

## Haruhiko Kuroda: The battle against deflation – the evolution of monetary policy and Japan’s experience

Speech by Mr Haruhiko Kuroda, Governor of the Bank of Japan, at Columbia University, New York City, 13 April 2016.

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Accompanying charts can be found at the end of the speech or on the Bank of Japan’s [website](#).

### Introduction

It is a great privilege to be invited to speak at Columbia Business School today. I was told that the Center on Japanese Economy and Business (CJEB), which is kindly hosting this conference, is celebrating its 30th anniversary this year. The CJEB has long played a pivotal role in promoting a better understanding of the Japanese economy and U.S.-Japan economic relations. I would like to express my sincere appreciation to Professor Hugh Patrick, the founder and long-time director of the CJEB and a leading expert on Japan’s economy, and all those related to the CJEB.

As you all know, Japan has long been mired in deflation. Deflation was once perceived to be a phenomenon unique to Japan. Looking back to the late 1990s and 2000s, while Japan was suffering from deflation, other economies were performing quite well. With Alan Greenspan, sometimes called the “maestro,” at the helm of the Federal Reserve, the United States enjoyed a prolonged period of stable prices and high economic growth, and overcame several economic shocks such as the collapse of IT Bubble in the early 2000s. At the time, there was talk of the so-called New Economy in which business cycles had allegedly disappeared due to IT innovation and economic globalization, resulting in strong and lasting economic growth under low and stable inflation. In Europe, regional economic integration made substantial progress with introduction of a common currency, the euro, in 1999, and the economy grew in a stable manner. Meanwhile, emerging economies including China and commodity-exporting countries continued to enjoy rapid growth. Only Japan seemed to be left behind in this tide of global growth.

But then the global financial crisis struck in 2008. Major advanced economies suffered a sharp deceleration in economic activity, but thanks to prompt and bold policy actions taken by the authorities including central banks, the global economy was able to avoid another Great Depression. However, even though eight years have passed since the start of the crisis, the global economy has yet to regain its full strength. Many countries – particularly advanced economies – continue to be plagued by low economic growth and low inflation, and there is concern that they might fall into Japanese-style deflation.

Fortunately, the end of deflation in Japan is in sight as a result of the bold monetary policy measures called “quantitative and qualitative monetary easing,” or QQE for short, we launched three years ago. Today, I will discuss how Japan, as the “front runner” of deflation, has fought against deflation and is overcoming it. While doing so, I will also explain the theoretical background to the evolution of what is called unconventional monetary policy.

### I. What is deflation? The harm of moderate yet persistent deflation

What is deflation? For those living in the United States, which has enjoyed moderate inflation for an extended period of time, this might not be immediately obvious, so let me start with this point.

Deflation refers to a situation where prices decline persistently. If prices of individual goods and services fall thanks to innovation and improved productivity, this is of course a good thing. A good example is the gradual price decline in PCs and smartphones. However, the

deflation I am talking about refers to a situation in which the prices of a broad range of goods and services decline, and consequently, prices as a whole drop. In most countries, including the United States, general prices are measured in terms of consumer price indices, which are the weighted averages of baskets of goods and services purchased by consumers. Put very simply, deflation can be understood as a continuous decline in consumer prices.

What happens to the economy if prices as a whole decline continuously (Chart 1)? Looking at the overall economy, suppliers of goods and services will see a decrease in sales and profits, and firms with declining profits typically start to lay off employees or restrain their wages. Employees that have been laid off or whose wages have declined experience a fall in their income and restrain their spending due to uncertainty about their future. Such restraint in spending leads to a further decline in the sale of goods and services, resulting in harsher competition among firms. Firms therefore lower prices in order to compete, leading to a further decline in their sales and profits. This simple outline shows that once deflation starts, it perpetuates itself, so that the economy falls into a bad “equilibrium, in which economic activity is shrinking.”

Japan has been struggling with deflation for a decade and a half, triggered by the collapse of the asset bubble of the late 1980s/early 1990s and the destabilization of the financial system reflecting this collapse. A key characteristic of Japan’s deflation is that it has been moderate but persistent. During the Great Depression in the United States, which is often cited as a typical example of deflation, prices plunged by nearly 30 percent in total. Moreover, they fell precipitously, dropping at an annual rate of almost 10 percent in 1931 and 1932. However, deflation persisted only for four years. In contrast, Japan’s consumer prices only fell by 4.1 percent in total in the 15 years from fiscal 1998 to fiscal 2012, which is equivalent to an annual average rate of only 0.3 percent. Thus, while deflation was much milder, it lasted for a decade and a half. Such prolonged deflation gave rise to the entrenched belief that prices and wages will not rise in the future.

If we use disease as an analogy, the substantial deflation of the 1930s can be regarded as an “acute disease,” while Japan’s deflation since the late 1990s is a “chronic disease.” Chronic diseases tend to cause relatively little pain to patients, but for that reason they can be “silent killers” that quietly ruin the entire body. Let me explain why moderate yet persistent deflation is harmful to the entire economy.

The biggest problem is that, under deflation, the value of cash gradually increases with the passage of time, discouraging firms and households from spending. The nominal value of cash remains unchanged and interest rates on deposits at banks are very unlikely to be negative. (I will come back to this point later when I talk about negative interest rate policy.) At the same time, prices of goods and services gradually decline, so that for consumers it is better to wait now and buy later when prices are lower. For firms, instead of exploring new business opportunities and investing in facilities or research and development, an easier way to shore up corporate value is to cut costs such as wages, increase cash flow, and accumulate cash in bank deposits. In Japan, all these phenomena have been widely observed since the 1990s.

