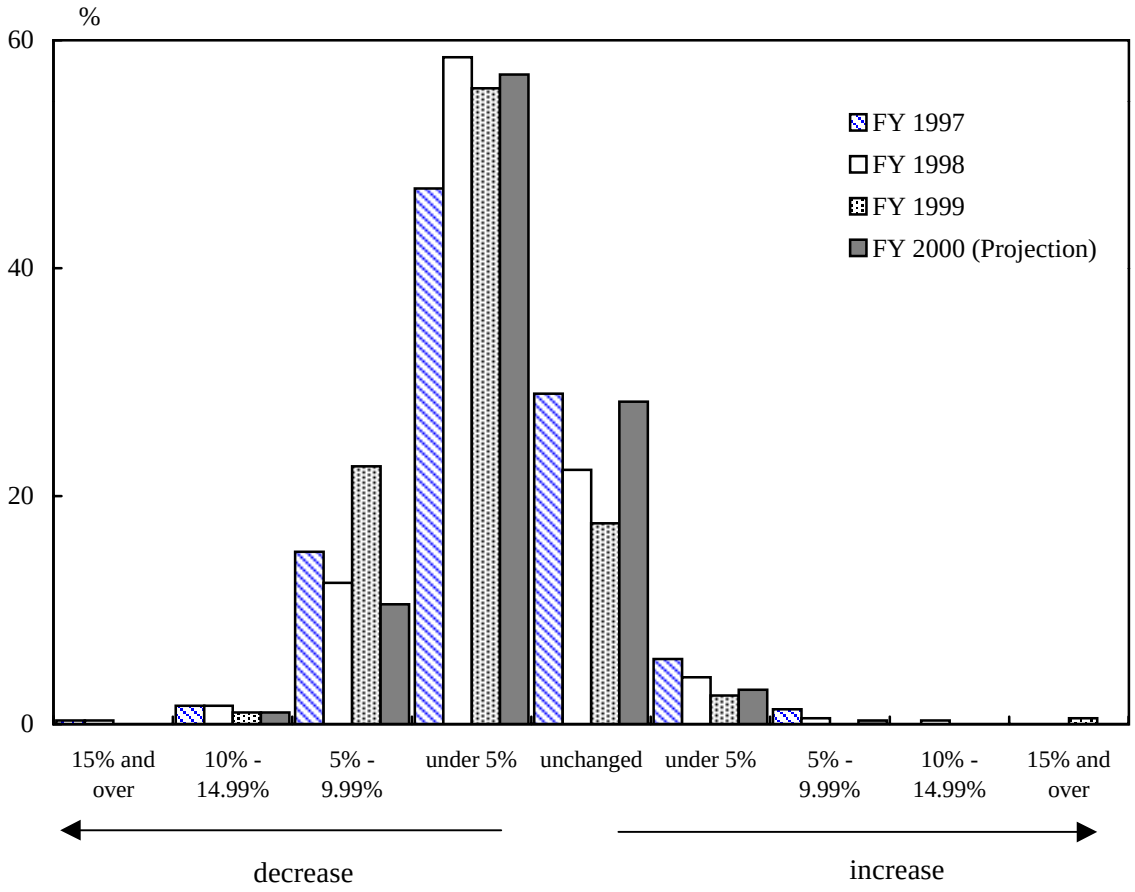
Notes: 1. Data for sales are seasonally adjusted. These figures have adjusted discontinuity of data based on firms of all scales in the *Financial Statements Statistics of Corporations by Industry, Quarterly.*

2. Total amount of sales (wholesale industry) based on data in the *Census of Commerce* .

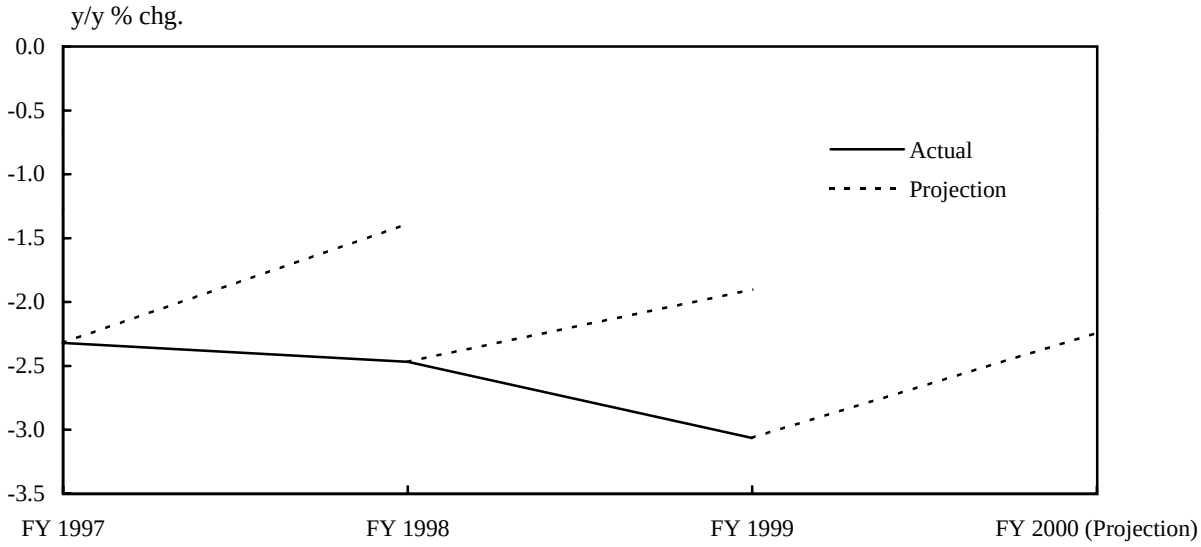
Sources: Ministry of Finance, "Financial Statements Statistics of Corporations by Industry, Quarterly";
Ministry of International Trade and Industry, "Census of Commerce."

Unit Price of Commodities (Retail Industry)

(1) Distribution of responses



(2) Actual results and projections (weighted average)

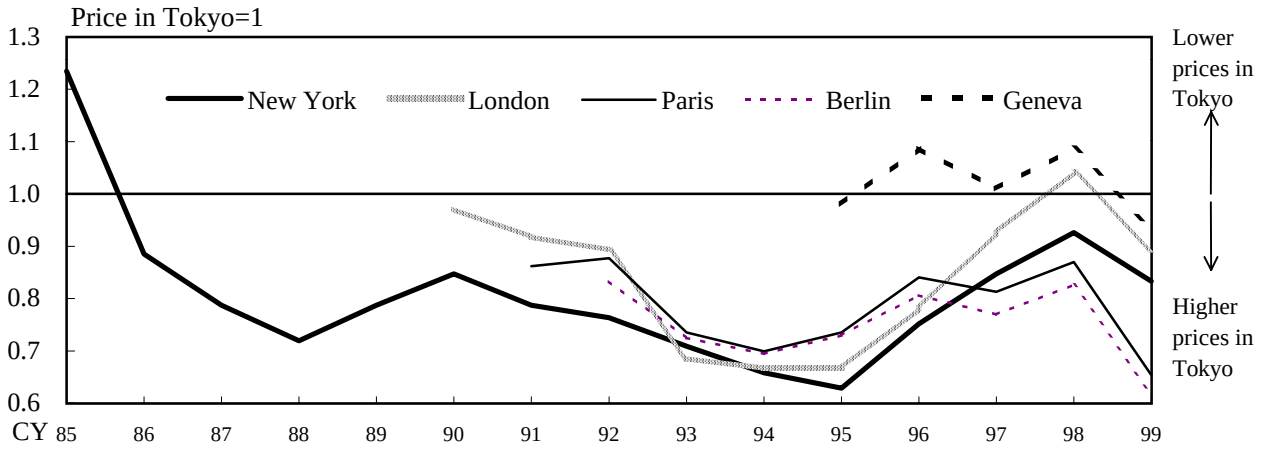


Note: Actual results and projections are the weighted average of the median of each response.

Source: *The Nihon Ryutsu Shinbun (July 6, 2000), "Nihon no Kourigyou Chousa* (Survey on the Japanese Retailing Industry)."

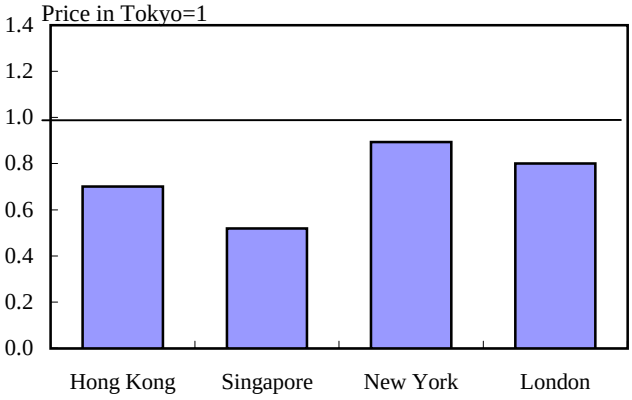
Gap Between Domestic and Foreign Prices

(1) Changes in price gaps of living expenses between Japan and Overseas

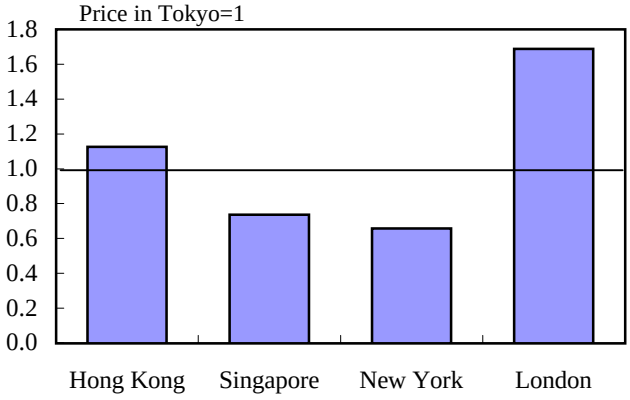


(2) Price gaps of final goods between Japan and overseas (1999)

