

*JSPS Grants-in-Aid for Scientific Research (S)*  
*Understanding Persistent Deflation in Japan*

*Working Paper Series*

*No. 011*  
*June 24, 2013*

This is the pre-peer- reviewed version of the following article: “Chronic Deflation in Japan”,  
*Asian Economic Policy Review*, vol. 9, issue 1, which has been published in final form at  
<http://onlinelibrary.wiley.com/doi/10.1111/aepr.12041/abstract> and DOI: 10.1111/aepr.12041.

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## Chronic Deflation in Japan

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This paper was presented at the Seventeenth Asian Economic Policy Review(AEPR) Conference  
“Japan’s Persistent Deflation and Monetary Policy,” July 15, 2013, Tokyo

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# **Chronic Deflation in Japan**

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## **Abstract**

Japan has suffered from long-lasting but mild deflation since the latter half of the 1990s. Estimates of a standard Phillips curve indicate that a decline in inflation expectations, the negative output gap, and other factors such as a decline in import prices and a higher exchange rate, all account for some of this development. These factors, in turn, reflect various underlying structural features of the economy. This paper examines a long list of these structural features that may explain Japan's chronic deflation, including the zero-lower bound on the nominal interest rate, public attitudes toward the price level, central bank communication, weaker growth expectations coupled with declining potential growth or the lower natural rate of interest, risk averse banking behavior, deregulation, and the rise of emerging economies.

**Key words:** deflation, Japan

**JEL codes:** E31, E58, O53

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## 1. Introduction

Why have price developments in Japan been so weak for such a long time? What can leading-edge economic theory and research tell us about the possible causes behind these developments? Despite the obvious policy importance of these questions, there has been no consensus among practitioners nor in academia. This paper is an attempt to shed some light on these issues by relying on recent works on the subject in the literature.

The paper proceeds as follows. Section 2 presents some stylized facts regarding deflation in Japan. It shows that Japan has indeed experienced long-lasting but mild deflation and that its weak price developments are not attributable to any specific item—this is the case not only in a breakdown of time-series data but also in cross-country comparison. The section also looks into correlation of inflation with the output gap, the unemployment rate and money. Section 3 then explores the causes of prolonged deflation in Japan based on the now-standard New Keynesian Phillips curve, examining each of the explanatory variables—namely, inflation expectations, the output gap and other factors—in turn. In doing so, we not only describe developments in these variables, but also discuss what the driving forces underlying them are in order to discover the more fundamental reasons for the chronic deflation. Section 4 concludes the paper. Two appendices document chronologies of the Bank of Japan’s communication on price stability as well as government and media reports that reveal public attitudes toward the price level.

## 2. Stylized Facts

### 2.1 Price developments

Japan has suffered from long-lasting but mild deflation since the latter half of the 1990s (Table 1). After reaching 11.6 percent in the first half of the 1970s, annual average CPI inflation rates declined, becoming around zero or slightly negative from the middle of the 1990s. A similar trend can be observed for inflation rates calculated from the GDP deflator, although they tend to be somewhat weaker than CPI inflation. The weakness of these prices from the mid-1990s onward becomes more evident, once the hike of oil prices and the depreciation of the yen against the US dollar are taken into account. Meanwhile, the Domestic Corporate Goods Price Index (DCGPI), which is an equivalent of the Producer Price Index (PPI), shows considerable volatility. It

declined sharply around the middle of the 1980s when oil prices fell and the yen appreciated. After the turn of the millennium, the DCGPI increased significantly until 2007, but then decreased sharply in the wake of the Lehman Crisis.

A breakdown of CPI inflation into its major components suggests that most of components contributed to the slowdown in CPI inflation from the mid-1990s onward. For instance, durable goods prices, which had pushed down inflation already since the mid-1980s, fell more rapidly in the 2000s. Price changes in other goods and services, which used to raise inflation, became almost flat or turned negative in the 1990s. On the other hand, the energy component raised inflation from 2000 onward, reflecting developments in commodity markets.

## 2.2 Cross-country comparison

Japan's CPI inflation rates have been consistently lower than those of the United States and the euro area (Figure 1, top left-hand panel). For instance, the difference between CPI inflation rates in Japan and the United States (based on five-year backward moving average) amounted to about -2 percentage points in the 1990s (second panel on the right-hand side). The difference widened to around -3 percentage points for the 2000s before narrowing somewhat following the Lehman crisis.

Japan's inflation is lower with regard to both goods and services prices. The gap in goods prices inflation shows some volatility, presumably due to the effects of the exchange rates and commodity prices (Figure 1, top right-hand panel). Meanwhile, the gap in service prices inflation has been more stable, even in the latter half of the 2000s (second panel on the left-hand side).

The comparatively low CPI inflation in Japan does not seem to be attributable to any specific item. While it is true that the inflation gap between Japan on the one hand and the United States and the euro area on the other is particularly pronounced in durable good prices (Figure 1, third panel on the left-hand side)---probably because of the greater weights attached to IT-related gadgets (PC, flat-panel TV, etc.), the greater competition among retailers of these products, and the difference in the manners of quality adjustment in the CPI compilation---durable goods are not the only component where there is a notable gap (third panel on the right-hand side). For instance, when stripping out the effects of housing rents, the measurement of which differs considerably from country to country, service price inflation is notably weaker in Japan (bottom right-hand panel).

The weakness in nominal variables in Japan can also be observed in unit labor costs and long-term bond yields, which are rough proxies of the costs of labor and capital for producing goods and services (Figure 2).<sup>1</sup>

### 2.3 Correlation with other variables

There exists a clear positive correlation between inflation and the output gap (indicated by the thick regression line in the top left-hand panel of Figure 3).<sup>2</sup>

However, that positive correlation appears to have weakened---as indicated by the flatter regression line for the post-2000 sample---and have shifted downward as inflation slowed from the 1980s to the 1990s and then the 2000s.

Similarly, a clear correlation can be observed between nominal wage increases and the unemployment rate (right-hand panel of Figure 3). However, that correlation becomes weak if the sample is limited to the period after 2000---the coefficient of determination ( $R^2$ ) drops to 0.12 from 0.59 for the entire sample.

In contrast, no clear correlation emerges between inflation and money. If money velocity  $v$  is stable, cross plots of inflation rates  $\Delta p$  and changes in money over real GDP  $\Delta m - \Delta y$  should scatter around the 45-degree line (lower left-hand panel of Figure 3).<sup>3</sup> However, there is no strong correlation between these two variables and the slopes of the regression lines are far from the 45-degree line.<sup>4</sup> This may be taken as indicating that money velocity is not sufficiently stable in Japan.<sup>5</sup>

## 3. Pathology

In order to examine the causes for this long-lasting deflation, we couch our investigation in terms of the now-standard New Keynesian Phillips curve, which explains inflation  $\pi_t$  by inflation expectations  $E_t\pi_{t+1}$ , the output gap  $Gap_t = y_t - y_t^n$  and other factors  $u_t$  such that:

$$\pi_t = \beta E_t \pi_{t+1} + \alpha Gap_t + u_t. \quad (1)$$

<sup>1</sup> Recently, Yoshikawa (2013) argues that it is a change in Japanese labor markets that caused deflation in Japan through a decline in nominal wages.

<sup>2</sup> The output gap is lagged by four quarters to maximize its correlation with inflation.

<sup>3</sup> This is because  $\Delta p = \Delta m - \Delta y + \Delta v$  (or  $MV = PY$ ).

<sup>4</sup> Kimura *et al.* (2010) point out that in recent years the correlation has become obscure not only in Japan but also in other major industrial countries.

<sup>5</sup> See Sudo (2011) for a discussion of recent developments in money velocity in Japan.