Let us take a look at sectoral saving-investment balances under deflation. Normally, the corporate sector has a financial deficit, that is, it is a net borrower. Firms conduct their business and produce added value in the economy by raising funds from banks and capital markets. However, in the late 1990s, the corporate sector started to register a financial surplus, or become a net saver. To make up for the shortage in aggregate demand brought about by the changes in the corporate sector, the government raised funds by issuing large amounts of Japanese government bonds (JGBs) and increased fiscal spending such as public works. Meanwhile, in the banking sector, deposits increased substantially while lending decreased as a result of the financial surplus in the corporate sector. The banking sector, in turn, invested these surplus funds in JGBs. Thus, under Japan’s deflationary environment, a peculiar flow of funds established itself, in which the corporate sector has a

financial surplus, the government sector has a financial deficit, and the banking sector expands its investment in JGBs (Chart 2).

Another problem of moderate yet persistent deflation is that, as the belief becomes entrenched that prices will not rise but continue to steadily decline, real interest rates remain high, hampering the effectiveness of monetary policy. Let me elaborate a bit on this point.

In terms of both lending and deposit interest rates, what matters for economic activity is not the nominal interest rate, but the real interest rate, or the interest rate adjusted by the outlook for inflation. For instance, if the nominal interest rate is 3 percent per annum and prices are expected to rise by 2 percent, the real interest rate is 1 percent. On the other hand, if the nominal interest rate is again 3 percent, but prices are expected to fall by 1 percent, the real interest rate is 4 percent. Obviously, financial conditions are more accommodative in the former than the latter case. If people start to think that prices will steadily decline – in the economics jargon, “inflation expectations” fall into negative territory – real interest rates will remain high compared to nominal interest rates.

These considerations illustrate how moderate yet persistent deflation is like a harmful chronic disease. It not only stymies the dynamism of the economy but also weakens the effectiveness of monetary policy.

## **II. The evolution of monetary policy: What is “Unconventional Monetary Policy”?**

Given the insidious effects of such deflation, you may be wondering how the Bank of Japan responded. Naturally, the Bank did not merely stand by. Although the Bank’s monetary policy measures were often criticized – especially abroad – as being “too little, too late,” the Bank did in fact adopt a variety of unconventional monetary policy measures from the late 1990s onward (Chart 3).

To start with, in 1999, the Bank adopted a “zero interest rate policy,” in which the overnight money market rate was guided close to 0 percent. In 2001, the Bank switched its main operating target from the overnight money market rate to current account balances held by financial institutions at the Bank of Japan, which are equivalent to what in the United States are usually called “reserve balances.” Under the policy, which lasted from 2001 to 2006, the Bank provided large amounts of liquidity, so that reserve balances eventually reached several multiples of required reserves. To the best of my knowledge, this was the world’s first quantitative easing. At the same time, the Bank committed itself to continuing with the policy until the annual rate of change in the consumer price index (CPI) would register “stably a zero percent or an increase.” This means that the Bank also pioneered what in recent years has come to be called “forward guidance.”

After the global financial crisis in 2008, Japan’s economy decelerated significantly as a result of the global recession, even though the direct impact of the global financial crisis on Japan’s financial system was relatively small. CPI inflation, which had been positive since 2006, fell back into negative territory. Against this backdrop, the Bank introduced another policy initiative in 2010 which we called “comprehensive monetary easing.” Under this policy, the Bank purchased large amounts of JGBs, focusing in particular on those with maturities of up to three years, pushing down interest rates on such JGBs to close to 0 percent. In addition, to reduce risk premiums, the Bank also – though to a lesser extent – purchased private-sector debt such as corporate bonds and commercial paper (CP), as well as equity financial products such as exchange-traded funds (ETFs) and real estate investment trusts (REITs). Moreover, in order to encourage lending by financial institutions, the Bank introduced special long-term lending facilities with a low interest rate, which are similar to the Funding for Lending Scheme by the Bank of England (BOE) and the targeted longer-term refinancing operations (TLTROs) by the European Central Bank (ECB). This means that the unconventional monetary policy measures taken by the Bank of Japan can stand comparison with those taken by other central banks at least in terms of their breadth and variety.

The series of unconventional monetary policy measures implemented by the Bank prevented Japan's economy from falling into a 1930s-style deflationary spiral of sharply falling prices and economic contraction. However, none of these monetary policy measures were sufficiently strong to overcome deflation. Why was this the case?

To understand the reasons, we should start with the mechanisms through which monetary easing affects the economy. A key concept in this context is the so-called "natural rate of interest," which is the real interest rate at which the economy neither accelerates nor decelerates. Monetary easing aims to push real interest rates in financial markets below the natural rate of interest through a lowering of the policy rate and/or increase in the supply of funds in order to stimulate economic activities such as business fixed investment and housing investment. This is the main channel through which monetary easing seeks to boost economic activity. Although the determinants of the natural rate of interest are the subject of considerable debate, it is widely thought that the potential growth rate of the economy plays a major role.

The conceptual framework I just outlined allows you to easily see that Japan's monetary policy under deflation faced two major challenges. The first was that real interest rates remained high. Nominal short-term interest rates – the policy tool of traditional monetary policy – already were close to 0 percent after the introduction of the zero interest rate policy in 1999. This means that short-term interest rates already faced the so-called "zero lower bound" in the sense that nominal interest rates cannot be lowered below 0 percent. At the same time, with the economy stuck in a deflationary equilibrium, inflation expectations remained low. As a result, real interest rates – that is, nominal interest rates minus inflation expectations – remained high.