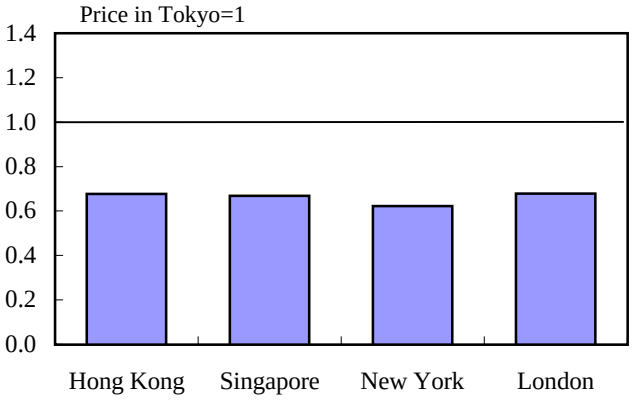
i) Clothes and footwear



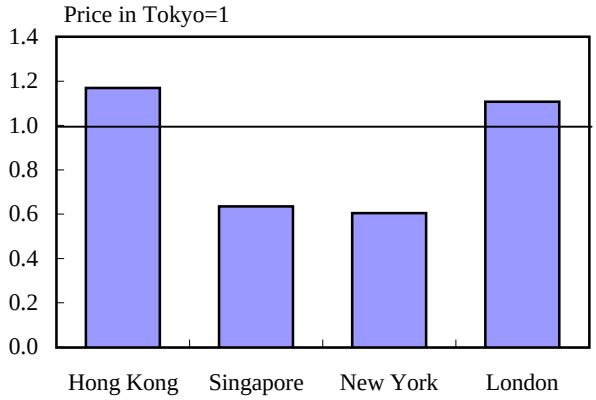
ii)Household electric appliances



iii)Food



iv)Other goods

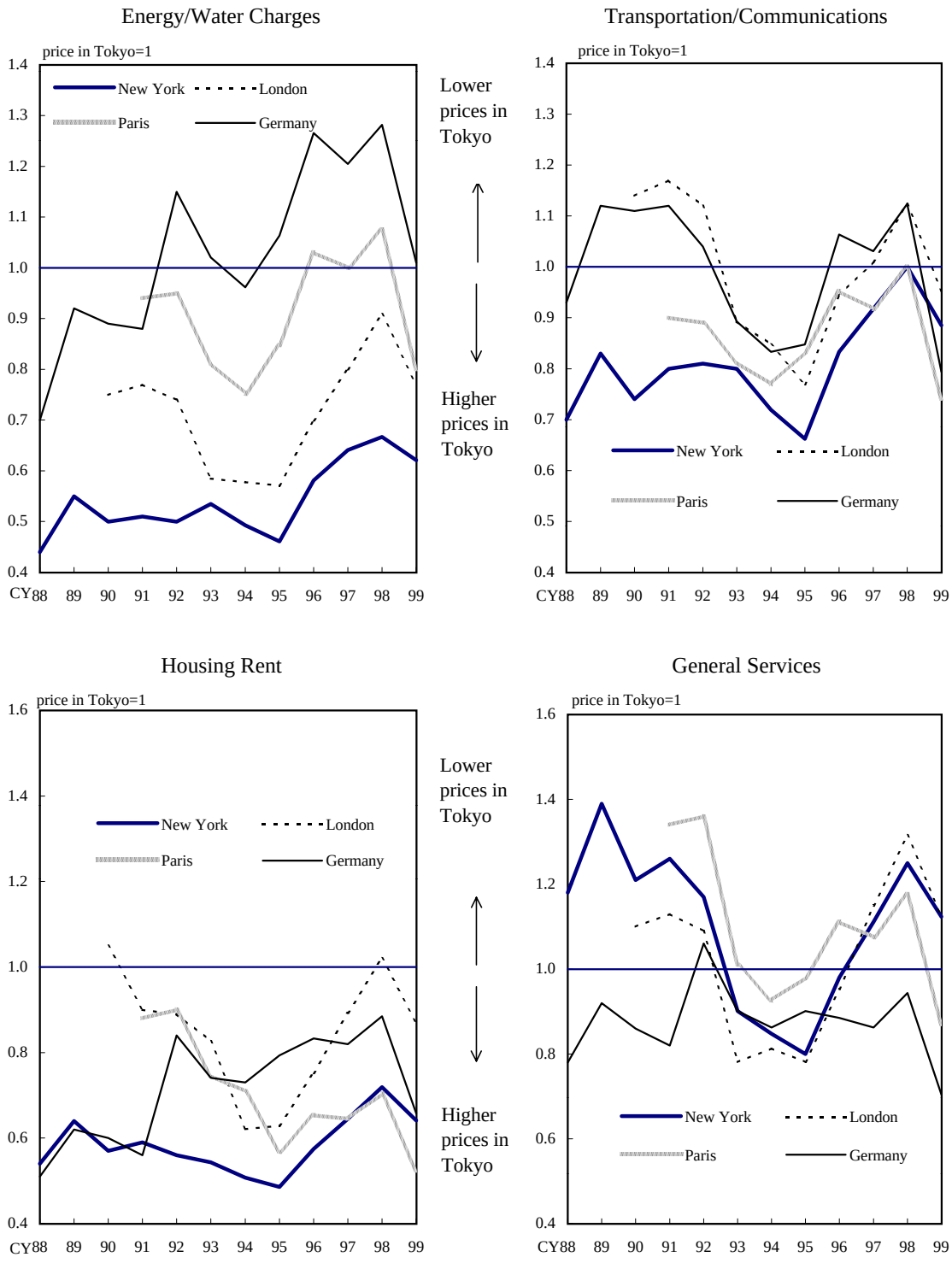


Note: Price gaps of final goods between Japan and overseas is based on the "*Shuyo na shohizai oyobi sabisu ni kakaru naigai kakakusa chousa kekka (1999 nen) ni tsuite* " (Economic Planning Agency; see source). Each component is weighted by using the weight of CPI of Japan (for "television," 1998 figures are used). The breakdown of each component is as follows:

- Clothes and footwear: Men's suits (for winter), Men's slacks (for winter), Skirts (for winter), Men's business shirts, Men's briefs, Men's shoes (leather).
- Foods: Rice, White bread, Spaghetti, Salmon, Fresh milk, Hen eggs, Onions, Oranges, Bananas, Sugar, Black tea, Cola drink, Beer.
- Household electric appliances: Television, Video tape recorders.
- Other goods: Facial tissue, Gasoline, Films, Magazines, Newspapers, Lipsticks, Compact Discs.

Source: Economic Planning Agency, *"Shuyona shohizai oyobi sabisu ni kakaru naigai kakakusa chousa kekka (1999 nen) ni tsuite* (Survey Results on the Price Gap of Major Consumer Goods and Services between Japan and Overseas<1999>)," *Seikeihi chousa ni yoru koubairyoku heika oyobi naigaikakakusa no gaikyo* (Summary Report on Purchasing Power Parity and Price Gaps between Japan and Overseas According to the Living Expense Survey)"; Management and Coordination Agency, "Consumer Price Index."

Gap Between Domestic and Foreign Prices (Services)

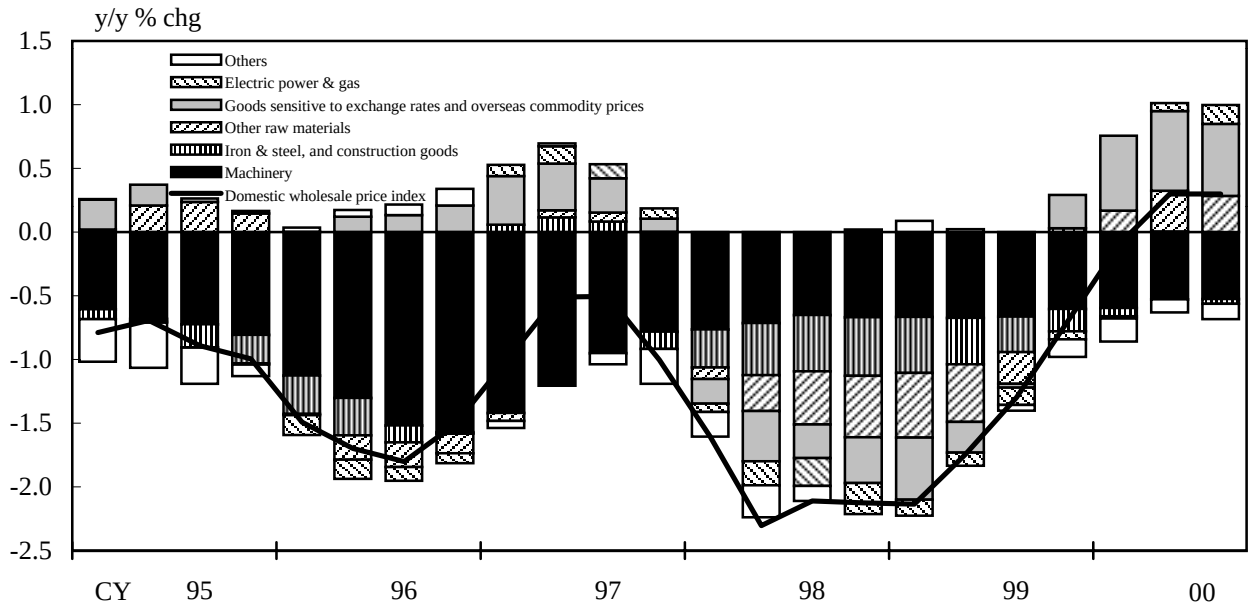


Notes: 1.Germany: data from 1988-1992 based on Hamburg; data from 1993 onwards based on Berlin.
2.General services = recreational services + housing maintenance services + housekeeping services + eating-out services + automobile maintenance related services + land related services (excluding housing rent), etc.

Source: Economic Planning Agency, " *Seikeihi chousa ni yoru koubairyoku heika oyobi naigaikakakusa no gaikyo* (Summary Report on Purchasing Power Parity and Price Gaps between Japan and Overseas According to the Living Expense Survey)."

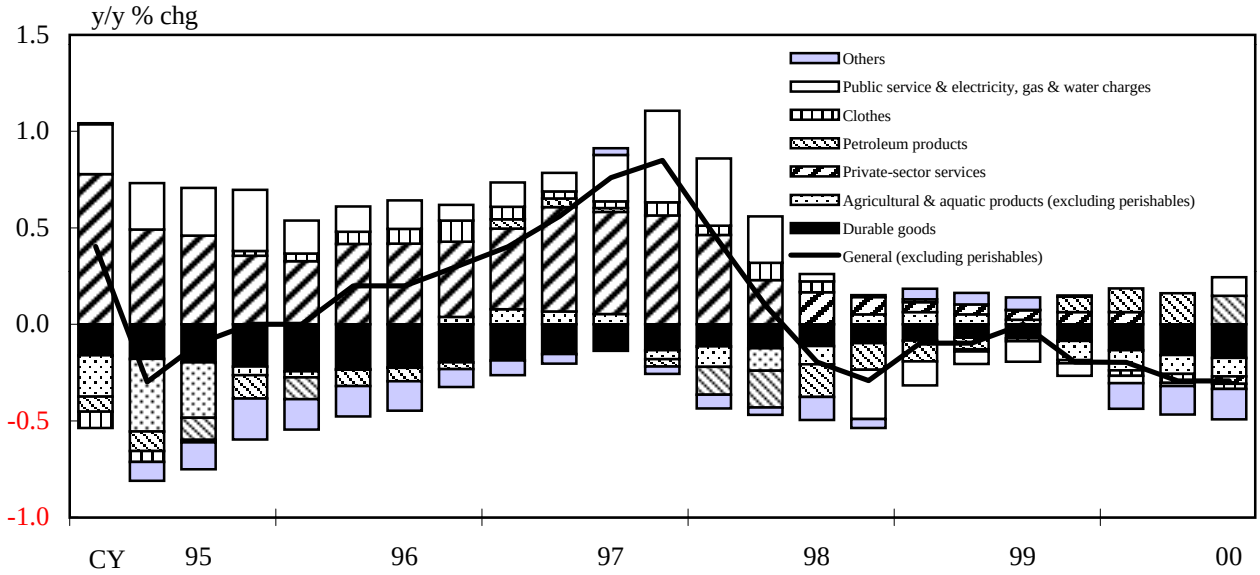
Breakdown of Domestic Wholesale Price Index and Consumer Price Index

1. Domestic Wholesale Prices



Notes: 1. Machinery = electrical machinery + general machinery + transportation equipment + precision instruments.
2. Iron & steel and construction goods = iron & steel + metal products + ceramics, stone & clay products + lumber & wood products + scrap & waste.
3. Other raw materials = chemicals + plastic products + textile products + pulp, paper & related products.
4. Goods sensitive to exchange rates and overseas commodity prices = petroleum & coal products + nonferrous metals.
5. Others = processed foodstuffs + other manufacturing industry products + edible agricultural, livestock, & aquatic products + inedible agricultural & forestry products + mining products + water.
6. 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 the tax rate.
7.The data for 2000/3Q are those of July.

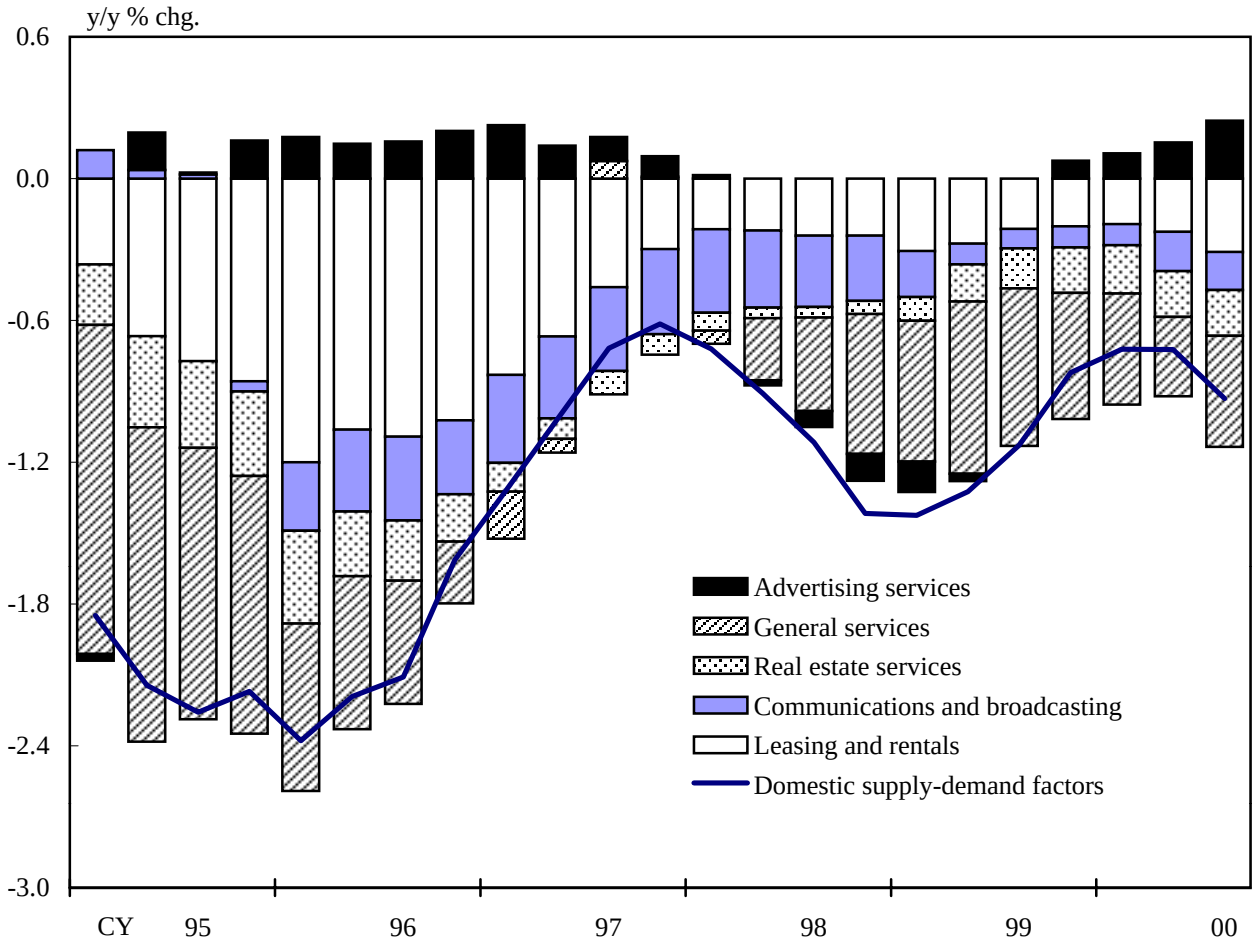
2. Consumer Prices (General, excluding perishables)



Notes 1.Petroleum products : propane gas, kerosene, gasoline (regular)
2. 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 the tax rate.
3.Data for 2000/3Q are those of July.