Following Cogley and Sbordone (2008), we first estimate equation (1) by introducing time-varying trend inflation  $\bar{\pi}_t$ . In addition, inflation inertia and time-varying coefficients are taken into account (see Appendix 1 of Nishizaki *et al.* (2012) for details of the estimation):

$$(\pi_t - \bar{\pi}_t) = \rho(\pi_{t-1} - \bar{\pi}_t) + b_t E_t(\pi_{t+1} - \bar{\pi}_t) + a_t Gap_t + u_t. \quad (2)$$

Here, trend inflation  $\bar{\pi}_t$  corresponds to long-run inflation expectations, to which inflation converges in the absence of additional shocks.

Table 2 shows the contributions of  $\pi_{t-1}$ ,  $\bar{\pi}_t$ ,  $Gap_t$  and  $u_t$  to the actual rate of CPI inflation. As can be seen, each of the four components contributes to the weakness in price developments. For example, the positive contribution of trend inflation diminished from the mid-1990s, while the contribution of the output gap turned negative. Moreover, the negative contribution of other factor increased somewhat during the 2000s.

In the remainder of this section, we will examine developments in each of the explanatory variables and consider what the driving forces are underlying these developments.

### 3.1 Inflation expectations

While there is a wide range of evidence suggesting that inflation expectations in Japan have declined, questions remain regarding how far and why. We will address these questions one by one.

#### 3.1.1 How far have inflation expectations declined?

Figure 4 shows various measures of expected inflation. All of them suggest that expected inflation declined to a greater or lesser extent over the past two decades or so. For instance, a survey of professional forecasters (the Consensus Forecast) shows that their forecast of inflation for a horizon of 6 to 10 years declined from 3 percent in the early 1990s to almost zero in the first half of the 2000s. Inflation expectations then recovered somewhat and have recently been stable around 1 percent. Trend inflation as estimated in the manner described above tracks Consensus Forecast inflation, partly because it utilizes information from the Consensus Forecast survey to detect trend inflation (see Nishizaki *et al.* 2012). Furthermore, a broadly similar inflation trend is obtained by Saito *et al.* (2012), who estimate trend inflation in their dynamic stochastic general equilibrium (DSGE) model by imposing a standard set of theoretical

restrictions without relying on the survey.

Particular importance is placed on the question whether or not expected inflation has fallen into the negative territory (Watanabe 2012). The reason is that, as argued by Benhabib *et al.* (2001) and Bullard (2010), if expected inflation was indeed negative, then Japan may have found itself in a liquidity trap equilibrium, in which the central bank was prevented from escaping from such a trap by cutting its policy interest rate due to the zero lower bound on the nominal interest rate. Heuristically, the Fisher equation,  $i = r^n + \pi^e$ , where  $i$  is the short-term nominal interest rate,  $r^n$  is the natural rate of interest and  $\pi^e$  is expected inflation, suggests that the zero lower bound on  $i$  becomes binding only when  $\pi^e$  becomes negative as long as  $r^n$  remains positive. We will discuss the possibility of a negative  $r^n$  later.

Although no consensus has yet emerged, it is quite likely that expected inflation has remained positive. Most surveys conducted either among professional forecasters or households suggest that long-run expected inflation has declined but has not turned negative. Such surveys include, for example, the above-mentioned Consensus Forecast as well as original household surveys conducted by Watanabe (2012). Of course, the reliability of these surveys may be questioned—for instance, households do not necessarily take quality adjustment into account and underlying inflation expectations therefore may be lower than the survey responses suggest. However, as seen above, these survey results seem to be consistent with the model-based inflation expectations estimated by Saito *et al.* (2012).

### 3.1.2 Why have inflation expectations declined?

Turning to the question why expected inflation has declined over the past two decades or so, Saito *et al.* (2012) argue that, from a theoretical perspective, the reason is either that the central bank has lowered its target rate for inflation or that the public has become more suspicious about the achievability of the target rate once the nominal interest rate has reached the zero floor.

The central bank's communication strategy may also have mattered. Appendix 1 summarizes how the BoJ has communicated its thinking on price stability. This summary reveals that (i) the BoJ has continuously defined price stability as a situation of neither inflation nor deflation; (ii) the BoJ openly acknowledged as early as in 1997 the possibility of a measurement bias, a year after the publication of the Boskin Report (1996); and (iii) the BoJ has improved its style of communication, for example, by putting a numerical figure for the price stability target, which was raised to 2% from

1% in January 2013.

As argued by Tobin (1972), Okun (1981) and Akerlof and Shiller (2009), public attitudes (or “norm”) toward the price level may also have mattered in forming inflation expectations. On that score, it is important to note that, in the 1990s, coupled with the very strong yen, the public seems to have felt that prices in Japan were too expensive compared to prices in other industrial countries. Or at least that is what the tone of the government and the media at the time, which tended to report that Japanese prices should be slashed, suggests (Appendix 2). In fact, that perception was warranted, as seen in the wide difference between domestic and foreign prices during the 1990s (Figure 9 below). It was only after turn of the millennium that the media began to pay more attention to the hazardous effects of deflation. The number of newspaper articles on deflation jumped in 2001, which may indicate that public attitudes toward the price level changed discontinuously at that time (Figure 5). The press coverage seems to have been affected by the government's “declaration of deflation” in 2001 and 2009, when its Monthly Economic Report used the term “deflation,” as indicated in Appendix 2.

### 3.2 The output gap

There is a consensus among researchers that the output gap has remained negative for almost the entire period since the mid-1990s. Figure 6 shows various measures of the output gap. Both when employing a production function approach (BOJ) and a survey measure (Tankan), the results suggest that the output gap has remained negative since the early 1990s except for short intervals in the latter halves of the 1990s and the 2000s. The model-based measure by Saito *et al.* (2012) points to a broadly similar trend.

However, no consensus has emerged regarding why the output gap has remained negative for such a long duration. As discussed below, there are various attempts to explain the phenomenon. As these explanations are not mutually exclusive, it may well be the case that the mechanisms they describe have worked simultaneously.

#### 3.2.1 Why has the output gap remained negative for a long time?

The simplest answer to the question could be mere bad luck. Just “unfortunately,” Japan has been hit by a series of large negative demand shocks. These include the demand shock resulting from the collapse of the asset price bubble in the early 1990s; the Japanese financial crisis and the Asian currency crisis in the latter half of the 1990s; the collapse of the US dotcom bubble in the early 2000s; and the global



financial crisis in the latter half of the 2000s. Instead of sighing over these “unlucky” events, however, researchers are trying to understand the forces underlying them. Since deterioration of the output gap has been accompanied with a decline in the potential growth rate, researchers have been trying to explain the link between two.

One strand of explanations of the negative output gap suggests that it is caused by a decline in the natural rate of interest and the zero lower bound on the nominal interest rate. For instance, following the approach of Laubach and Williams (2003), Watanabe (2012) shows that, along with the potential growth rate, the natural interest rate in Japan has declined to an extent that it has fallen into negative territory. In that case, once the central bank faced the zero floor, it was no longer able to lower the policy rate in tandem with the decline in the natural interest rate. This may have produced the negative output gap, since the policy rate was too restrictive compared to the natural rate. Couching his argument in the Fisher equation,  $i = r^n + \pi^e$ , Watanabe (2012) suggests that instead of the negative inflation expectations  $\pi^e$ , the reason why the economy has fallen into a liquidity trap is the negative natural interest rate  $r^n$ . Essentially, this line of argument is same as Krugman's (1998).