The second major challenge that made it more difficult to overcome deflation is the decline in the natural rate of interest reflecting a deceleration in Japan's growth potential. With the benefit of hindsight, we know that deflation has coincided with a decline in the productive population as a result of rapid population aging, reducing Japan's growth potential. Another factor contributing to the deceleration in growth potential was sluggish capital accumulation reflecting the prolonged deflation. Specifically, while Japan's potential growth rate in the early 1990s was around 3–4 percent, it subsequently followed a declining trend and recently has been under 1 percent (Chart 4). Given that, as mentioned, the potential growth rate likely is a key determinant of the natural rate of interest, it is likely that the latter also followed a declining trend.

As a result, Japan was trapped in a situation in which the zero lower bound on nominal interest rates and the decline in inflation expectations made it difficult to reduce real interest rates just at a time when lower real interest rates were warranted due to the decline in the natural rate of interest. This situation can be easily grasped by comparing Japan's estimated potential growth rate and real interest rates as approximated by the yields on 10-year JGBs minus actual inflation (Chart 5). Given these challenges, Japan was unable to find an appropriate cure for the chronic disease of prolonged deflation. This is how a deflationary equilibrium took hold.

I hope that, based on this outline, you can clearly see the challenges that Japan's policy authorities have been facing in order to overcome deflation. The first challenge has been to raise the potential growth rate and thereby increase the natural rate of interest. The second challenge has been to simultaneously devise monetary policy measures to substantially lower real interest rates. It has been widely argued that monetary policy is no longer effective and that economic policy should center on strategies to promote growth. However, as I hope my explanation so far has made clear, tackling deflation is not a choice between monetary policy or a growth strategy: both are necessary. In this context, the government's initiative to enhance Japan's economic growth as well as growth-oriented efforts by the private sector are of vital importance. At the same time, the Bank of Japan has to accomplish its mission as the central bank.

### **III. The 2 percent price stability target and the introduction of QQE**

In the course of Japan's prolonged battle against deflation, it became increasingly clear that more powerful monetary easing was needed. Against this background, the newly elected Abe administration in December 2012 launched "Abenomics," consisting of "three arrows," namely, bold monetary policy, flexible fiscal policy, and a growth strategy to promote private investment. In January 2013, the Bank of Japan then introduced a price stability target of 2 percent CPI inflation, which was reiterated in the joint statement of the government and the Bank of Japan. This followed the Federal Reserve's announcement of a similar longer-run inflation goal a year earlier in January 2012.

I was installed as the governor of the Bank of Japan just after the introduction of the price stability target, in March 2013. The following month, in April, we introduced a new policy initiative, QQE. We designed QQE to overcome the limitations of previous policies. QQE consists of two major elements (Chart 6). First, QQE seeks to raise inflation expectations and hence drastically change the deflationary mindset that has taken hold among the public through the Bank's strong commitment to achieving the price stability target of 2 percent at the earliest possible time. Second, through massive JGB purchases by the Bank, QQE exerts downward pressure not only on short-term nominal interest rates but on the entire yield curve. By combining these two elements, QQE allows the Bank to significantly lower not only short-term but also long-term real interest rates.

As for the massive JGB purchases, the Bank is purchasing JGBs with maturities of up to 40 years, the longest maturity in Japan, exploiting to the greatest extent possible any remaining room for further declines in nominal interest rates. When QQE was initially introduced, the Bank's operational guideline was to purchase JGBs so that the Bank's holdings of JGBs would increase at an annual pace of about 50 trillion yen. The pace was accelerated in October 2014 to about 80 trillion yen a year and this guideline continues to this day. Given that Japan's nominal GDP is about 500 trillion yen, JGB purchases of about 80 trillion yen correspond to about 16 percent of Japan's GDP. As a result of such purchases, the ratio of the Bank's balance sheet to nominal GDP has risen from 35 percent at the end of March 2013 to 77 percent at the end of December last year and will continue expanding. The equivalent ratio in the case of the Federal Reserve, after three rounds of large-scale asset purchases (LSAPs), is 25 percent as of end-December last year. This comparison should give you a good sense of how massive monetary easing in Japan is. Turning to the qualitative aspect of the Bank's JGB purchases, the average remaining maturity of JGBs purchased by the Bank was extended from slightly less than three years to about seven years when QQE was introduced. The Bank later extended the targeted average remaining maturity further and the target range now is about seven to twelve years. Moreover, the Bank is continuing with the purchase of ETFs and REITs, which started under "comprehensive monetary easing" in 2010, but expanded the scale of such purchases as well.

### **IV. Effects of QQE: Japan's economy is overcoming deflation**

QQE, which differs drastically from previous measures, has been exerting its intended effects. I would now like to show how Japan's economy has changed since the introduction of QQE by referring to major financial and economic indicators.

Let me start with financial indicators. Nominal long-term interest rates as measured by the yields on 10-year JGBs declined by 0.4 percentage points from 0.7 percent before the introduction of QQE in 2013 to 0.3 percent around the end of 2015. Next, turning to inflation expectations, while it should be noted that measures of inflation expectations tend to vary considerably and therefore should be treated with a degree of caution, a widely watched survey of economists indicates that medium- to long-term inflation expectations have risen by about 0.4 percentage points in the same period. Using these figures to calculate real long-term interest rates suggests that these have declined by 0.8 percentage points. Research by

the Bank's staff indicates that the effects of QQE on the entire yield curve are equivalent to a reduction in the short-term policy rate of about 2 percent. Under these accommodative financial conditions, the amount outstanding of bank lending, including lending to small firms, has continued to increase at a moderate pace of 2.0–3.0 percent on a year-on-year basis.