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

Breakdown of Corporate Service Price Index

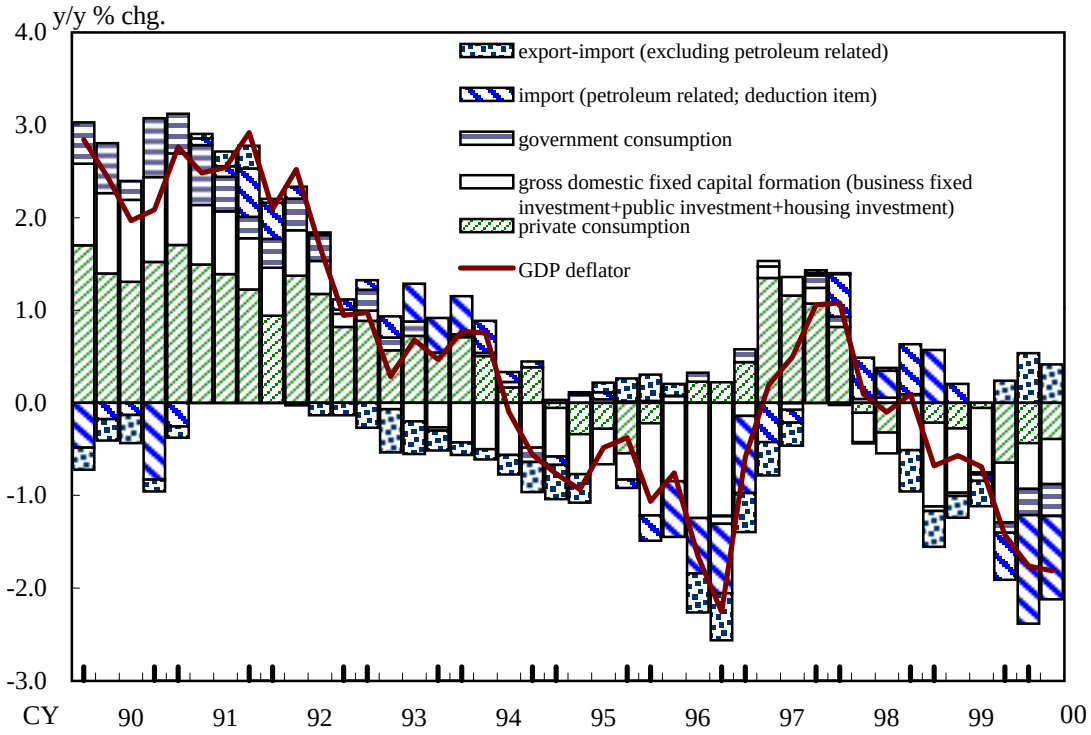


Notes: 1. CSPI (domestic supply-demand factors) includes all items aside from "others" as defined below.
This index mainly reflects the supply and demand conditions in the domestic private sector.
Others = automobile insurance (compulsory) + railroad fares + bus fares + taxi fares + domestic air fares + tolls + postal services + sewerage disposal + ocean freight + international air freight + international air fares + securities issuance and related services (banks' procuration service for issuing debentures<excluding underwriting services>).
2. General services = finance & insurance + transportation + information services + building maintenance services + temporary worker services + machinery maintenance, etc.
3. 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 the tax rate.
4. Data for 2000/3Q are those of July.

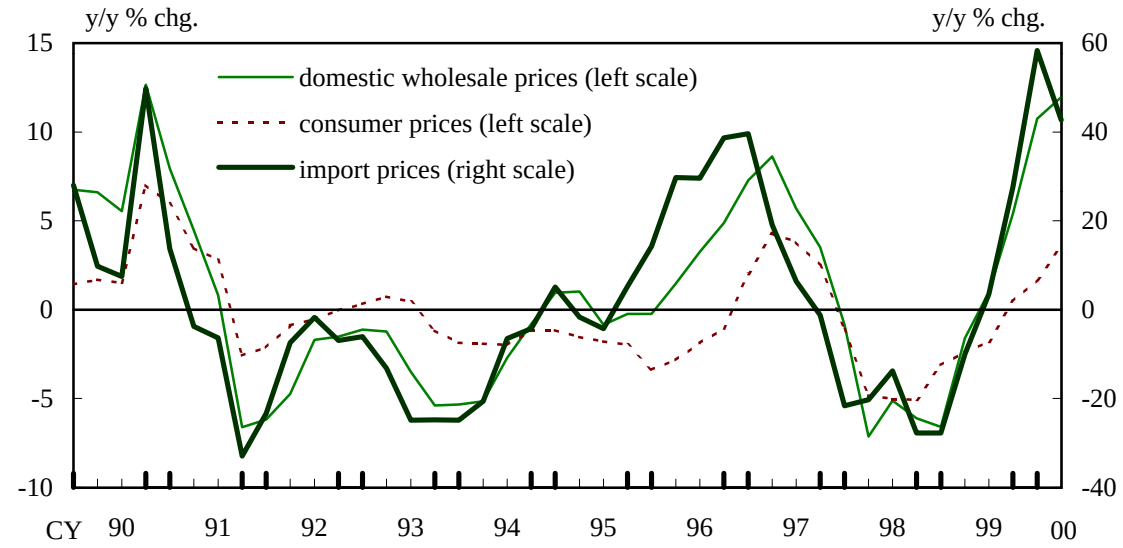
Source: Bank of Japan ,"Corporate Service Price Index."

Breakdown of GDP Deflator

(1) GDP deflator



(2) Prices of petroleum related goods (import, domestic wholesale, consumer prices)

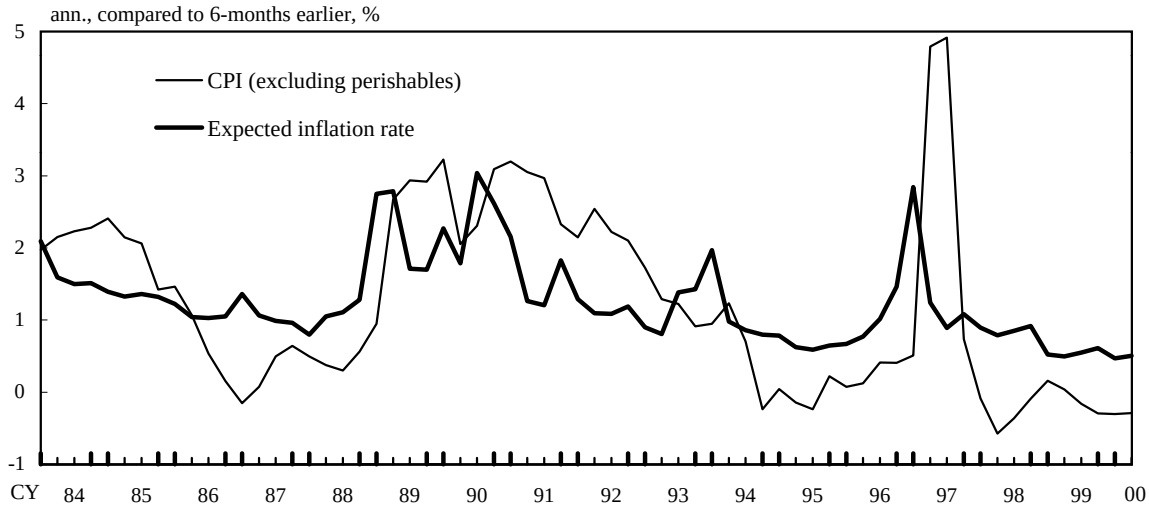


Notes: 1. The contribution of petroleum-related goods to the import deflator assumes the import deflator to move along with import prices of wholesale price index and uses the contribution of petroleum, coal, and natural gas to the percentage growth (year to year) of import prices.
2. Data of petroleum related goods (WPI) include petroleum and coal related goods, electric power, gas, and water charges.
3. Data of petroleum related goods (CPI) include electricity and gas charges, liquified propane and gasoline (regular).

Sources: Economic Planning Agency, "National Income Statistics";
Bank of Japan, "Wholesale Price Indexes"; Management and Coordination Agency, "Consumer Price Index."

Estimation of the Expected Inflation Rate

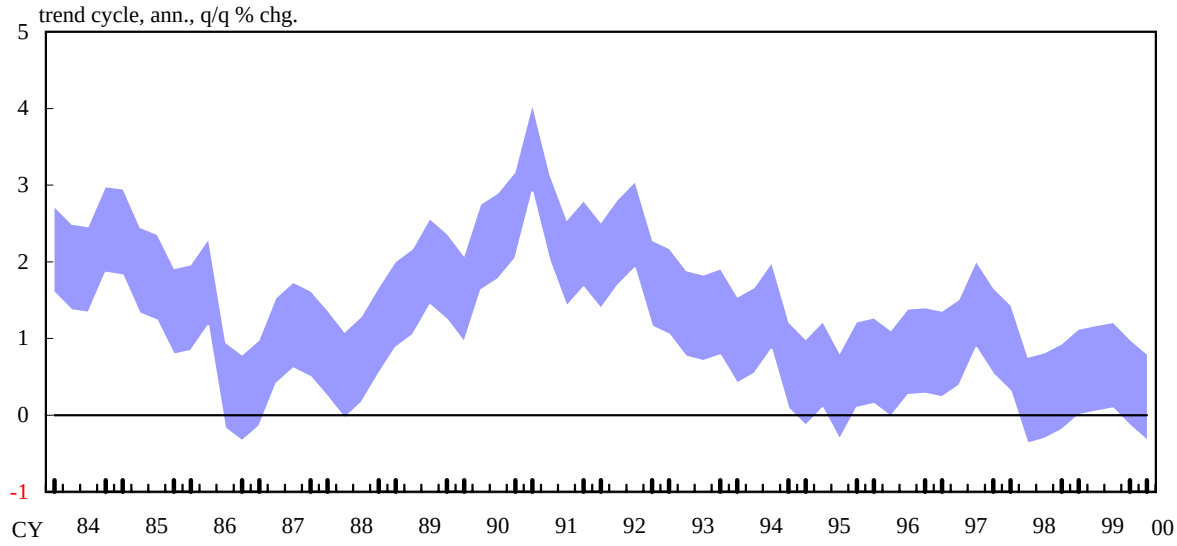
(1) Estimation using the Consumer Sentiment Indexes (consumer prices; Carlson-Parkin method)



Notes:1. For the expectation formation period (projection) of the Consumer Sentiments Indexes, prior to 1991/1Q the question to consumers was about "the price rise for the following year," whereas from 1991/2Q it was "the price rise for the following six months." Thus, data prior to 1991/1Q are based on year-to-year changes (not seasonally adjusted) while data from 1991/2Q (seasonally adjusted) are annualized figures compared to six months earlier.

2. The Carlson-Parkin method is used to calculate the expected inflation rate. Here, the critical value, the point when the economic unit acknowledges the price change, is calculated by the OLS. The estimator is unchanged during the estimation period (1983/1Q-2000/2Q).

(2)Estimation using the output gap (consumer prices)



Notes:1. Expected inflation rate is a theoretical value based on the Phillips Curve estimated using the output gap (See Chart 12 for the estimation sum).

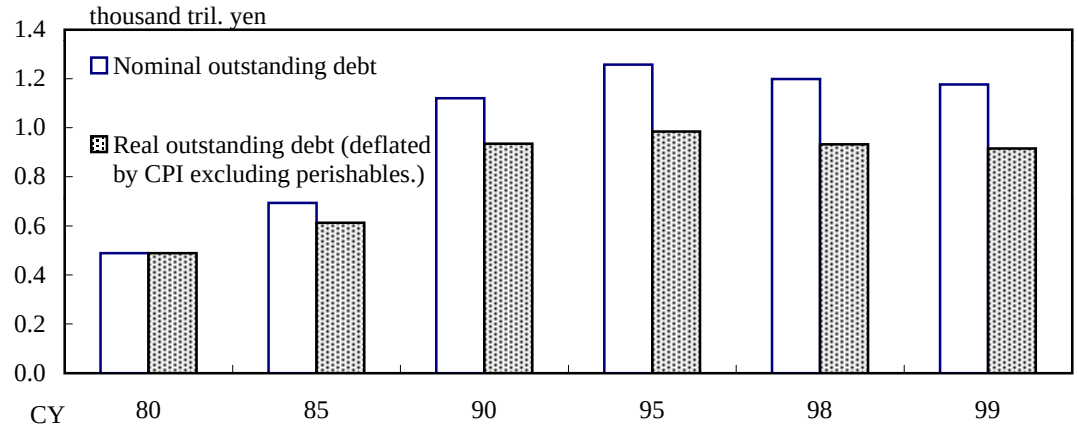
2. Lower limit value=inflation rate of the previous quarter×parameter.