However, just like in the case of inflation expectations, whether the natural rate of interest, which is unobservable, has become negative is a matter of debate. Figure 7 shows various measures of potential growth, which are assumed to be linked with the natural rate of the interest rate. All of the measures of potential growth---be they based on a production function approach (BOJ), estimates from a model (Saito *et al.* 2012), a corporate survey (Corporate) or the forecasts of economists (Consensus Forecast)---point to a decline in the potential growth rate, but none of them show a negative potential growth rate except for a short interval around the Lehman crisis. Furthermore, in their analysis of historical decompositions of the inflation rate, Saito *et al.* (2012) show the effects of the zero lower bound of the nominal interest rate on inflation are rather small, as long as these effects are captured by negative monetary policy shocks.<sup>6</sup>

Another strand of explanations sees a link between lower (but not necessarily negative) potential growth and the deterioration in the output gap via growth expectations. Saito *et al.* (2012) argue that weaker growth expectations have squeezed demand more than supply. The key question is whether permanent or transitory negative shocks on productivity have lowered potential growth. In the case of permanent shocks, a

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<sup>6</sup> The DSGE model of Saito *et al.* (2012) does not explicitly model the zero lower bound and thus estimated monetary policy shocks are assumed to capture the effects of the zero lower bound.

“preemptive” reaction of the demand side to a future decline in supply potential may reduce demand heavily and thus lead to deterioration in the output gap. On the other hand, in the case of transitory shocks, consumption smoothing may lead to a limited reaction on the demand side and thus improve the output gap. The impulse response analysis of Saito *et al.* (2012) shows, in line with this kind of reasoning, a permanent negative shock to productivity drags down inflation, while a transitory shock lifts inflation.

Moreover, they also explore the theoretical possibility that prices become weaker if, for some reasons (lack of innovative entrepreneurs, government regulation, etc.), the supply side of the economy cannot fully respond to a change in the demand structure. For instance, it is widely assumed that population aging leads to changes in the demand structure, such as greater demand for health care and less demand for, say, automobiles. If the quantity and price of health care services are heavily regulated and cannot accommodate the growing demand of the elderly, then general prices may decline, as the elderly may save their money instead of purchasing automobiles in the expectation that health care services will be provided in the future. Another study that examines the impacts of population aging on inflation through changes in the demand structure is that by Katagiri (2012) who uses a multi-sector DSGE model with search friction. Meanwhile, Kimura *et al.* (2010), while not treating the output gap explicitly, argue that a decline in the natural rate of interest may reduce private expenditure, because an increase in the present discount value of government debt may reduce private expenditure.

Yet another strand of explanations focuses on the financial side. Given that Japan's growing government debt has been financed by banks which have increased their purchases of Japanese Government Bonds (JGBs), the question naturally arises whether there is any relationship between the behavior of banks and the output gap. Aoki and Sudo (2012) construct another DSGE model, in which the Value-at-Risk (VaR) constraint leads banks to accumulate large amount of JGBs instead of financing private investment (a crowding-out-like phenomenon). They show that this worsens the output gap and thus puts downward pressures on prices. They also demonstrate that a decline in the potential growth rate due to a negative permanent productivity shock tightens the VaR constraint and thus puts downward pressure on inflation.

### 3.2.2 Related issues

If, as suggested above, the lower natural rate of interest or lower potential growth is

responsible for the prolonged negative output gap, the next question that arises is why Japan's growth potential has declined. Including Hayashi and Prescott's (2002) seminal study of Japan's "lost decade," there is an extensive literature on this issue, which it is beyond the scope of this paper to examine. Shirakawa (2012) and Watanabe (2012) suggest that the malfunction of financial intermediaries after the collapse of the asset price bubble as well as the demographic trends of population aging and decline may have played a role. Recently, Nishimura (2011) has highlighted the link between these two factors using an overlapping generations model in which demographic aging and decline trigger a drop in asset prices and thus lead to a distortion in financial intermediation. On the other hand, Ikeda and Saito (2012) have constructed a DSGE model in which a decline in the working-age population lowers the real interest rate and that effect is amplified by a fall in land prices in the presence of collateral constraints.

Another separate issue is why the slope of the Phillips curve has become flatter, as seen in Figure 3. Again, an extensive literature has developed in the context of the Great Moderation. Potential explanations of the flattening of the Phillips curve in Japan that have been advanced include, among others, that the impact of the global output gap on Japan's inflation has increased as a result of globalization (Borio and Filardo 2007), or the strategic complementarity in firms' price-setting behavior plays a role (Watanabe 2012).

### 3.3 Other Factors

In an open economy setting, external factors are added to a Phillips curve such as the one represented by equation (1). For instance, since Japan heavily relies on imports of natural resources, commodity prices are frequently added to the equation. However, given the developments in the energy components shown in Table 1, developments in commodity prices, including energy, cannot explain the chronic deflation in Japan. Import prices, which largely reflect developments in commodity prices, have shown a number of ups and downs, which is in contrast with the prolonged and steady decline in consumer prices (lower panel of Figure 8). For this reason, below, we will focus on other external factors, namely the exchange rate and domestic-foreign price differences.

#### 3.3.1 Does the appreciation of the yen matter?

Over the past few decades, the yen's nominal effective exchange rate (NEER) has appreciated as a trend (upper panel of Figure 8). At the same time, although evidence is

still mixed, the pass-through of changes in the exchange rate may have declined, as, for example Otani *et al.* (2003) suggest. If this is indeed the case, then, at least superficially, it might seem rather difficult to argue that the appreciation of the yen has played a significant role in deflation in Japan. However, if the equilibrium mark-up diminished along with the declining pass-through, this would lead to lower prices domestically.

There are other arguments that suggest that the appreciation of the yen matters. For instance, Watanabe (2012) demonstrates theoretically that, as argued by McKinnon and Ohno (2001), once expectations of yen appreciation are firmly embedded among the public, Japan may fall into a liquidity trap in the presence of the zero lower bound on the nominal interest rate. Heuristically, if uncovered interest rate parity holds, i.e.,  $i = i^* + \Delta d$ , where  $i^*$  is the short-term nominal interest rate in a foreign country and  $\Delta d$  is the expected rate of depreciation,  $i$  may be subject to the zero lower bound and the economy may hence fall into a liquidity trap, when  $\Delta d < 0$  (i.e., when the yen appreciates). Furthermore, as will be discussed below, Iwasaki *et al.* (2012) show that the less flexible exchange rate regime of the Chinese renminbi has the effect of amplifying downward pressure of Chinese productivity shocks on Japanese inflation.

### 3.3.2 Do domestic-foreign price differences matter?

As seen in Appendix 2, in the 1990s, wide differences between domestic and foreign prices were a matter of concern for both policy makers and the public. The 1990s were indeed a period in which prices in Japan were considerably higher than those in other major advanced economies (upper panels of Figure 9). However, the difference declined substantially in the 2000s. Similar observations can be made with regard to GDP per capita (lower panels of Figure 9).<sup>7</sup>

Japan deregulated in a wide range of areas during the late 1990s and early 2000s including zoning laws for large retailers, which may have contributed to slashing domestic-foreign price differences by reducing margins and/or improving productivity in the distribution chain.<sup>8</sup>

Supply shocks in emerging economies may also matter. Although supply shocks, as

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<sup>7</sup> The positive correlation between price levels and real GDP per capita is often taken as evidence of the Balassa-Samuelson effect.

<sup>8</sup> An effect of narrower margins can be captured by a markup shock in the New Keynesian Phillips Curve estimated by Saito *et al.* (2012). It might be possible to obtain more direct evidence for a change in margins using firm-level data, as demonstrated by Ariga *et al.* (1999). Unfortunately, there are no studies that have pursued this avenue of research in recent years.