The stimulative effects of the substantial decline in real interest rates on the economy have become increasingly apparent (Chart 7). Japanese firms' profits have been increasing, reaching record levels. This is not only the case for large firms, but also for small firms. Against this background, business fixed investment has been increasing moderately. Turning to the labor market, the unemployment rate has declined to a range of 3.0–3.5 percent, which can be regarded as full employment. Moreover, in the 2014 *Shunto* – the annual wage negotiations between workers and management in spring – an increase in base pay was seen for the first time in two decades, and an increase for the third year in a row will follow this year. Moreover, there are signs that wages of non-regular employees including part-time employees are also being raised as a result of labor shortages. Reflecting the improvement in the employment and income situation, private consumption has been resilient, albeit with some fluctuations due to factors such as the weather. Japan's economy has continued its moderate recovery with a virtuous cycle from income to spending being maintained in both the corporate and household sectors.

On the back of the improvement of the real economy, the underlying trend in inflation has been steadily improving (Chart 8). The output gap, which shows the utilization of production factors such as labor and capital, has been improving and recently returned to the average of the past of 0 percent. As I noted earlier, compared to the time before the introduction of QQE, inflation expectations have increased on the whole. The year-on-year rate of change in the CPI recently has been around 0 percent, largely reflecting the substantial decline in crude oil prices since summer 2014. However, the year-on-year rate of change in the all-item CPI excluding energy and fresh food shows a completely different picture. Before the introduction of QQE in April 2013, the rate of change was slightly negative, registering about minus 0.5 percent. Following the introduction of QQE, it turned positive in October 2013 and since then has remained positive for 29 consecutive months. It recently increased to a level above 1 percent. This is the first time that Japan has registered such sustained inflation since it fell into deflation. Thus, although Japan's economy still has some way to go until the price stability target of 2 percent is achieved, there is no doubt that there has been a clear change in the inflation trend under the Bank's QQE.

## **V. Objectives of the negative interest rate policy**

Against the background just described, the Bank of Japan introduced “QQE with a Negative Interest Rate” in January 2016.

As indicated, QQE has been exerting its intended effects. However, since the turn of the year, global financial markets have been unstable against the backdrop of the further decline in crude oil prices and uncertainty over future developments in emerging and commodity-exporting economies, particularly the Chinese economy. Moreover, although Japanese firms' behavior has become increasingly proactive based on the prospects of a post-deflationary economy, they have nevertheless remained somewhat cautious despite their high levels of profits, probably reflecting that the prolonged period of deflation is still fresh in their memories. Therefore, the risk that market volatility could lead to a deterioration in firms' sentiment and bring about a setback in the conversion of people's deflationary mindset, which had been underway, should not be underestimated. It was in order to preempt the manifestation of such risk and to maintain the momentum toward achieving the price stability target that the Bank decided on further monetary easing through “QQE with a Negative Interest Rate.”

Let us return to the mechanism of monetary easing considered earlier (Chart 3). Through “QQE with a Negative Interest Rate,” the Bank's aim is to lower the short end of the yield

curve by applying a negative interest rate of minus 0.1 percent to part of financial institutions' current account balances at the Bank of Japan. In combination with large-scale purchases of JGBs, the Bank can exert even stronger downward pressure on interest rates across the entire yield curve, resulting in lower real interest rates. Some argue that the negative interest rate policy has shifted the Bank's policy focus from the quantitative to the interest rate aspect. This is not the case. Rather, "QQE with a Negative Interest Rate" further boosts the effects of existing policy measures by directly pushing down the short-end of the yield curve. In this sense, it can be called "enhanced QQE."

As I mentioned earlier, in the debate on monetary policy, the zero lower bound on nominal interest rates has traditionally been regarded as insurmountable. Since a negative interest rate implies that the borrower receives interest while the lender has to pay interest, it is something that under normal circumstances is highly unlikely.

However, the experience of some central banks in Europe in recent years has shown that it is possible to have negative interest rates between institutional players in financial markets by applying a negative interest rate on financial institutions' current accounts held at the central bank. The policy framework adopted by the Bank of Japan follows the example of the frameworks adopted by European central banks but includes some modifications reflecting the specifics of Japan's financial system.

In designing a policy framework to overcome the zero lower bound, a key challenge is that a negative interest rate potentially has adverse effects on the profitability of the banking sector. The reason is that private banks will end up holding assets, including current accounts at the Bank of Japan, that have a negative yield. Given that income from yield spreads – such as the difference between yields on loans and deposits – represents financial institutions' main source of earnings, the negative interest rate policy potentially reduces their profitability. Yet, the banking sector plays a key role in the transmission of monetary policy in that it acts as an intermediary between those that have surplus funds and those that have a deficit of funds; therefore, if the negative interest rate policy were to excessively reduce financial institutions' earnings and undermine the stability of the financial sector, it would make them more reluctant to lend or lead them to demand higher lending rates, which would potentially weaken their functioning as financial intermediaries and thus impair the effects of monetary easing.