3. Upper limit value=inflation rate of the previous quarter×parameter+constant term.
(the largest value that cannot be explained only by the fixed parameter on the inflation rate of the previous quarter).

Sources: Economic Planning Agency, "National Accounts," "Gross Capital Stock of Private Enterprises," "Consumer's Behavior Survey"; Management and Coordination Agency, "Consumer Price Index"; Bank of Japan, "Wholesale Price Indexes."

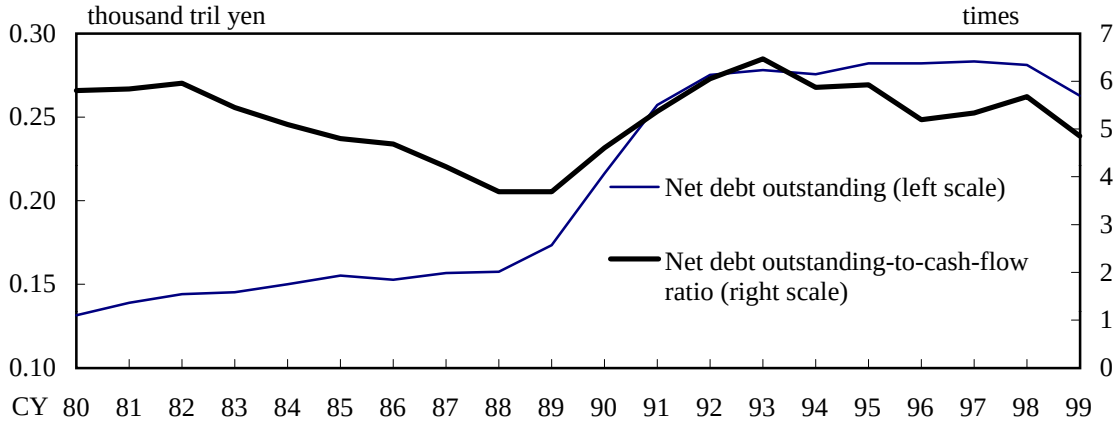
Debt Burden and Debt-Paying Ability

(1) Debt outstanding in the private sector (SNA basis)



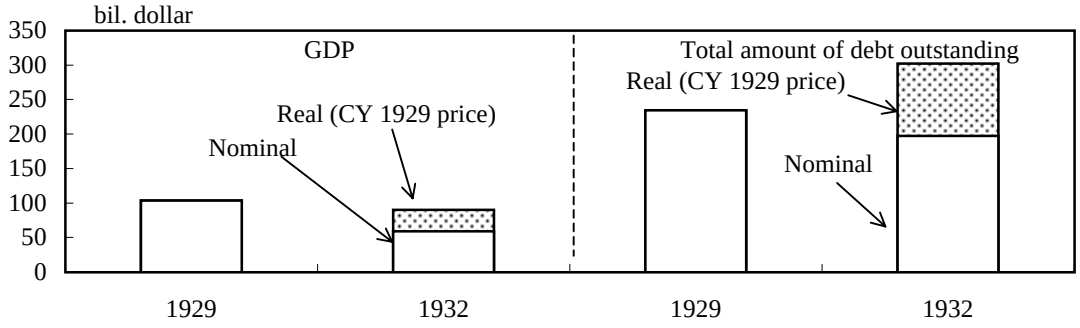
Notes: 1. Real outstanding debt = (total amount of outstanding debt <SNA basis> - stocks held) / CPI (excluding perishables; 1995 price basis, FY 1980=100)
2.Private debt = private nonfinancial corporations + households + private nonprofit institutions serving households
3.FY 1999 is estimated from the *Flow of Funds Accounts.*

(2) Net outstanding debt and net outstanding debt-to-cash-flow ratio of private firms (Financial Statements Statistics of Corporations by Industry, Quarterly basis)



Notes: Figures are based on all industries of all scales (excluding large firms in the services industry; adjusted for the discontinuity of the data).

Reference: U.S. GDP and total amount of debt outstanding during the Great Depression

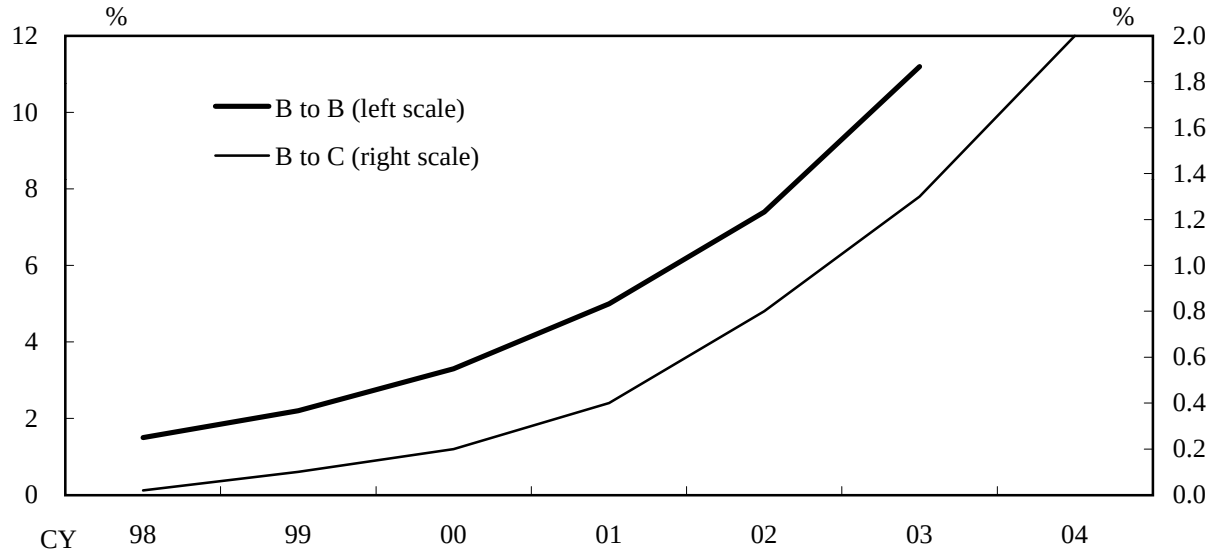


Note: For total debt outstanding and deflator (CY 1929 price), refer to Fisher (1932) "Booms and Depressions" p. 109.

Recent Changes in the Economic Environment

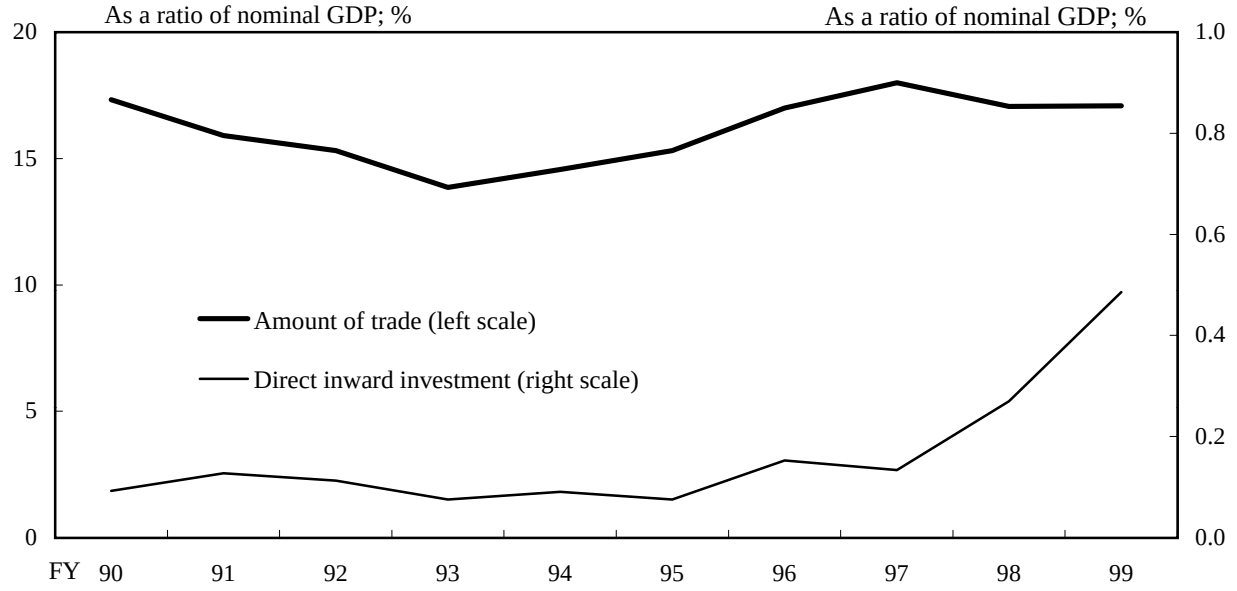
(1) Projections of ratio of electric commerce

(Ministry of International Trade and Industry, Electric Commerce Promotion Council of Japan, and Andersen Consulting)



Notes: B to B = Ratio of business-to-business electric commerce in Japan
(compared to the total amount of all business-to-business electric commerce)
B to C = Ratio of business-to-consumer electric commerce in Japan
(compared to the total consumer spending of all households)
Figures for "B to B" are projections from 1999 and onwards,
while those for "B to C" are from 2000. Data estimated using projections of the U.S., etc.

(2) Amount of trade and direct inward investment



Note: Amount of trade: total of nominal export and nominal import on a customs-clearance basis.

Sources: Ministry of Finance, "Foreign Direct Investment," "The Summary Report on Trade of Japan";
Ministry of International Trade and Industry "Size of Market Study for Electronic Commerce";
Electronic Commerce Promotion Council of Japan, Andersen Consulting,
"Market Survey Concerning Electronic Commerce."

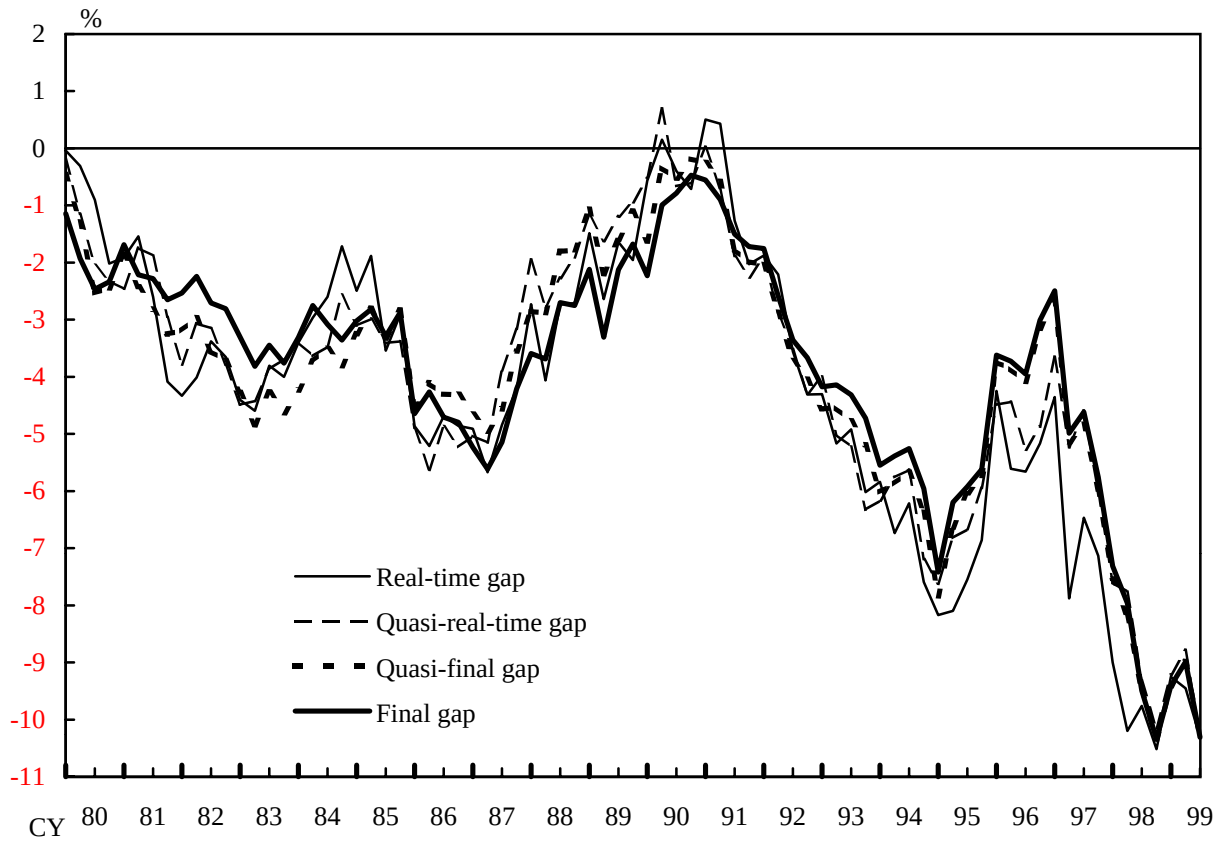
Theories Regarding the Deflationary Spiral