Sekine (2009) suggests, have affected inflation not only in Japan but also in other industrial economies, the impact may have been more pronounced in Japan as a result of the close trade links with the dynamic emerging economies of Asia, particularly China. Using industrial panel data, Iwasaki *et al.* (2012), for instance, find that the impact of a higher share of imports from emerging economies, which can be regarded as a proxy of productivity shocks in these economies, is greater in Japan than in the United States and Europe. Furthermore, they construct a three-sector, three-country DSGE model (consisting of a tradable final goods, a tradable intermediate goods, and a non-tradable goods sector with the countries corresponding to Japan, China, and the United States) which incorporates the features that (i) Japan heavily exports intermediate goods to China in exchange for final goods; (ii) Japan-China trade links are stronger than Japan-US and US-China trade links; (iii) intermediate goods are less substitutable than final goods; and (iv) the Chinese renmenbi is fixed to the US dollar.

Their impulse response analysis of a rise in Chinese productivity in the tradable final goods sector shows that Japanese inflation falls more than US inflation. This is because, given the strong trade links, Japan imports more low-cost final goods from China than the United States. Despite an increase in imports from China, Japan's trade balance is less deteriorated than that of the United States, since more final goods production in China leads to higher demand for Japanese intermediate goods. The model suggests that this results in an appreciation of the yen vis-à-vis the US dollar, which puts additional downward pressure on Japanese inflation. This deflationary impact could be mitigated if China were to adopt a more flexible exchange rate regime.

#### 4. Conclusion

This paper examines a long list of structural features that may explain Japan's chronic deflation. At this stage of investigation, it is still difficult to single out one specific or dominant explanation for Japan's prolonged period of deflation and it may well be the case that it is the result of a combination of factors. We hope that further researches will shed more light on the issue.

The long list of hypotheses aside, an issue arises whether or not monetary policy can overcome these deflationary forces. Shortly after his appointment as the BoJ Governor, Kuroda (2013) stated “There are many factors—both at home and abroad—exerting downward pressure on prices in Japan: an increase in cheap imports from overseas, increased distribution efficiency mainly due to deregulation, and the consequent

low-price strategies of firms as well as an increased preference among households for low prices. Notwithstanding these factors, it is the Bank's mandate as the central bank to achieve price stability by addressing them. Indeed, no other country in the world is undergoing such a prolonged period of deflation.” Ueda (2012) pointed out the suboptimal monetary policy making as one of reasons behind Japan’s long-lasting deflation.

On April 4, 2013, the BoJ introduced the new operational framework of its quantitative and qualitative monetary easing to lift inflation to 2% over a time horizon of about two years. The new framework is thought to affect all three variables examined in Section 3. First, by the BoJ’s clear and simple commitment to achieve the 2% target, inflation expectations are aimed to rise and be anchored to that level. Second, the output gap is expected to improve through a decline in funding costs. Third, although this is a byproduct of monetary easing, import prices are likely to rise for the time being reflecting from developments in the foreign exchange market. There are some indications that the economy is moving in the right direction. However, since the transmission lag of monetary policy is long and variable, it is too early to tell its full effects at the timing of writing this paper. One thing that we can say certain is that we, economists, will learn lots from this ambitious monetary policy framework.

### Acknowledgement

We would like to thank all the participants at the conference on “Price Developments in Japan and Their Backgrounds: Experiences Since the 1990s” jointly held by the Center for Advanced Research in Finance (CARF) of the University of Tokyo and the Research and Statistics Department of the Bank of Japan on November 24, 2011. We would also like to thank seminar participants at Columbia University, the Federal Reserve Board, the Federal Reserve Bank of New York, and the Bank for International Settlements Research Workshop, in particular, Eiji Maeda, Etsuro Shioji, Nobutoshi Kitaura, David Weinstein, Neil Ericsson, and Hibiki Ichiue, for useful comments and discussions. We are solely responsible for any remaining errors in the paper. The views expressed in this paper do not necessarily reflect those of the Bank of Japan.

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## Appendix 1 Bank of Japan's Communication on Price Stability (Chronology)

1994-05-27: *Principles for the Conduct and the Goal of Monetary Policy* (Speech made by Governor Mieno) (authors' translation)

“One of main goals of monetary policy is delivering ‘sustainable growth without inflation’ in the medium- to long-run.” “The question is often posed on which price indicator, the Consumer Price Index or the Wholesale Price Index, the definition of price stability should be based. However, it is inappropriate to single out a price indicator, as the goal of monetary policy is the ‘stability of prices’ not ‘stability of a price index.’”

1996-10-11: *Financial Innovation, Financial Market Globalization, and Monetary Policy Management* (Speech made by Governor Matsushita)

“The Bank of Japan ... intends to manage monetary policy appropriately with the aim of maintaining price stability, preventing inflation or deflation of domestic prices.”

1997-06-27: *A New Framework of Monetary Policy under the New Bank of Japan Law* (Speech made by Governor Matsushita)

“It is, however, not easy to define price stability. There are diverse types of price indicators: for example, the Consumer Price Index, Wholesale Price Indexes, and the GDP deflator. Each of these has its limitation, such as the range of items covered or the timing of release. Further, many studies have been conducted more recently on the possibility that these indicators offer a substantially biased measurement of prices.”

2000-10-13: *On Price Stability*

“[I]t is not deemed appropriate to define price stability by numerical values.”  
“Price stability, a situation neither inflationary nor deflationary, can be conceptually defined as an environment where economic agents including households and firms can make decisions regarding such economic activity as consumption and investment without being concerned about the fluctuation of the general price level.”

2006-03-09: *The Introduction of a New Framework for the Conduct of Monetary Policy*

“Price stability is a state where various economic agents including households and firms may make decisions regarding such economic activities as consumption and investments without being concerned about the fluctuations in the general price

level.” “Price stability is, conceptually, a state where the change in the price index without measurement bias is zero percent.”

2006-03-09: *An Understanding of Medium- to Long-term Price Stability*

“It was agreed that, by making use of the rate of year-on-year change in the consumer price index to describe the understanding, an approximate range between zero and two percent was generally consistent with the distribution of each Board member's understanding of medium- to long-term price stability. Most Board members' median figures fell on both sides of one percent.”

2007-04-27: *Outlook for Economic Activity and Prices*

“The ‘understanding’ expressed in terms of the year-on-year rate of change in the CPI, takes the form of a range approximately between 0 and 2 percent, with most Policy Board members' median figures falling on one side or the other of 1 percent.”

2009-12-18: *Clarification of the ‘Understanding of Medium- to Long-Term Price Stability’*

“In a positive range of 2 percent or lower, and the midpoints of most Policy Board members' ‘understanding’ are around 1 percent.”

2012-02-14: *The Price Stability Goal in the Medium to Long Term*

“The Bank judges that ‘the price stability goal in the medium to long term’ is in a positive range of 2 percent or lower in terms of the year-on-year rate of change in the consumer price index (CPI) and, more specifically, set a goal at 1 percent for the time being.”

2013-01-22: *The “Price Stability Target” under the Framework for the Conduct of Monetary Policy*

“The newly-introduced ‘price stability target’ is the inflation rate that the Bank judges to be consistent with price stability on a sustainable basis...[T]he Bank sets the ‘price stability target’ at 2 percent in terms of the year-on-year rate of change in the consumer price index (CPI) -- a main price index.”

## Appendix 2 Government and Media Reports on Price Level<sup>9</sup>

### Government Reports

1993 July: *Annual Report on Japan's Economy (FY1993)*

“While Japanese income per capita converted to US dollars is one of the highest in the world, living standards in reality as such are not. This is mainly because of the gap between internal and external prices. ... Consumers would be better off if prices in Japan declined, narrowing this domestic-foreign price difference.”