That being said, there is no danger of this happening in Japan. One reason is that Japan's financial institutions have a sufficient capital buffer, since they were barely affected by the global financial crisis. In addition, credit costs have declined significantly, since amid the continued economic recovery the number of bankruptcies has declined to a very low level. In fact, not only major banks but also regional banks have registered profits close to record levels despite the low interest rate environment.

Moreover, the Bank of Japan carefully calibrated the framework in order to ensure that the negative interest rate policy does not excessively reduce financial institutions' profits and hence undermine the transmission of monetary policy. Specifically, it adopted a three-tier system in which current accounts held by financial institutions at the Bank are divided into tiers with different interest rates, namely, plus 0.1 percent, 0 percent, and minus 0.1. Moreover, the Bank caps the amount to which the negative interest rate is applied by adjusting the tier to which an interest rate of 0 percent is applied (Chart 9). This is a practical application of the basic principle taught in introductory economics (Econ 101) that prices are determined by marginal costs, not average costs. Put differently, what matters in the formation of interest rates is the cost of a one unit increase in a financial institution's current account balance. Roughly speaking, the total of financial institutions' current account balances at the Bank is somewhat less than 300 trillion yen, and the tier to which the negative interest rate is applied is about 10 to 30 trillion yen – that is, no more than one tenth of the present entire balance. The Bank continues to apply an interest rate of 0.1 percent to a portion of current account balances roughly corresponding the average balances financial

institutions held in 2015, which amount to about 200 trillion yen. Under this framework, the direct impact on financial institutions' profits of the negative interest rate is minimized, while the policy still produces its intended effects on interest rates in financial markets.

In fact, the impact of the policy is already clearly visible in developments in JGB yields. Interest rates across the entire yield curve have declined further, with rates up to a maturity of about 10-years having become negative (Chart 10). Benchmark rates for business lending as well as interest rates on housing loans have also declined. Moreover, recently CP with a negative yield has been issued. Going forward, the effects of the negative interest rate policy are likely to steadily spread to the real economy and inflation.

In sum, "QQE with a Negative Interest Rate" is a very powerful framework enabling the Bank to pursue monetary easing by combining a negative interest rate with quantitative and qualitative easing. The Bank will continue with "QQE with a Negative Interest Rate," aiming to achieve the price stability target of 2 percent, as long as it is necessary for maintaining that target in a stable manner. It will examine risks to economic activity and prices, and will not hesitate to take additional easing measures in terms of three dimensions – quantity, quality, and the interest rate – if it is judged necessary for achieving the price stability target. It is probably no exaggeration to say that "QQE with a Negative Interest Rate" represents the most powerful monetary easing in modern central banking history. The Bank of Japan will achieve the price stability target of 2 percent for sure by making full use of "QQE with a Negative Interest Rate."

## **Conclusion**

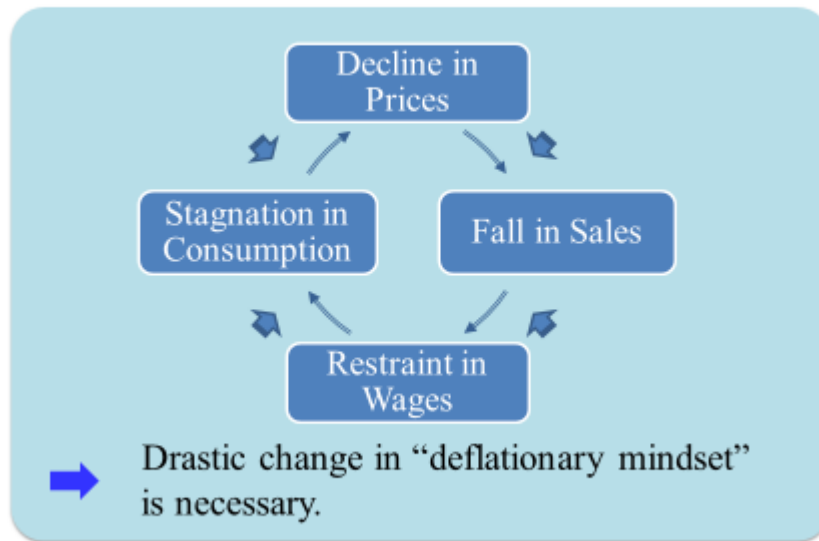
Central banks around the world currently are facing an unprecedented challenge: to firmly anchor inflation expectations amid strong downward pressure on prices while almost having exhausted the traditional monetary policy tool of lowering short-term interest rates. In the United States, thanks to the Federal Reserve's decisive and timely conduct of monetary policy, the economy has been recovering steadily and inflation expectations have remained anchored; yet, with wage growth and inflation not as strong as the tightening of labor market conditions might suggest, the process of normalizing interest rates is attracting close attention globally. Meanwhile, in Europe, the ECB in March this year decided to take additional easing measures in order to deal with increasing risks to the price stability target, pointing to the importance of avoiding second-round effects of low inflation rates on inflation expectations. Under these circumstances, Japan's experience of fighting prolonged deflation should provide a valuable case study for the central banks of other advanced economies in finding appropriate monetary policy responses.

Throughout their long history, central banks around the world have overcome various difficulties by learning from each other's experience and coming up with innovative solutions. I am convinced that, through their wisdom and will, central banks will continue to fulfill their mission of ensuring price stability in this changing and challenging world.

Thank you very much for your attention.