	Emphasis on debt-deflation	Emphasis on deflationary expectations	Emphasis on the credit paradigm
Characteristic	The real debt outstanding of a debtor increases due to deflation. This causes a decline in effective demand from cutbacks in spending and induces further deflation.	Deflationary expectations caused by a substantial demand shock increases real interest rates and decreases effective demand. Thus, deflation induces further deflation automatically.	The financial intermediary function of financial institutions deteriorates and debtors reduce their spending due to increases in costs of capital. Thus, further deflation occurs.
Prerequisite	The economy has extremely large debt as a whole. Debtors try to pay their debts at the same time.	Dynamic Keynes model (1) Gradual adjustments are made to prices and nominal wages, and demand determines the amount of production. (2) The Phillips curve exists between prices and the number of employment. (3) Expectations are adaptive.	Financial crisis occurs simultaneously.
Process of deflationary spiral	(1) Deflation occurs (2) The real debt outstanding of debtors (nonfinancial corporations, farmers, and households) increases. (3) Debtors reduce spending such as investment and consumption at the same time in order to reduce their nominal debt outstanding. (4) Decrease in effective demand and a further deterioration of the economy. (5) Further deflation. (6) Back to (2), and a deflationary spiral progresses.	(1) A substantial demand shock occurs. (2) Divergence from the equilibrium growth path. (3) Strong deflationary expectations occur. (4) Real interest rate rises. (5) Effective demand decreases. (6) Deflation occurs by self-fulfillment. (7) Back to (3) and a deflationary spiral progresses.	(1-1) A recession and deflation occur. (1-2) A financial crisis occurs. (2-1) Real debt outstanding of debtors increases and owner's capital (at collateral value) depreciates. (2-2) A bank run occurs and deposits at some banks intensifies. (2-3) Financial institutions choose a portfolio which is safe and has liquidity. (3-1) Credit rationing is implemented and financial intermediation fees rise for debtors (mainly small corporations, farmers, and households) that are in danger of defaulting on debts to financial institutions. (3-2) Credit contraction to debtors (mainly small corporations, farmers, and households) caused by the failure of financial institutions. (4) Debtors reduce spending due to the increase in costs of capital. (5) Effective demand decreases and the recession worsens. (6) Deflation progresses further. (7) Back to (1-2) or (2) and a deflationary spiral progresses.

Sources:Fisher(1933),Tobin(1975), Bernanke(1983)

Measurement Errors in the Output Gap due to Data Accumulation and Revisions

-- Fixed capacity utilization rate of nonmanufacturers --



Note: In order to smooth the fluctuation in the gaps, data from 1996/Q1-1998/Q1 in Chart 11 have been adjusted to take into account the effects from the surge in demand ahead of the rise in consumption tax and the decrease that followed. Here, however, such adjustments are not made to make clear the estimation gap from data accumulation and revisions.

(1) Real-time gap
The gap is estimated from data available during the estimation period.
--The gap calculated each time preliminary GDP figures are released.

(2) Quasi-real-time gap
The gap is estimated using the revised GDP figures available during the estimation period.
--The gap is calculated using the revised GDP figures instead of the preliminary figures.

(3) Quasi-final gap
The gap is estimated on the assumption that the data used are currently available during the estimation period.

(4) Final gap
The gap is estimated on the assumption that the estimation period continues to the present and the data used are currently available.

(Assumed model)

(1) Assume the Cobb-Douglas production function and calculate the Solow residual by taking the logarithm.

$$Y_t = A_t * K_{t-1}^{\alpha} * L_t^{1-\alpha} \longrightarrow \quad lnA_t = lnY_t - \alpha * lnK_{t-1} - (1-\alpha) * lnL_t$$

(2) Assume the linear trend of TFP and estimate the TFP from the Solow residual obtained in (1). However, assume temporary upward shift of TFP from 1985/1Q-1991/4Q.

$$lnA_t = b_0 + b_1 * Trend_t + e_t \longrightarrow \quad lna_t = b_0 + b_1 * Trend_t$$

(3) Calculate the potential GDP by substituting maximized input of capital and labor, and TFP into the production function.

$$QN_t = \alpha_t * Kmax_{t-1}^{\alpha} * Lmax_t^{1-a}$$

(4) Calculate the output gap as the rate of divergence between GDP and potential GDP.

(variables used)

Y: GDP, A: Solow residual, a: TFP, K: operating capital stock, L: amount of labor input, a: capital share,
Trend: linear trend, Kmax: maximum operating capital stock, Lmax: maximized amount of labor input, QN: potential GDP

Chart B-2

Estimation Method of the Output Gap
(Revised capacity utilization rate of nonmanufacturers)

1. Estimation of Total Factor Productivity (TFP)

(1) Assume the Cobb-Douglas production function

$$Y_t = A_t \cdot (H_t \cdot L_t)^{1-\alpha} \cdot (Om_t \cdot Km_{t-1} + Oo_t \cdot Ko_{t-1})^{\alpha}$$

Y_t : real GDP, A_t : TFP, H_t : total hours worked, L_t : number of workers employed,

α : capital share ratio, Om_t : capacity utilization rate (manufacturing),

Km_t : capital stock (manufacturing), Oo_t : capacity utilization rate (nonmanufacturing),

Ko_t : capital stock (nonmanufacturing)

(2) Calculation of TFP

Obtain TFP (At) by taking the logarithm on both sides of the equation and then subtracting the contribution of capital and labor from the GDP

$$\ln A_t = \ln Y_t - (1-\alpha) \cdot \ln(H_t \cdot L_t) - \alpha \cdot \ln(Om_t \cdot Km_{t-1} + Oo_t \cdot Ko_{t-1})$$

2. Calculation of potential GDP

Potential GDP = "GDP produced using both maximized capital and labor." Then, substitute the maximum input amount of each production factor of capital and labor to the production function calculated in 1.

$$QN_t = A_t \cdot (H\max_t \cdot L\max_t)^{1-\alpha} \cdot (Om\max_t \cdot Km_{t-1} + Oo\max_t \cdot Ko_{t-1})^{\alpha}$$

QN_t : potential GDP, A_t : TFP, $Hmax_t$: maximum total hours worked,

$Lmax_t$: maximum number of workers employed, α : capital share ratio,

$Ommax_t$: historically maximum value of capacity utilization rate (manufacturing),

Km_t : capital stock (manufacturing),

$Oomax_t$: historically maximum value of capacity utilization rate (nonmanufacturing),

Ko_t : capital stock (nonmanufacturing)

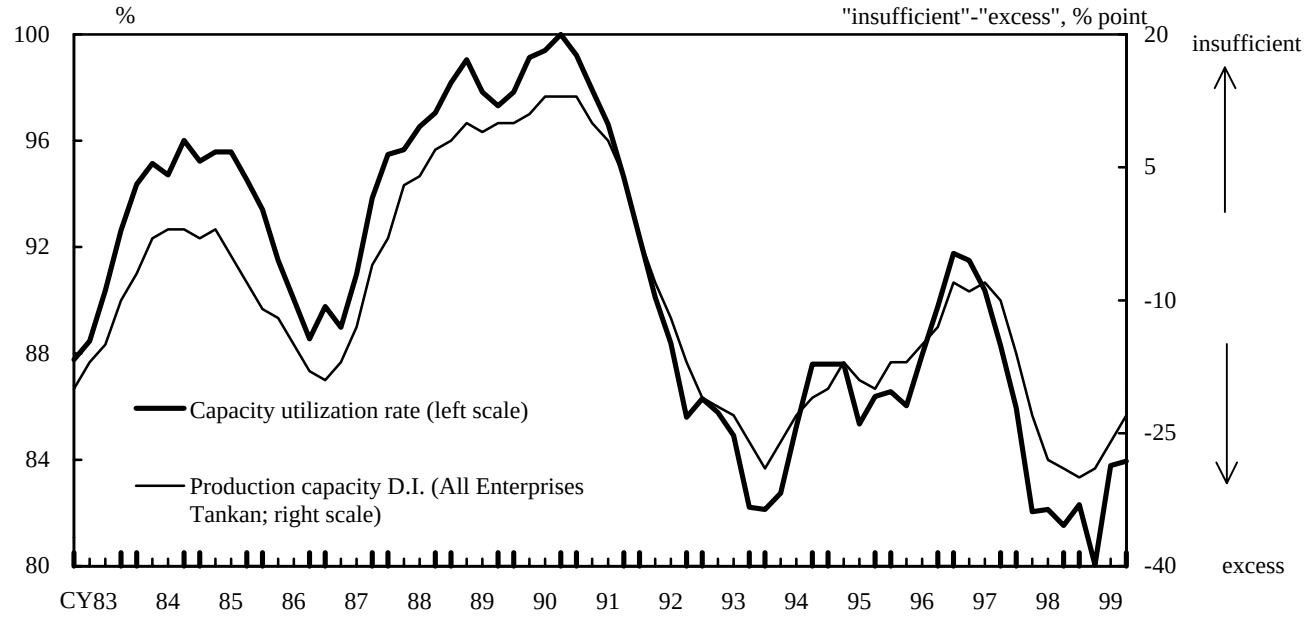
3. Calculation of the output gap

Calculate the output gap using the rate of divergence between GDP and potential GDP.

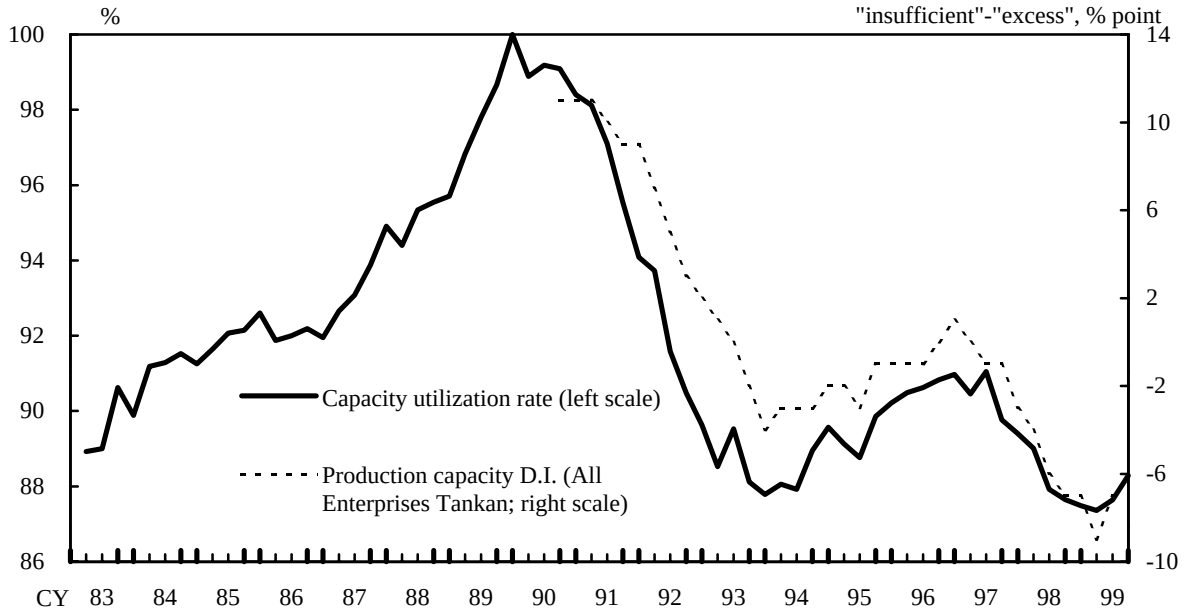
$$GAP_t = \frac{GDP_t}{QN_t} \cdot 100 - 100$$

Capacity Utilization Rate (Output gap estimation)

(1) Capacity utilization rate of manufacturers



(2) Capacity utilization rate of nonmanufacturers



Note: Capacity utilization rate: historically maximum value = 100

<Estimation method of the capacity utilization rate (nonmanufacturing)>

(1) Regress commercial power unit on BSI and make it level using the parameter.

(Estimation)

Commercial power unit = 487.3 + 2.10 × Trend + 4.72 × BSI + ε

(130.3) (24.7) (11.1)

Estimation period : 1983/Q2-1999/Q4, Adj-R^2: 0.90, D.W.ratio: 0.58

Unit of electric power for business use:

commercial unit = commercial electricity consumption / commercial power contracts.

Trend : linear trend during the estimation period.