1999 June: *Report of the Committee on Price Problems under Zero Inflation*

“Deflation is a situation where sub-par growth and a fall in prices take place simultaneously.” “A fall in prices does not necessarily incur recession.” “It would be appropriate for the authorities to aim at zero inflation. However, some margin needs to be taken into account, given the positive measurement bias in the consumer price index.”

2001 March: *Monthly Economic Report*

“The Japanese economy is in a mild deflationary phase, if deflation is defined as ‘a continuing decline in prices.’”

2001 December: *Annual Report on Japan's Economy and Public Finances (2000-2001)*

“[U]nder the current situation of the Japanese economy, even a mild deflation is believed to have adverse effects on the economy.”

2009 November: *Monthly Economic Report*

“Recent price developments show that the Japanese economy is in a mild deflationary phase.”

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<sup>9</sup> Most of the quotes are the authors' translation.

## Op-Ed Articles in Major Newspapers

1994-10-04: *Can We Self-Praise Price Stability?* (Nikkei Shimbun)

“A 10% appreciation of the yen would increase households' real purchasing power by 30 to 40 thousands yens on average. The Price Report for FY1994, which the Economic Planning Agency published last week, stressed price stability amid the appreciation of the yen by presenting the above estimation. The CPI increased by 1.2% in FY1993. ... However, the Report appears to sing its own praises too much on price stability. In fact, consumer prices in Japan should have been lowered.”

1998-07-27: *Is Inflation Adjustment Really a Good Deal?* (Asahi Shimbun)

“Some commentators in the market as well as in academia have turned to inflation in order to lift the economy. They claim that deliberately created inflation would sort out the problems of Japan's economy, where sales have declined and prices have fallen. This is so called ‘inflation adjustment.’ ... The costs of pursuing such a policy are much too large. It is difficult to imagine that this is a worthwhile policy.”

2001-03-17: *Conquer Deflation, Once Admitted* (Nikkei Shimbun)

“Among major advanced economies, Japan is the only country where prices have continued to decline. The Government and the Bank of Japan should quickly come up with specific policies to conquer this deflation.”

2003-11-16: *Don't Forget the Homework of Conquering Deflation* (Asahi Shimbun)

“Deflation places a greater burden on firms and individuals who borrow money, as the amount they have to pay back does not fall even when prices fall. This is the problem of deflation.”

Table 1 Price Developments (annual average, %)

	1971-1975	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2009
CPI (less fresh food)	11.6	6.5	2.5	1.2	1.3	0.0	-0.4	0.0
GDP deflator	10.4	5.5	1.5	1.2	0.7	-0.9	-1.3	-0.9
DCGPI	10.3	6.1	-0.4	-1.0	-0.9	-1.1	-0.2	0.6
Oil price	53.7	26.7	-4.3	2.6	-4.1	14.5	16.4	7.2
Yen/USD	-3.4	-5.5	0.6	-7.6	-7.3	3.3	0.8	-4.7
Contribution to CPI (less fresh food)								
Energy	0.9	0.7	0.0	-0.2	0.0	0.0	0.1	0.1
Durable goods	0.3	0.1	0.0	-0.1	-0.1	-0.2	-0.2	-0.2
Other goods	6.3	2.3	1.3	0.5	0.4	-0.1	-0.2	0.2
Services	4.3	3.4	1.3	1.0	1.0	0.3	0.0	0.0

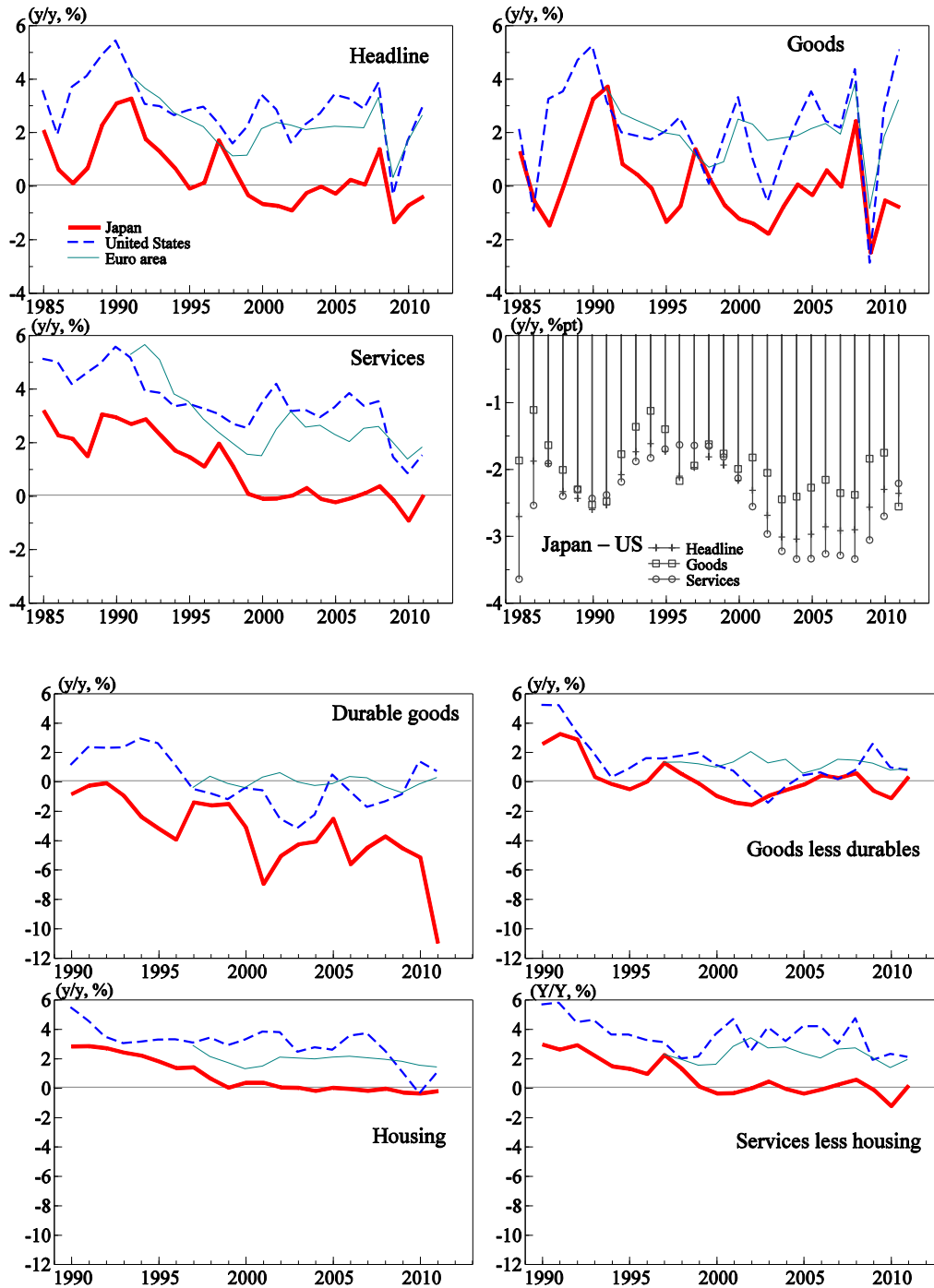
Note: DCGPI stands for the domestic corporate goods price index. Data prior to 2000Q4 are those of the domestic wholesale price index. The CPI is adjusted so as to exclude the effects of changes in consumption tax rates and subsidies for high school tuition (the same applies below). The shaded bars indicate a period of recession.

Sources: Bank of Japan, Cabinet Office, Ministry of Internal Affairs and Communications.