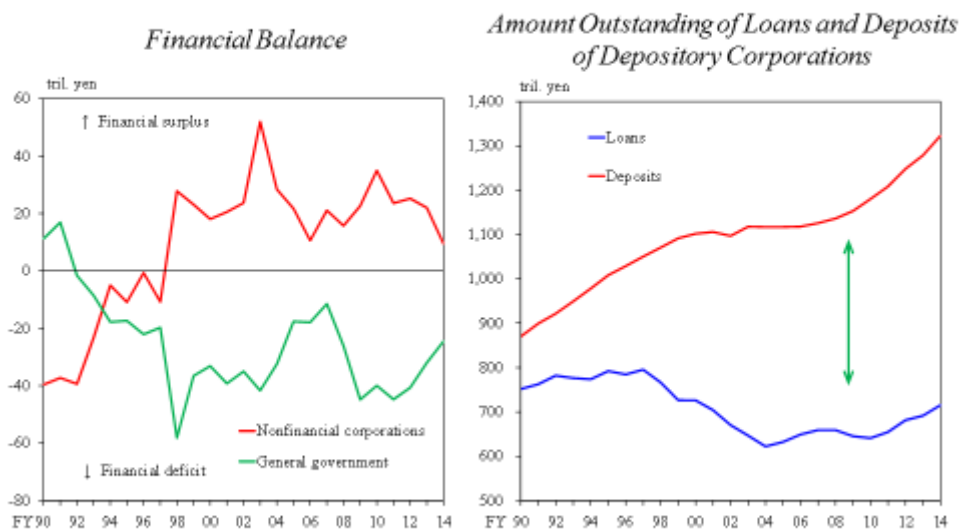


### Vicious Cycle of Deflation



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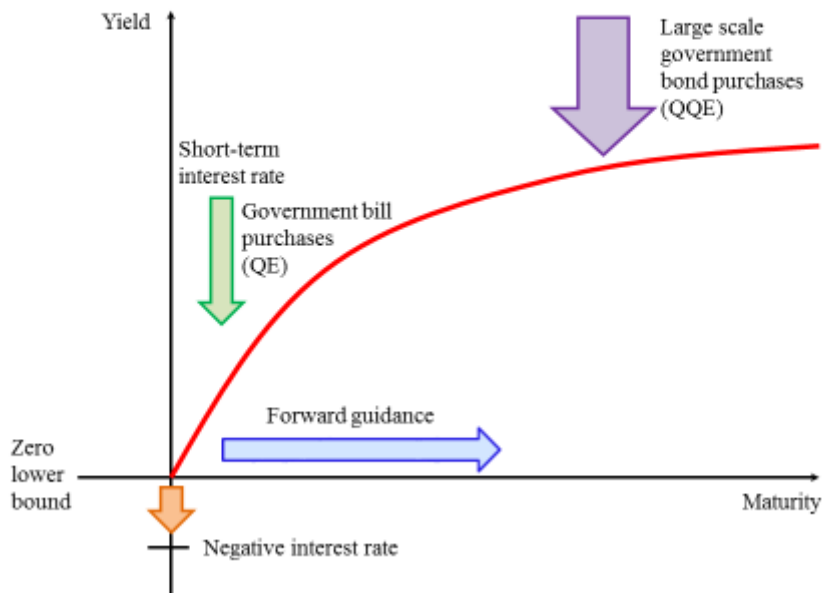
### What Happened under Deflation?



Source: Bank of Japan.

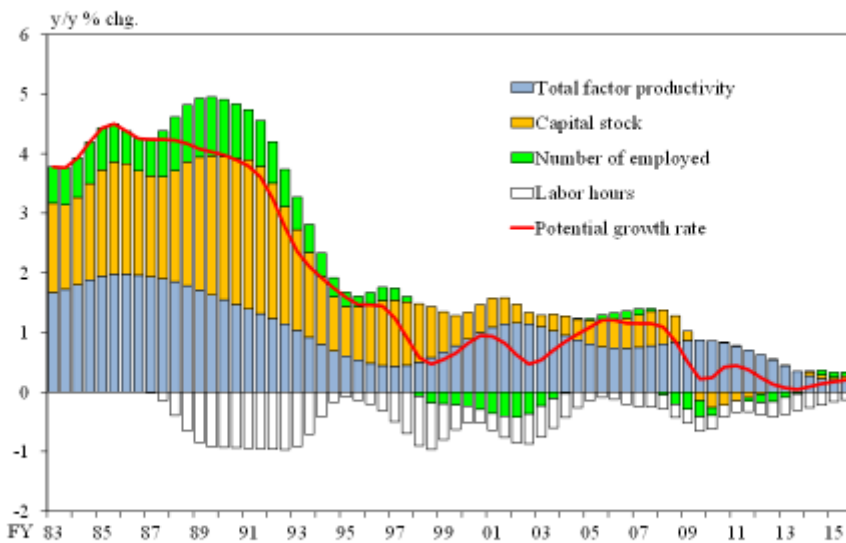
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### Evolution of Monetary Policy