(2) From the estimation result, the capacity utilization rate of nonmanufacturers is obtained by:

capacity utilization rate of nonmanufacturers = (487.3 + 4.72 × BSI) / max (487.3 + 4.72 × BSI) × 100

Chart C-1

Stability Test of the Phillips Curve

[Basic model]

Time-variant Phillips curve: $\pi_t = \alpha + \beta \cdot \pi_{t-1} + \gamma (GAP_t - GAP_t^*) + \delta \cdot WPIIM_t + \varepsilon_t$

Short-run anchor of the output gap: $\mathrm{GAP}_t^* = \Sigma_{i=1}^4 \omega_i \cdot \mathrm{GAP}_{t-i} + (1 - \Sigma_{i=1}^4 \omega_i)\mathrm{GAP}^{**}$

- π_t: quarter-to-quarter trend cycle of the CPI (annualized)
- GAP_t^*: short-run anchor of the output gap
- GAP^{**}: mid-run anchor of the output gap
- $WPIIM_t$: quarter-to-quarter change (annualized) of import prices (wholesale prices, yen basis, total average)

-------- The short-run anchor GAP_t^* of the output gap is determined by the mid-run anchor and the short-run hysteresis of the output gap. This formula is based on the idea that although the expected anchor of the short-run gap takes a constant value in the mid-run, it is adjusted adaptively taking into account the actual gap. The inflation rate of the current quarter is determined by the expected inflation rate $(\alpha + \beta \cdot \pi_{t-1})$, the divergence from the short-run anchor of the output gap $(GAP_t - GAP_t^*)$, and import prices.

[Estimation]

$$\pi_t = \mu + \beta \cdot \pi_{t-1} + \lambda_0 \cdot GAP_t + \lambda_1 \cdot \Delta GAP_t + \lambda_2 \cdot \Delta GAP_{t-1} + \lambda_3 \cdot \Delta GAP_{t-2} + \lambda_4 \cdot \Delta GAP_{t-3} + \delta \cdot WPIIM_t + \varepsilon_t$$

Where,

$$\mu = \alpha - \gamma(1 - \Sigma_{i=1}^4 \omega_i) GAP^{**}$$
$$\lambda_0 = \gamma(1 - \omega_1 - \omega_2 - \omega_3 - \omega_4)$$
$$\lambda_1 = \gamma(\omega_1 + \omega_2 + \omega_3 + \omega_4)$$
$$\lambda_2 = \gamma(\omega_2 + \omega_3 + \omega_4)$$
$$\lambda_3 = \gamma(\omega_3 + \omega_4)$$
$$\lambda_4 = \gamma \cdot \omega_4$$

[Testing of statistical hypothesis]

mid-run stability: $H_0 : \Sigma_{i=1}^4 \omega_i = 0 \quad \leftrightarrow \quad H_0 : \lambda_1 = 0$ (however, $\lambda_0 \neq 0$)

short-run stability: $H_0^{'} : \omega_1 = \omega_2 = \omega_3 = \omega_4 = 0 \leftrightarrow H_0^{'} : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$

Estimation of the Time-variant Phillips Curve and the Test of Stability

H_0: The Phillips curve is stable in the mid-run ($\lambda 1=0$).

H_0': The Phillips curve is stable in the short-run ($\lambda i=0$, i=1,…,4).

Estimation period	1984Q2 -1999Q4	1987Q2 -1999Q4	1990Q2 -1999Q4	1984Q2 -1991Q4	1984Q2 -1994Q4	1984Q2 -1997Q4
u	1.49 [.000]	1.75 [.000]	1.87 [.002]	1.44 [.020]	1.62 [.001]	1.69 [.000]
β	0.60 [.000]	0.51 [.000]	0.50 [.002]	0.63 [.000]	0.57 [.000]	0.56 [.000]
λ_0	0.19 [.001]	0.23 [.000]	0.24 [.003]	0.18 [.085]	0.21 [.007]	0.23 [.000]
λ_1	-0.04 [.713]	-0.09 [.483]	-0.01 [.963]	-0.06 [.768]	-0.12 [.432]	-0.12 [.351]
λ_2	-0.15 [.174]	-0.19 [.107]	-0.11 [.471]	-0.21 [.264]	-0.27 [.075]	-0.25 [.039]
λ_3	-0.14 [.248]	-0.18 [.195]	-0.06 [.710]	-0.23 [.260]	-0.14 [.379]	-0.17 [.192]
λ_4	0.01 [.937]	-0.06 [.639]	-0.12 [.483]	0.14 [.484]	0.15 [.351]	0.13 [.313]
δ	0.01 [.000]	0.01 [.053]	0.01 [.329]	0.01 [.000]	0.01 [.000]	0.01 [.000]
R^2	0.83	0.84	0.85	0.83	0.80	0.83
Adj-R^2	0.80	0.82	0.82	0.78	0.76	0.80
Durbin's h	1.06	2.15	6.37	0.58	0.72	0.50
Wald Test (P-value) $\lambda i=0$(i=1,…,4)	0.582	0.394	0.872	0.552	0.321	0.173

Note: Figures in parentheses are P-value.

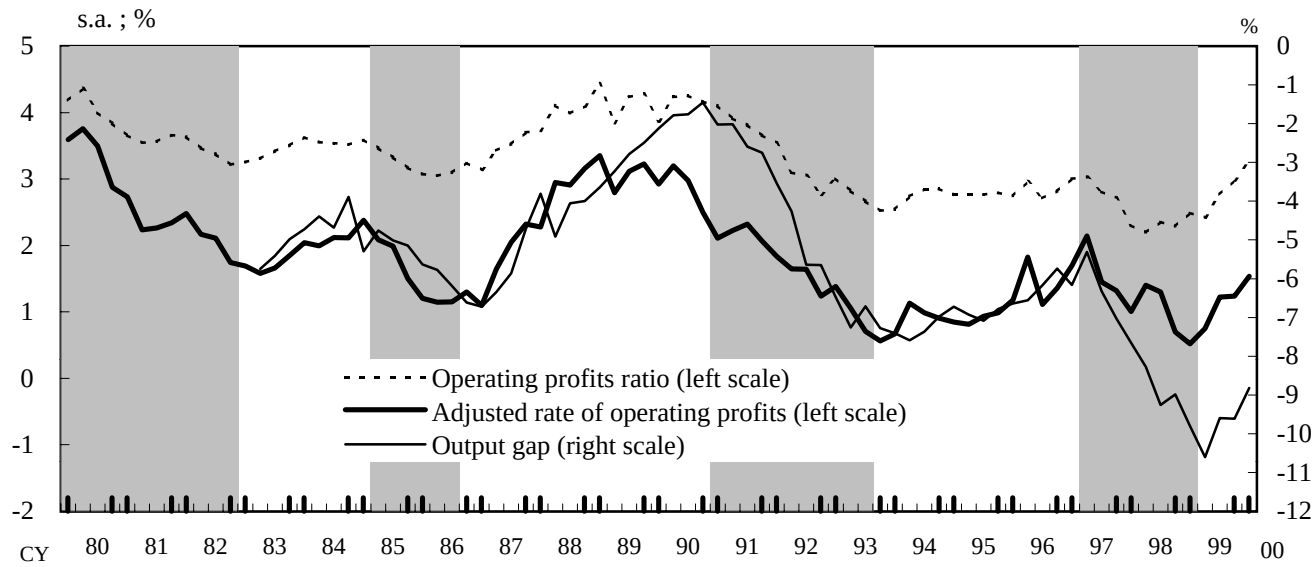
Reference: The weight of the short-run hysteresis in the output gap

ω_1	0.76	0.82	0.44	1.14	1.30	1.13
ω_2	0.03	-0.00	-0.17	0.24	-0.41	-0.24
ω_3	-0.81	-0.48	0.26	-2.19	-1.63	-1.51
ω_4	0.02	-0.34	-0.53	0.81	0.73	0.61

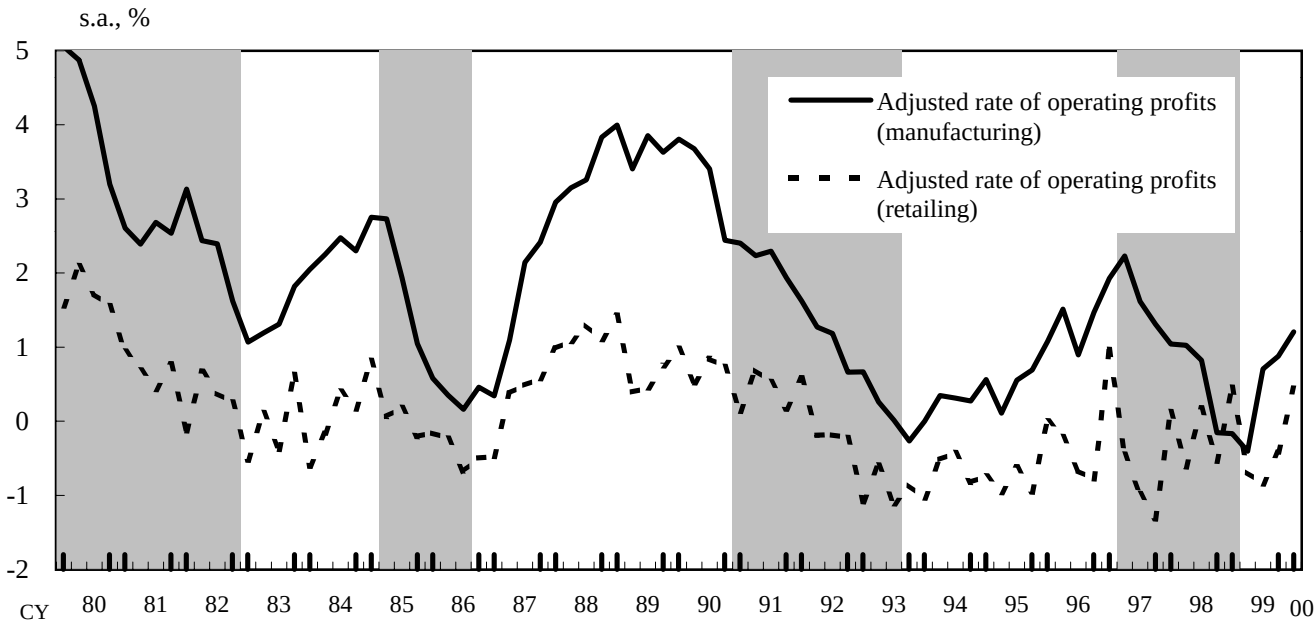
Note: Each weight is the estimation calculated on the assumption that $\lambda 1=0$

Ratio of Operating Profits

(1)All industries



(2)Manufacturing and Retail industries



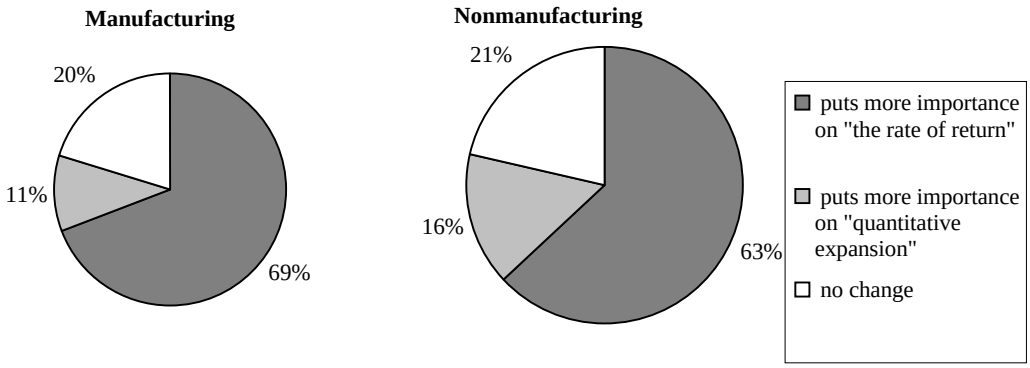
Notes: 1.Data for operating profits ratio based on firms of all scales in the *Financial Statements Statistics of Corporations by Industry, Quarterly*. Adjusted for the discontinuity of the figures.
2.Output gap = revised capacity utilization rate of nonmanufacturers. (Chart 11(1))
3.Shaded areas indicate recession periods.
4.Adjusted rate of operating profits uses the following cost of capital instead of depreciation expenses in the *Financial Statistics of Corporations by Industry, Quarterly.* The definition is:
Capital cost=prices of capital goods × (real interest rate+capital consumption rate) × net capital stock.
Prices of capital goods: capital goods of WPI
Real interest rate: Government bond yield to subscribers (10-year) - rate of change in prices of capital goods.
Capital consumption rate=1- (ratio of remaining value ^(1/average years used))
Ratio of remaining value=amount of tangible fixed net assets/amount of tangible fixed gross assets.
(Data from the "*National Wealth Survey 1970*" are used for both ratio of remaining value and average years used.)
Net capital stock=capital stock of firms (equipped, seasonally adjusted) × ratio of remaining value.
However, data for the most recent capital stock uses the growth rate of all industries (private enterprises) on an actual execution basis.

Sources: Ministry of Finance, "Financial Statements Statistics of Corporations by Industry, Quarterly";
Economic Planning Agency, "Gross Capital Stock of Private Enterprises," etc.