Table 2 Inflation Contribution of Phillips Curve Variables (annual average, %)

	1987-1990	1990-1995	1996-2000	2001-2005	2006-2009
CPI (less fresh food)	1.4	1.3	0.0	-0.4	0.0
<i>Contribution to CPI :</i>					
Own lag	0.5	0.4	0.0	-0.1	0.0
Trend inflation	1.5	1.2	0.7	0.6	0.9
Output gap	0.6	0.1	-0.3	-0.4	-0.3
Others	-1.2	-0.4	-0.4	-0.6	-0.6

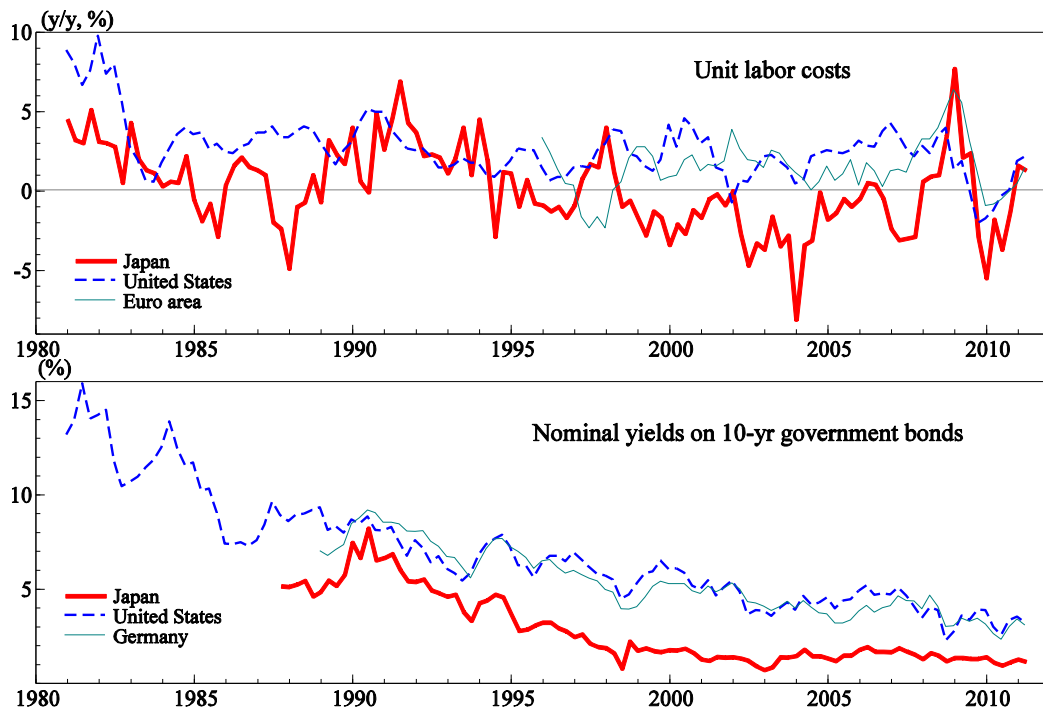
Figure 1 Cross-Country Comparison (CPI)



Note: The index lines in the second panel on the right-hand side show difference in headline, goods and services inflation rates (rate in Japan minus rate in the United States). Five-year backward moving averages are taken to smooth out cyclical fluctuations.

Sources: Ministry of Internal Affairs and Communications, US Bureau of Labor Statistics, Eurostat.

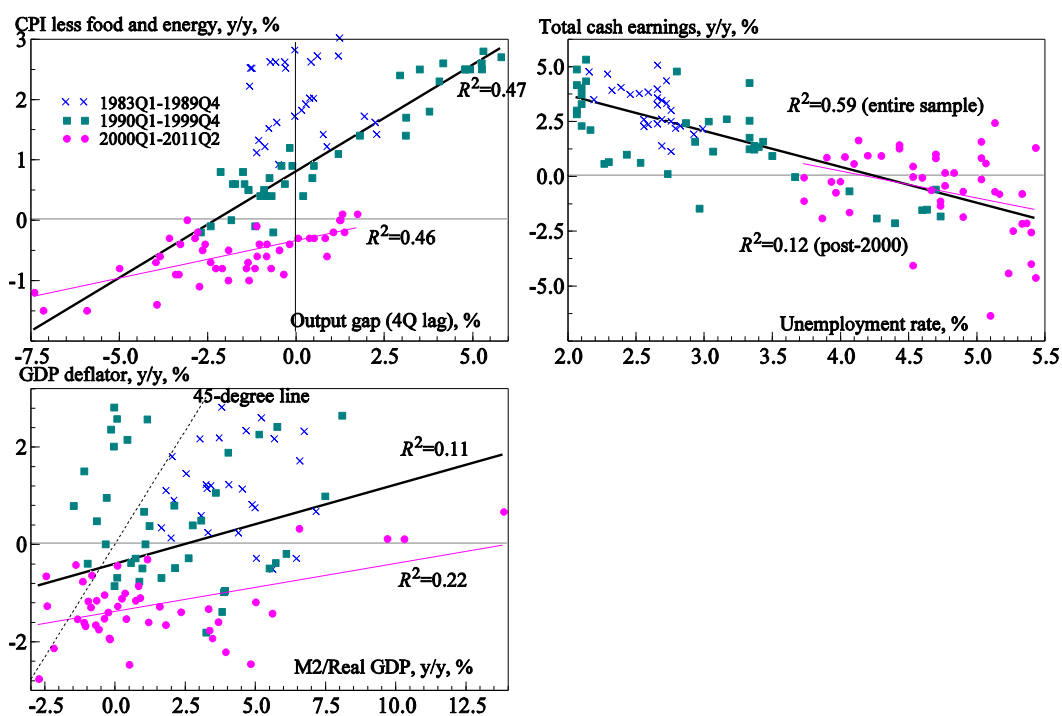
Figure 2 Unit Labor Costs and Nominal Yields



Sources: Cabinet Office, US Bureau of Labor Statistics, Eurostat, Bloomberg.