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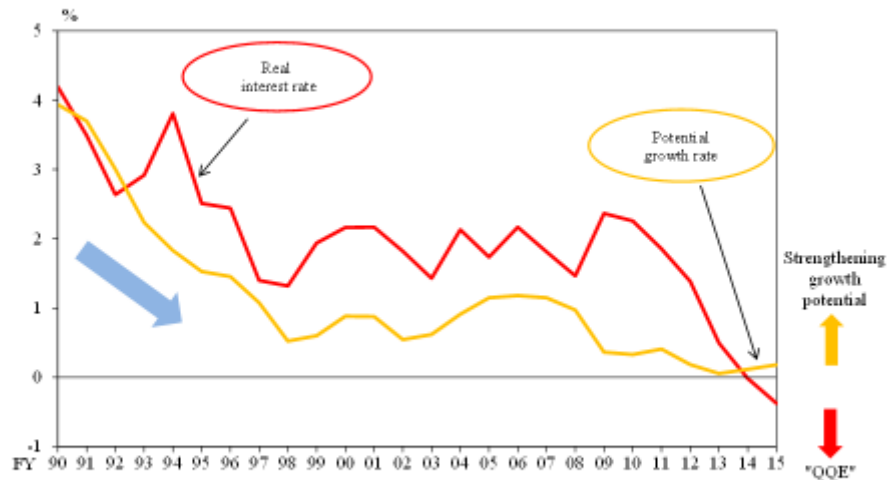
### Potential Growth Rate



Note: The potential growth rate is estimated by the Research and Statistics Department, Bank of Japan. Figures for the second half of fiscal 2015 are those of 2015/Q4.  
 Sources: Cabinet Office, Bank of Japan; Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare; Ministry of Economy, Trade and Industry; Research Institute of Economy, Trade and Industry.

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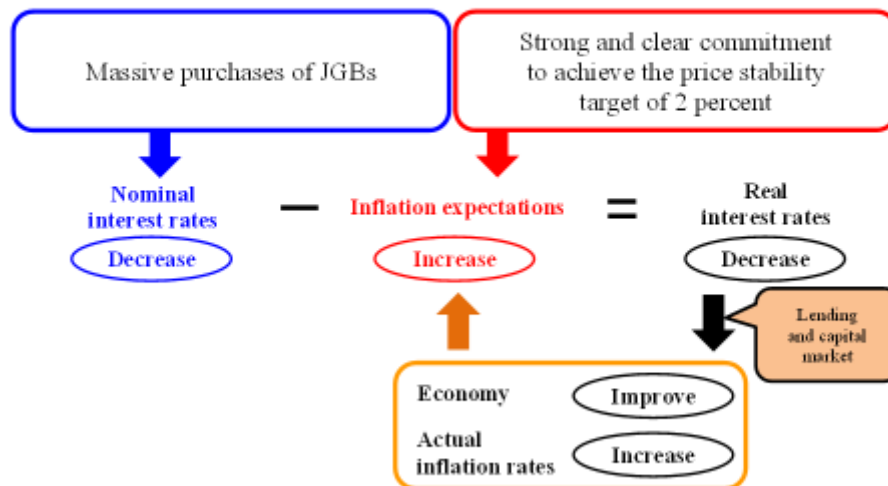
### Real Interest Rate and Potential Growth Rate



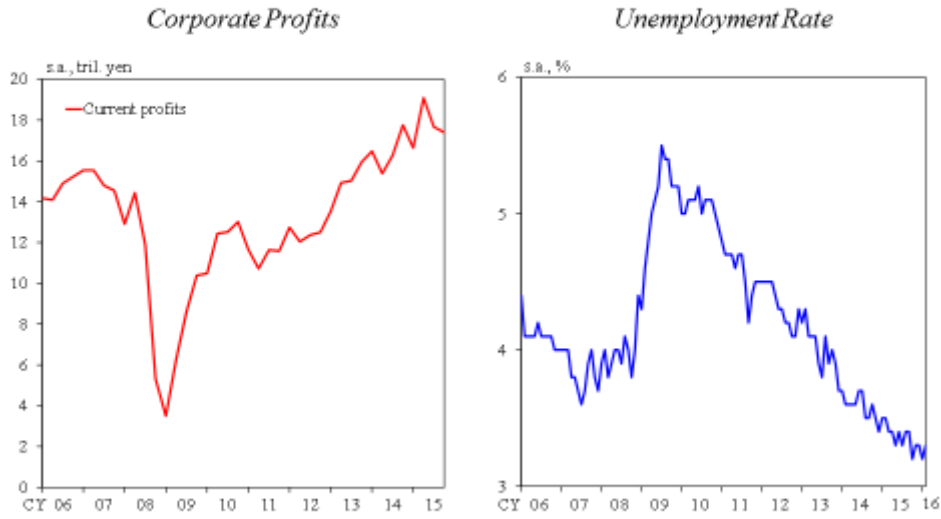
Notes: 1. Figures for the real interest rate are calculated by subtracting the year-on-year rate of change in the CPI (all items less food and energy), adjusting the direct effects of the consumption tax hike, from the yield on 10-year Japanese government bonds. The figure for the real interest rate for fiscal 2015 is the April 2015-February 2016 average.  
 2. The potential growth rate is estimated by the Research and Statistics Department, Bank of Japan. The figure for fiscal 2015 is the April-December average.

Sources: Ministry of Internal Affairs and Communications; Bloomberg; Cabinet Office; Bank of Japan; Ministry of Health, Labour and Welfare; Ministry of Economy, Trade and Industry; Research Institute of Economy, Trade and Industry.