Chart D-2

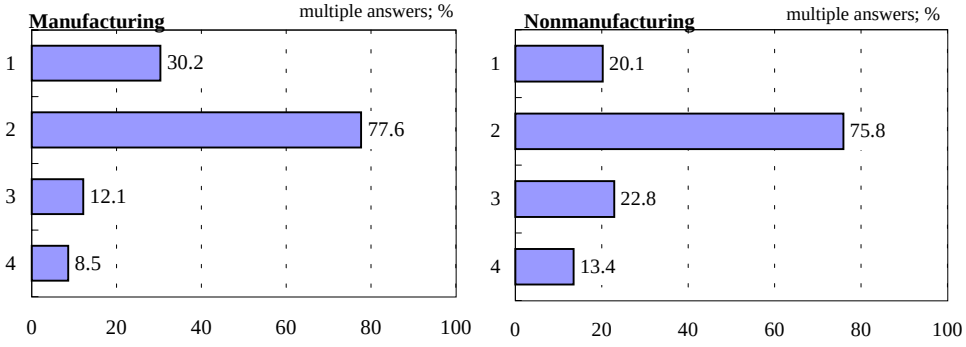
Japanese Corporate Management Strategy

(1) Change in management strategy (comparison with 1996-97)



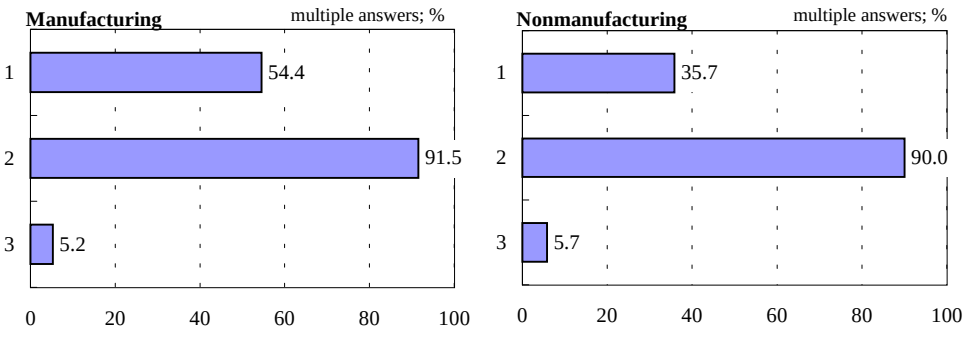
(2) Management strategy attaching importance to "the rate of return"

(i) Reasons for that change



1: A strong pressure to increase the rate of return from banks and stockholders
2: Difficult to expect growth in the product market, compared with the past
3: Difficult to make quantitative expansion because of financial difficulty, compared with the past
4: Other

(ii) Measures to achieve a goal

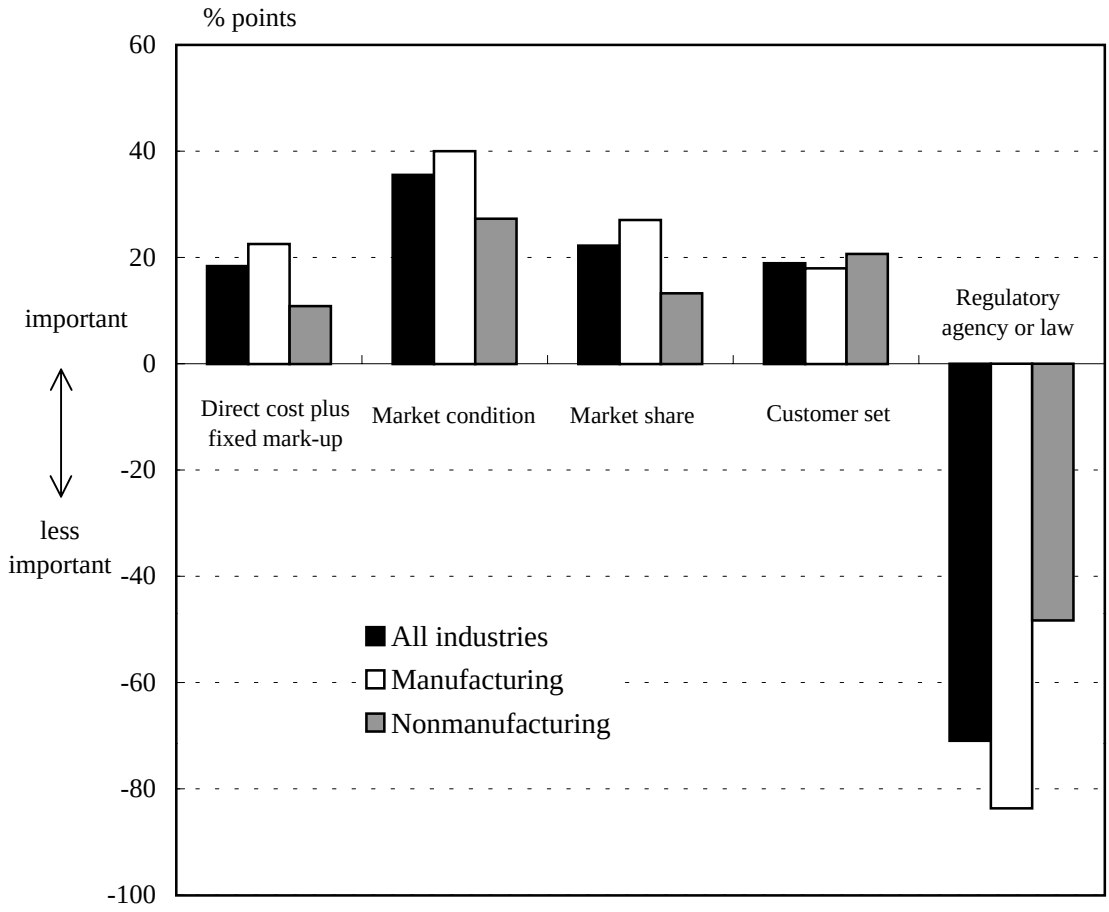


1: Keep the rate of return by product differentiation without increasing or decreasing prices, compared with the past
2: Keep the rate of return by further increase in productivity and reduction in costs
3: Other

Source: Bank of Japan (2000b), "Price-Setting Behavior of Japanese Companies."

Chart D-3

Factors Determining Price Setting



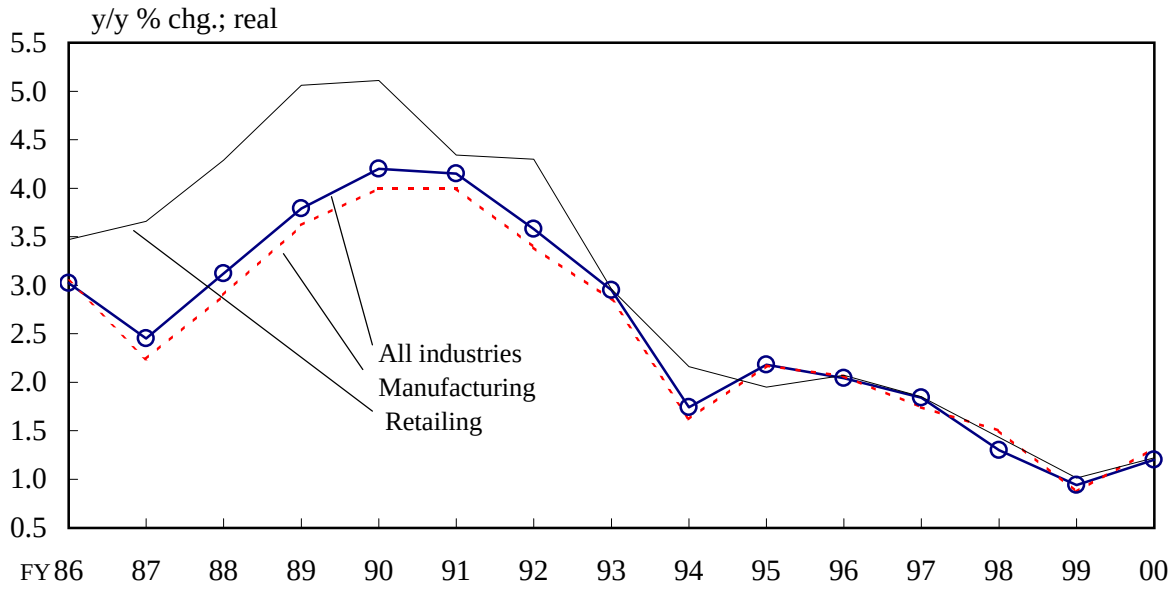
Note: DI = Percentage of companies responding "important" minus percentage of companies responding "less important"

Question: (i) Direct cost plus fixed mark-up
Price is made of direct costs (personnel expenses or material costs) per unit plus a fixed percentage mark-up which is set at a level designed to achieve a desired gross profit per unit.
(ii) Market condition
Price is set at the upper limit permitted by the market (weak relationship with costs, such as personnel expenses or material costs and strong relationship with supply-demand condition of markets).
(iii) Market share
Price is determined by importance of market share (quantitative expansion) and competitor prices (foreign companies or imported products) rather than mark-up.
(iv) Customer set
Price is specified by principal customer.
(v) Regulatory agency or law
Price is determined by a regulatory agency or law.

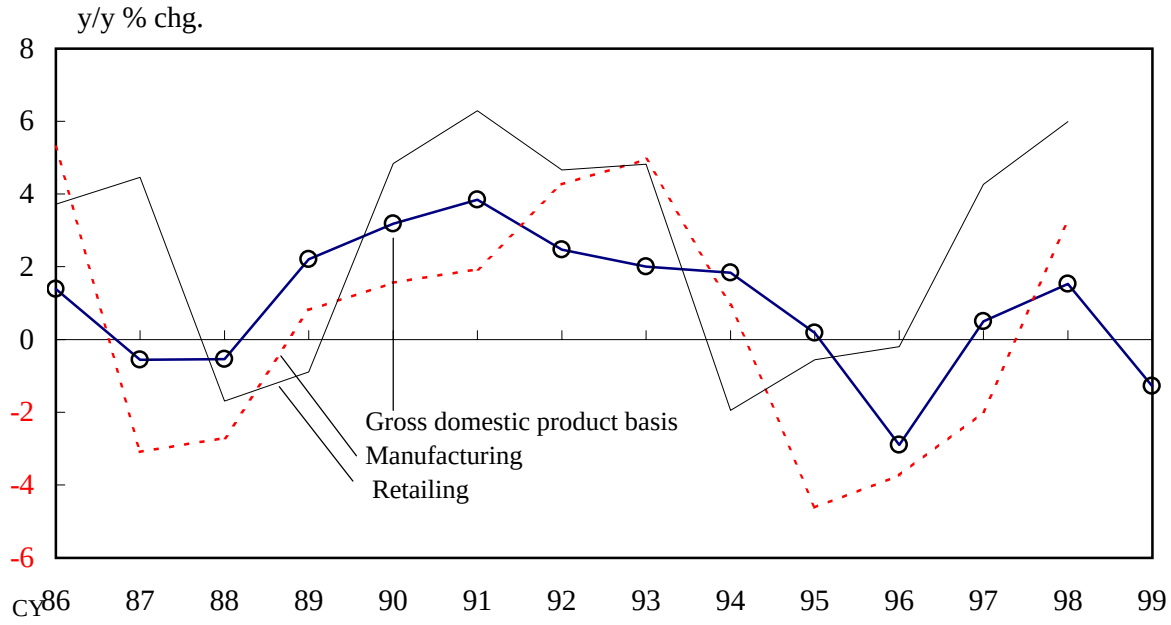
Sources: Bank of Japan (2000b), "Price-Setting Behavior of Japanese Companies."