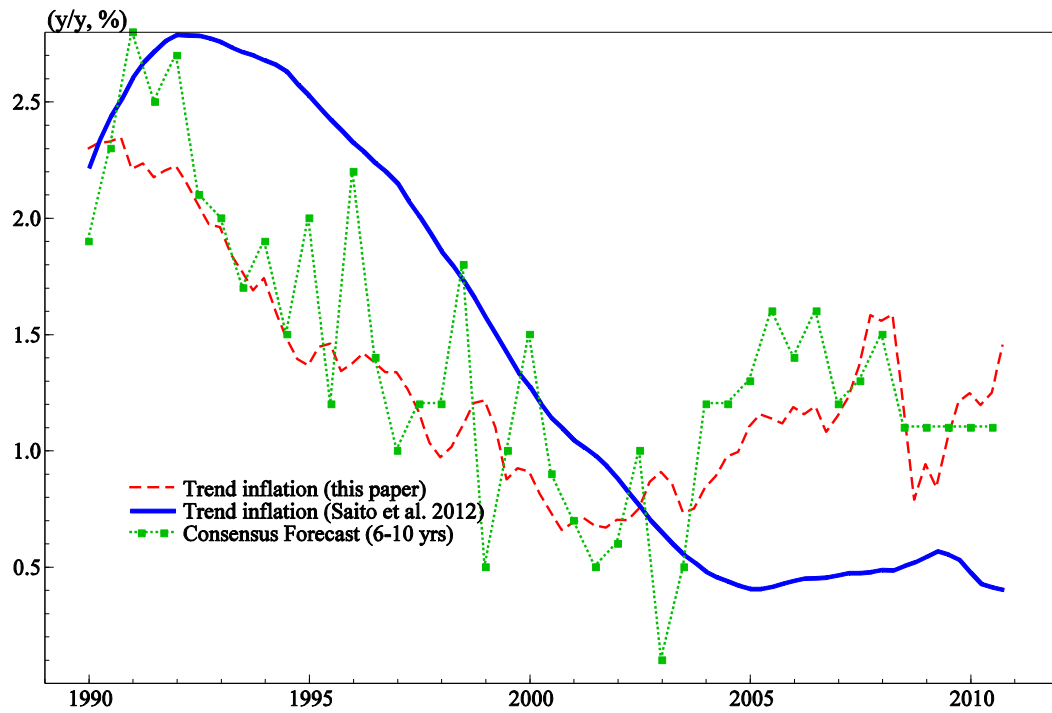


Figure 3 Correlation with Other Variables



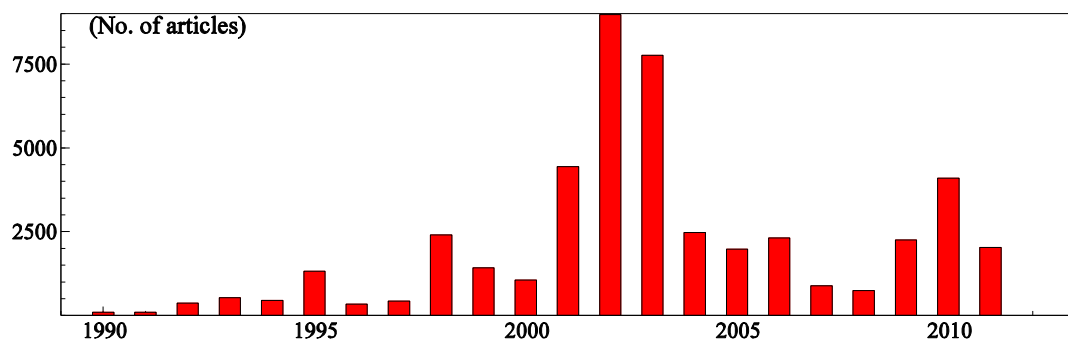
Note: Regression lines are calculated for the entire observation period (thick lines) and the post-2000 periods (thin lines). The  $R^2$  values are for the corresponding regression lines.  
Sources: Bank of Japan, Cabinet Office, Ministry of Internal Affairs and Communications, Ministry of Health, Labour and Welfare.

Figure 4 Expected Inflation



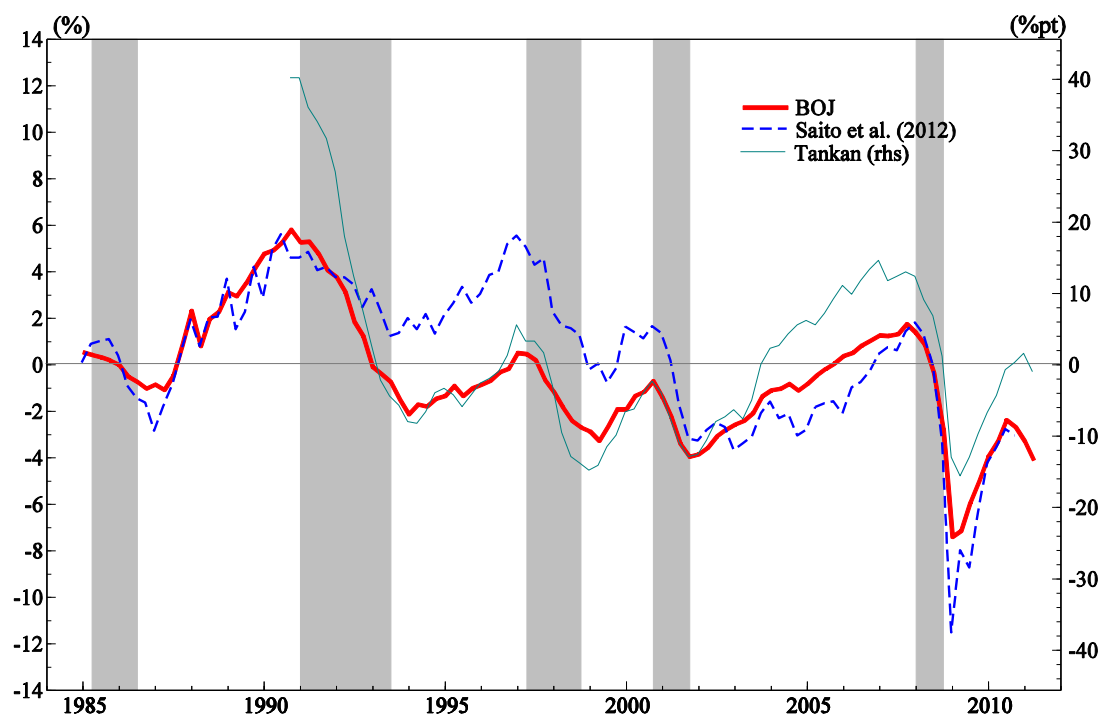
Sources: Ministry of Internal Affairs and Communications, Consensus Forecast, Bloomberg.

Figure 5 Press Coverage of Deflation



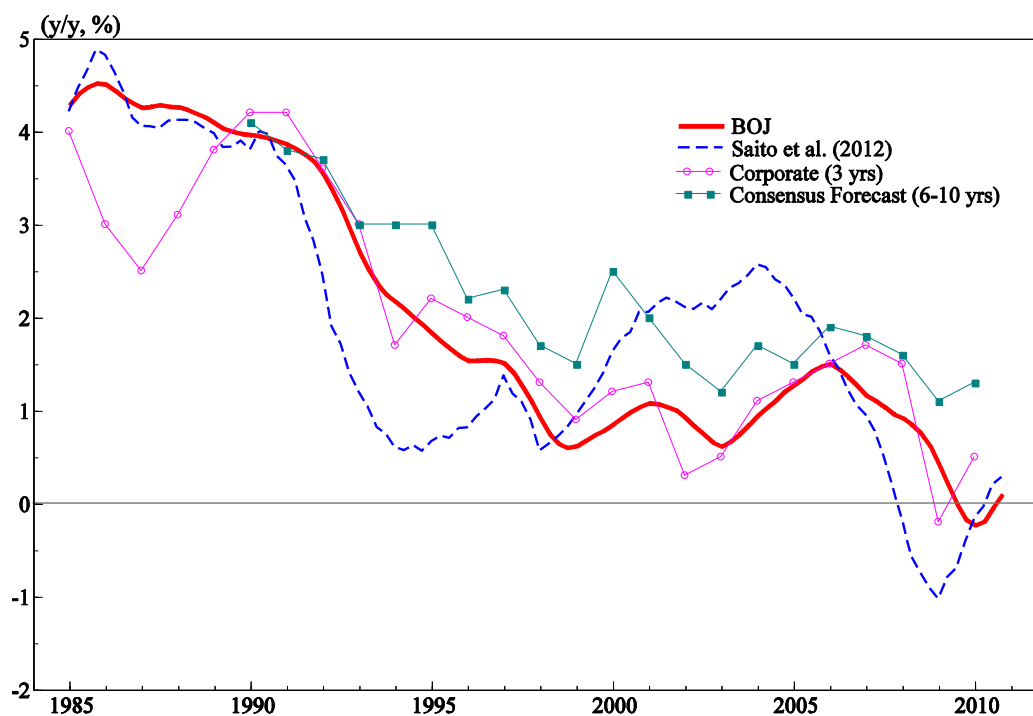
Note: The figure shows the number of hits for the search term “deflation” in articles of major newspapers (Nikkei, Asahi, Mainichi, Yomiuri, Sankei). The figure for 2011 is the annualized value of the number of hits for articles up to September that year.