### Mechanism of "Quantitative and Qualitative Monetary Easing"



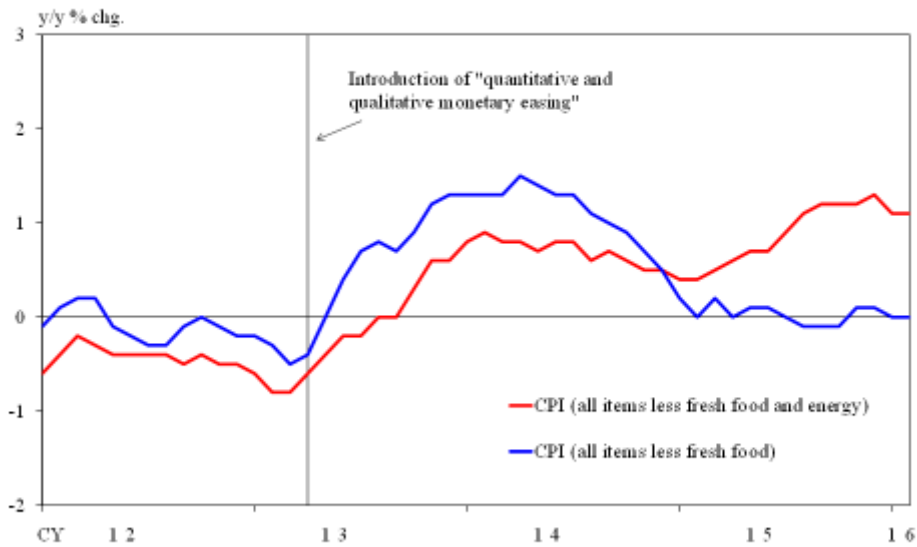
## Japan's Economic Fundamentals



Sources: Ministry of Finance; Ministry of Internal Affairs and Communications.

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## Consumer Prices

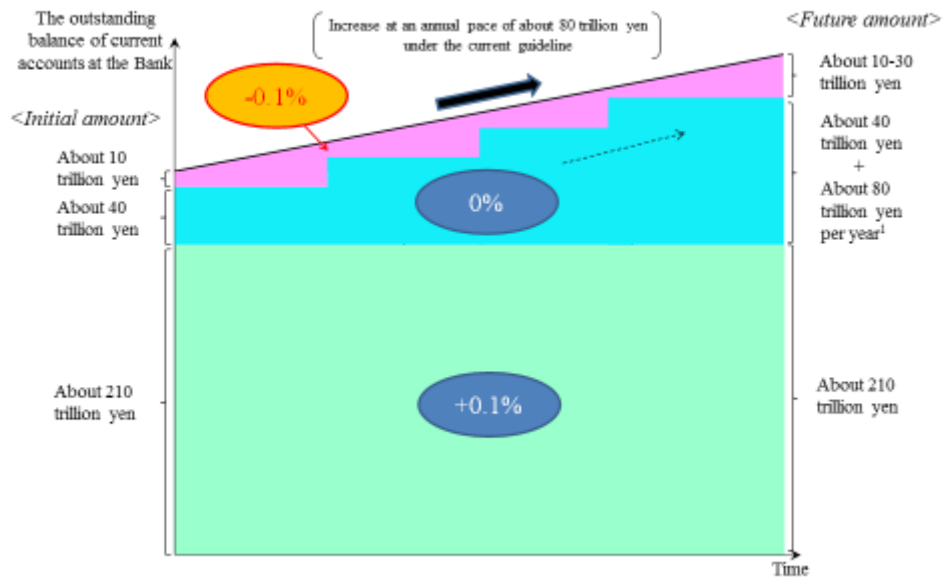


Note: Figures are adjusted to exclude the estimated effects of changes in the consumption tax rate.

Figures for the CPI (all items less fresh food and energy) are calculated by the Research and Statistics Department, Bank of Japan.  
Source: Ministry of Internal Affairs and Communications.

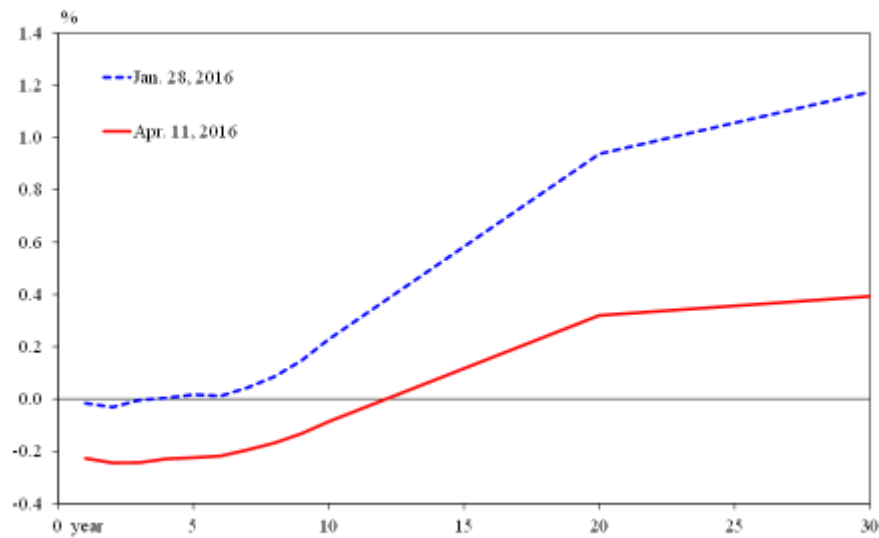
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### Framework of the Three-Tier System



Note: 1. As the Bank will increase the amount outstanding of the tier to which a zero interest rate is applied at the same pace as the increase in the total outstanding balances of current accounts that financial institutions hold at the Bank, the pace of increase will be about 80 trillion yen per year.

### JGB Yield Curve



Source: Bloomberg.