Price Setting of Firms from 1998-1999

(1) Growth rate of industry demand forecasted by firms
(average growth rate for the following 3 years)



(2) Unit Labor Cost

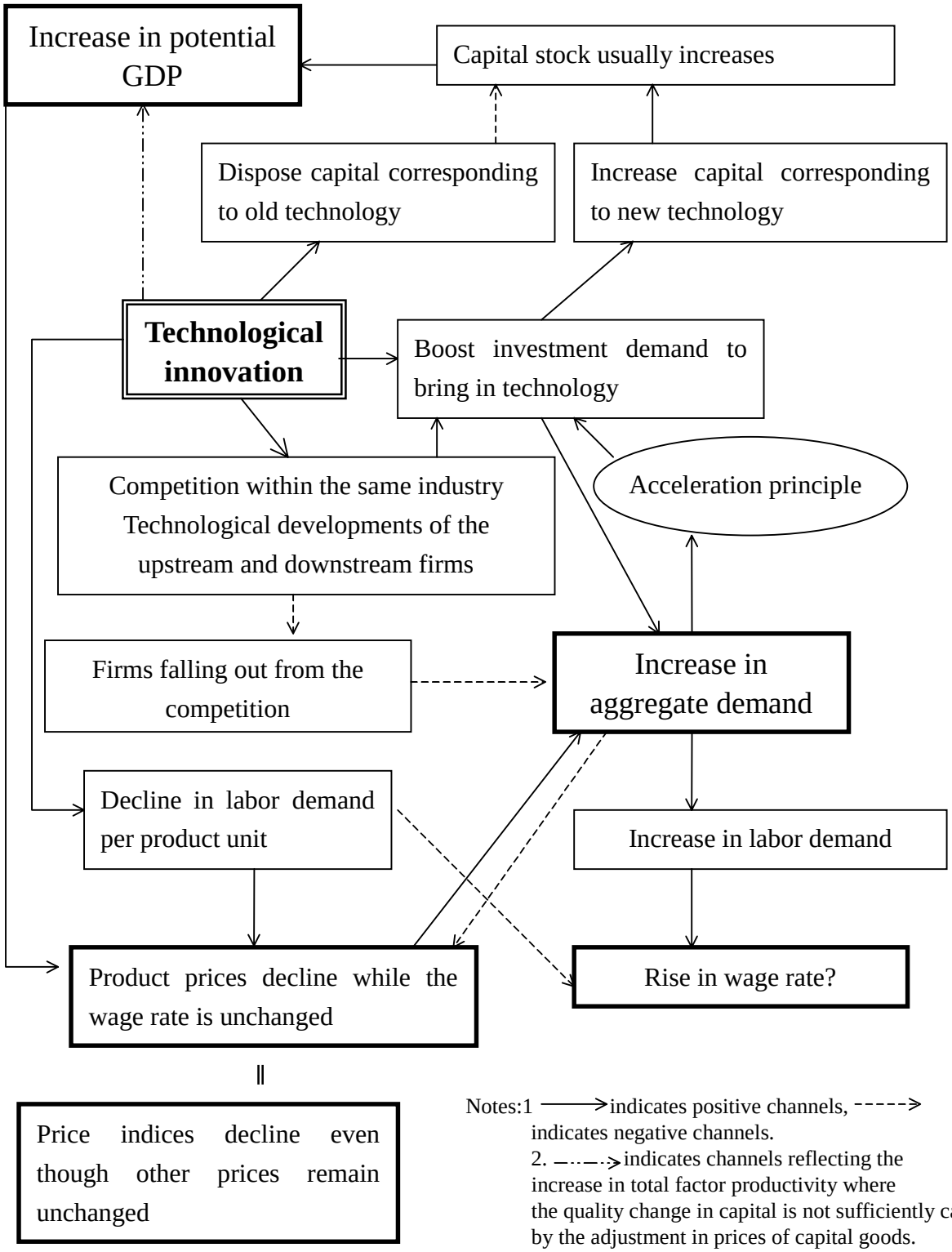


Note: Unit Labor Cost=Compensation of employees/Amount of real gross domestic product (value added basis)

Sources: Ministry of Finance, "Financial Statements Statistics of Corporation by Industry, Quarterly"; Economic Planning Agency, "National Accounts," "Report of Survey Research Concerning Corporate Behavior (*Kigyo Koudo ni Kansuru Anketo Chousa Houkoku*), FYs 1998, 1999."

Chart E-1

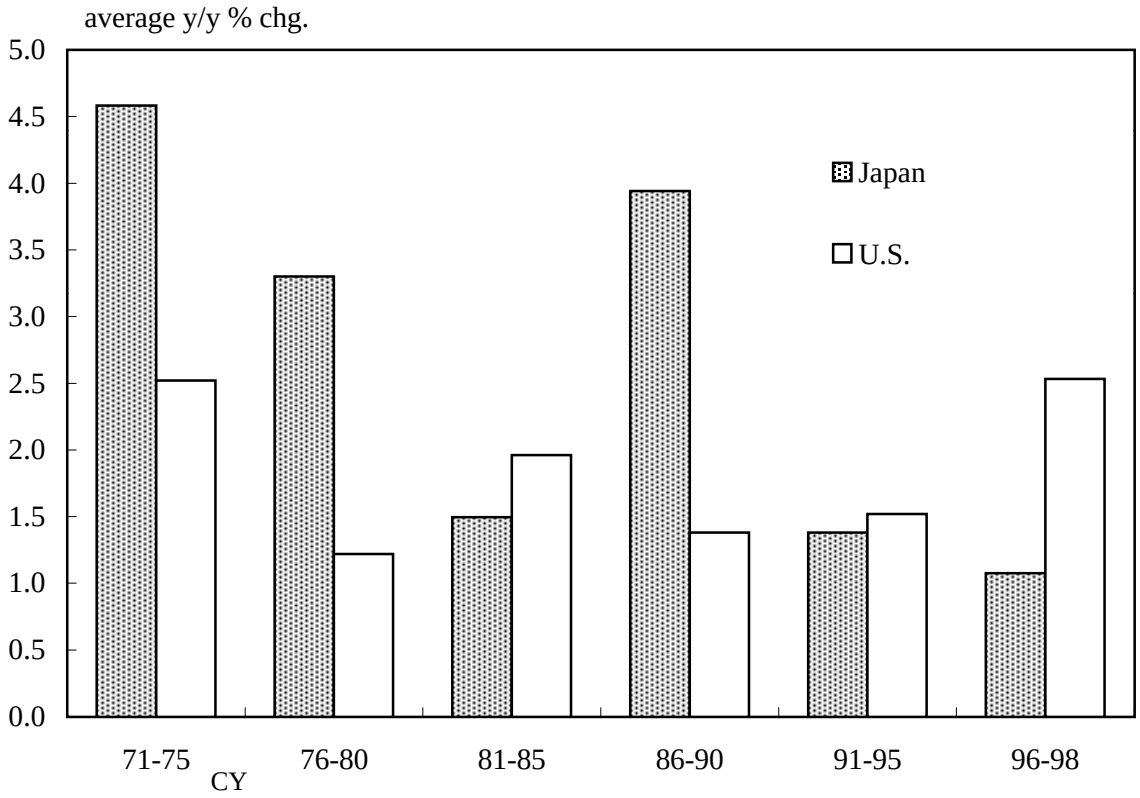
Price Changes due to Technological Innovation



Notes:1 ——→ indicates positive channels, - - - - - → indicates negative channels.
2. —·—·→ indicates channels reflecting the increase in total factor productivity where the quality change in capital is not sufficiently captured by the adjustment in prices of capital goods.

Chart E-2

Labor Productivity (Japan/U.S.)



Note: 1 Definition of labor productivity

U.S. : Real GDP(excluding agricultural industry)/labor input (compiled by the U.S.Department of Labor)

Japan

:Real GDP (excluding agricultural, forestry, and fishery industries)/
(number of employees<excluding forestry, agricultural, and fishery industries>×
total hours worked.)

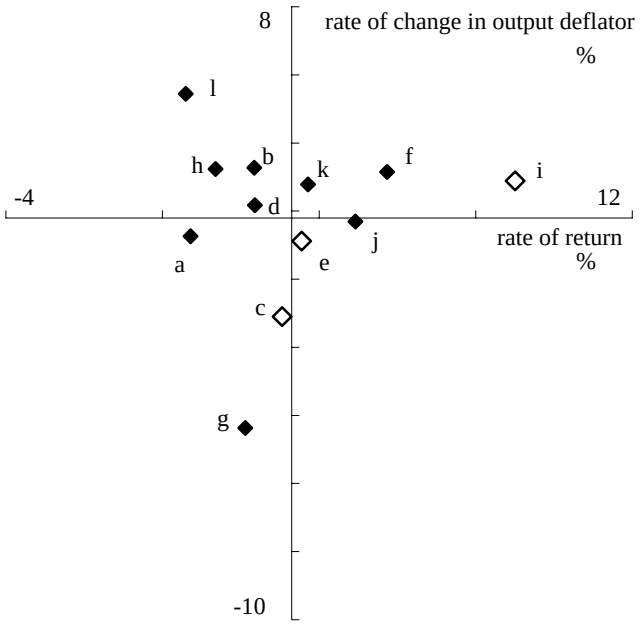
2. Average year-to-year percent changes = average of year-to-year change of each year.

Sources: Data from the U.S.Department of Labor; Economic Planning Agency, "National Accounts"; Ministry of Labor, "Monthly Labour Survey."

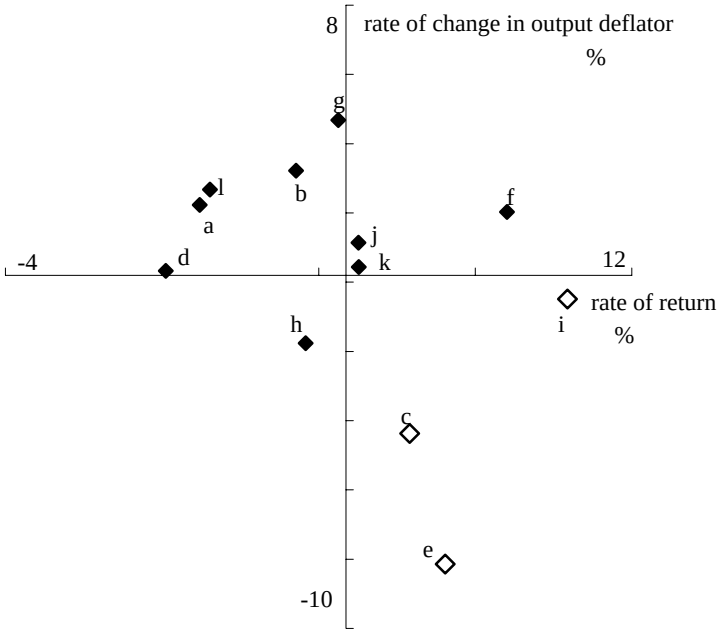
Rate of Return and Prices (Japan/U.S.)

1. U.S.

(1) 1985-1989



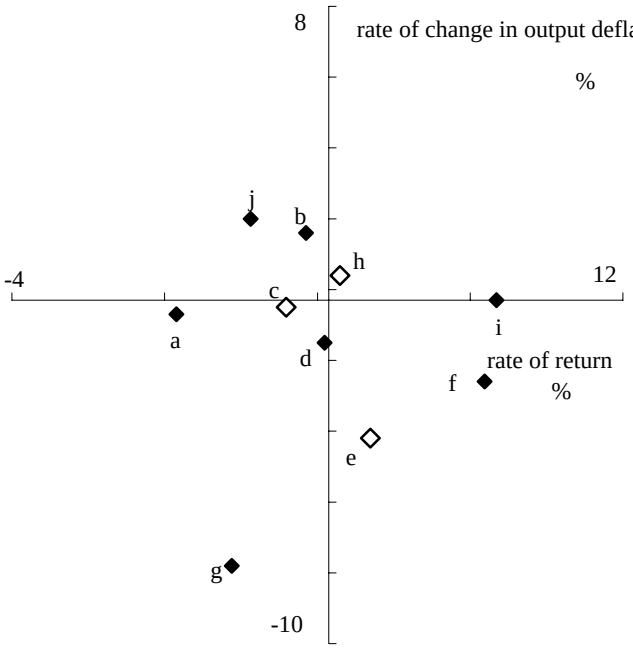
(2) 1995-1997



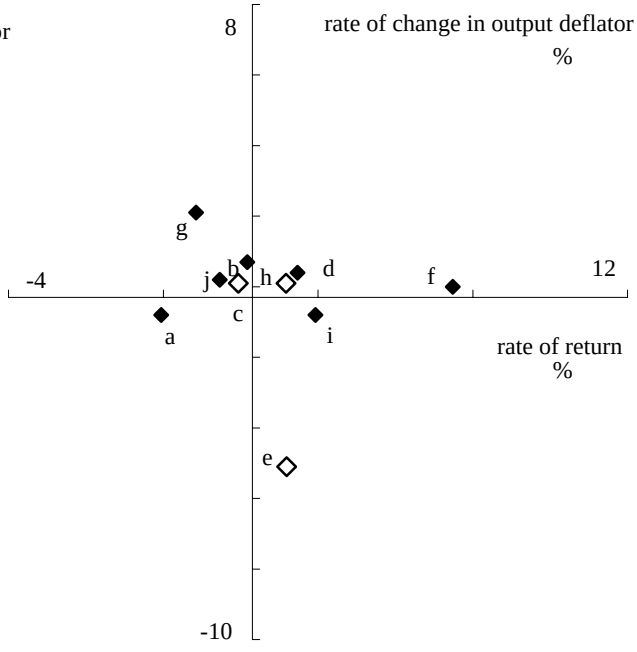
a:Agricultural, forestry, and fishery industry b:Construction industry **c:Industrial machinery industry** d:Motor vehicles industry **e:Electrical machinery industry** f:Chemicals industry g:Petroleum and coal industry h:Transportation industry **i:Telecommunications industry** j:Wholesaling industry k:Retailing industry l:Services industry

2. Japan

(1) 1985-1989



(2) 1995-1998



a:Agricultural, forestry, and fishery industry b:Construction industry **c:General machinery industry** d:Transportation equipment industry **e:Electrical machinery industry** f:Chemicals industry g:Petroleum and coal industry h:**:Telecommunications and transportation industry** i:Wholesaling and retaling industry j:Services industry

Notes: 1. For both 1985-1989 and 1995-1997, the horizontal and vertical axes intersect at the average value of the rate of return and the rate of change in output deflator of all industries.

2. Among the rates of return of the U.S. during 1995-1997 in 1, data for industrial machinery, motor vehicles, electrical machinery, chemicals, and petroleum and coal industries are 1995 figures.

Sources: Economic Planning Agency, "National Accounts"; Ministry of Finance, "Financial Statements Statistics of Corporation by Industry, Quarterly"; Data from the U.S. Department of Commerce.