Figure 6 Output Gaps



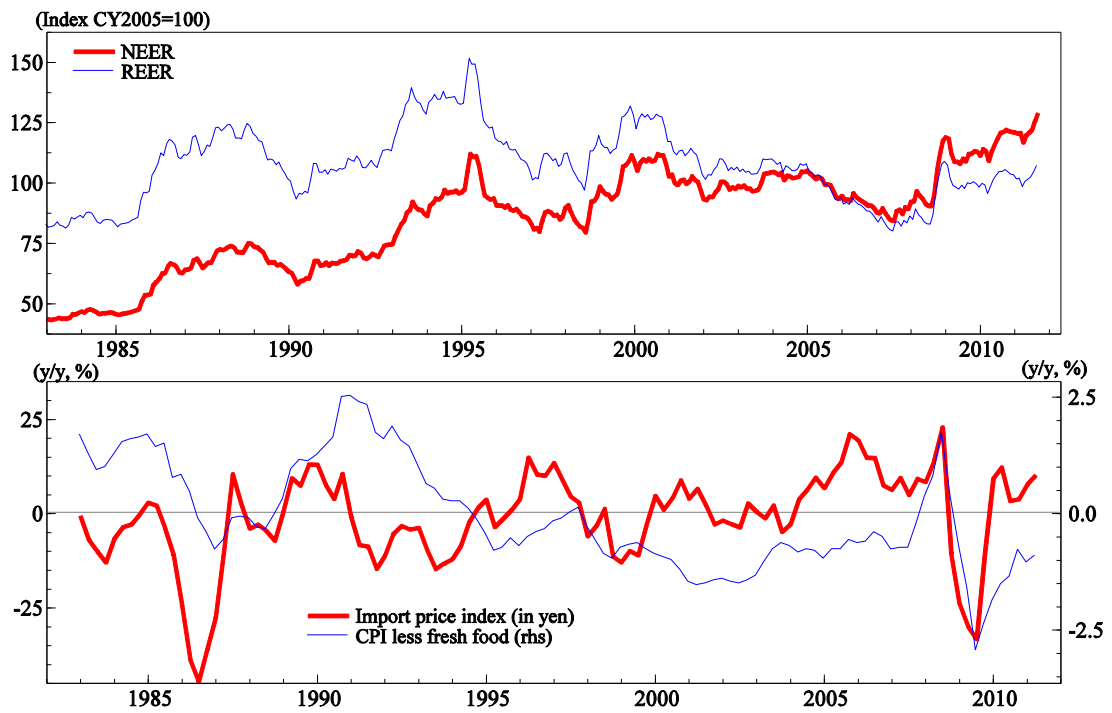
Note: “BOJ” refers to the output gap estimated by the Research and Statistics Department, Bank of Japan (Hara et al. 2006), while “Tankan” refers to the weighted averages of the production capacity DI and employment conditions DI in the Tankan Corporate Survey. The FY1990-2010 averages of capital and labor shares in the National Accounts are used as the weight. Finally, “Saito et al. (2012)” is the output gap estimated based on their DSGE model, where the output gap is defined as the deviation of real GDP from its potential level (Fueki et al. 2010). The shaded bars indicate periods of recession.

Figure 7 Potential Growth



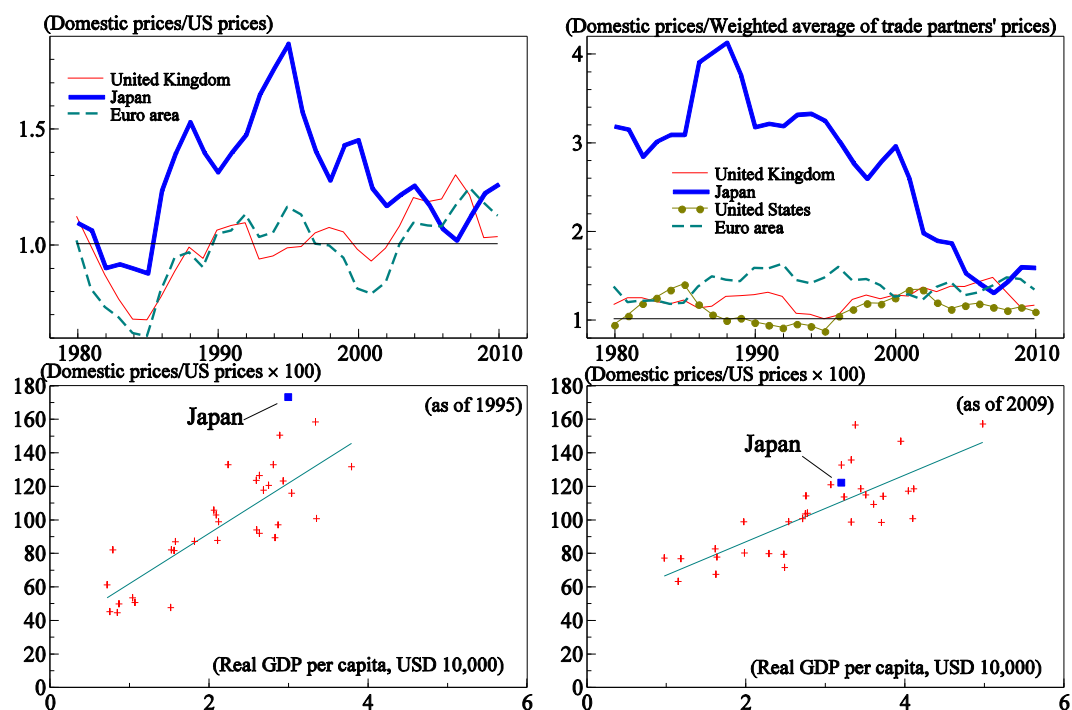
Note: “BOJ” refers to the potential growth rate estimated by the Research and Statistics Department, Bank of Japan (Hara et al. 2006), while “Saito et al. (2012)” refers to the potential growth rate estimated based on their DSGE model. “Corporate (3 yrs)” refers to the outlook for the 3 years ahead real demand growth rate for industry in the Annual Survey of Corporate Behavior (Cabinet Office). Finally, “Consensus Forecast (6-10 yrs)” refers to the Consensus Forecast for the average real GDP growth rate for the next 6 to 10 years.

Figure 8 Exchange Rates and Import Prices



Sources: Bank for International Settlements, Bank of Japan, Ministry of Internal Affairs and Communications.

Figure 9 Deviation from Purchasing Power Parity (PPP)



Note: Figures in upper panels are domestic-foreign price differences calculated as  $P/P^*e$ , where  $P$  is domestic prices,  $P^*$  is foreign prices and  $e$  is the market exchange rates. In the left-hand side,  $P^*$  is US prices and  $e$  is the bilateral exchange rate against the US dollar, whereas in the right-hand side  $P^*$  is prices of major trade partners and  $e$  is the nominal effective exchange rates. In the left-hand side,  $P/P^*$  is obtained from the PPP exchange rate in the IMF World Economic Outlook database and  $e$  from Bloomberg. In the right-hand side,  $e$  is obtained from the BIS nominal effective exchange rates (narrow base comprising 27 economies) and  $P/P^*$  are calculated by the authors using the above bilateral PPP exchange rate and the weights of the BIS NEERs. Lower panels are scatter diagrams of OECD countries (less Luxembourg). Real GDP per capita is based on the PPP exchange rates.

Sources: Bank for International Settlements, International Monetary Fund, Bloomberg, Penn World Table 7.0.