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Bank of Japan

Overcoming Deflation: Theory and Practice

Speech at Keio University in Tokyo

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(English translation based on the Japanese original)

Introduction

It is a great honor to have the opportunity to speak to you today at the Faculty of Economics at Keio University.

Founded by Yukichi Fukuzawa in 1858, Keio Gijuku has a history spanning more than 150 years. The Faculty of Economics -- the precursor of which, together with the Faculty of Letters and the Faculty of Law, was one of the three original faculties of Keio University established in 1890 -- is said to be the oldest economics faculty in Japan. Since then, it has not only been a leading force in economic scholarship in Japan in a wide range of research areas but has also turned out a large number of individuals that have gone on to play prominent roles in the world of politics, business, and finance.

Since I have been given the opportunity to speak at such an academic venue, today I would like to talk about the implementation of so-called unconventional monetary policy and their link to developments in academic research, based on the Bank's experience in implementing quantitative and qualitative monetary easing (QQE).

I. QQE with a Negative Interest Rate

Japan has struggled with deflation since the late 1990s, and in the process the need for more powerful monetary easing gradually became evident. The Abe administration was inaugurated in December 2012 and launched its so-called "Abenomics" policies consisting of "three arrows," and I assumed my role as Governor of the Bank of Japan in March 2013. In April, at the first Monetary Policy Meeting after I became Governor, the Bank decided to introduce QQE.

QQE comprises two elements designed to break through the bounds to previous monetary policy measures (Chart 1). The first element consists of trying to drastically convert the deflationary mindset that had gained hold among people and to raise inflation expectations through the Bank's strong commitment to achieving the price stability target of 2 percent at the earliest possible time. The second element consists of exerting downward pressure not only on short-term nominal interest rates but on the entire yield curve through massive purchases of Japanese government bonds (JGBs). The consequence of these elements is that

they make it possible to exert greater monetary easing effects on the real economy by substantially lowering real interest rates not only at the short end but also at the long end.

Subsequently, the pace of monetary expansion was accelerated in October 2014 both in quantitative and qualitative terms and, in January this year, the policy was augmented in a third dimension by adding an interest rate dimension to the quantitative and qualitative dimensions through the introduction of "QQE with a Negative Interest Rate" (Chart 2). The introduction of a negative interest rate aims to exert further downward pressure on the entire yield curve by lowering the short end of the yield curve, coupled with massive purchases of JGBs. This could be called "enhanced QQE" in that it is an extension of previous QQE policies and further enhances their effects.

With regard to massive purchases of JGBs, the Bank initially conducted purchases such that the amount outstanding of JGBs held by the Bank would increase at an annual pace of about 50 trillion yen, and in October 2014 this was accelerated to today's pace of about 80 trillion yen. Since Japan's nominal GDP is about 500 trillion yen, an annual increase of 80 trillion yen corresponds to about 16 percent of GDP (Chart 3). As a result of such purchases, the Bank of Japan's balance sheet relative to nominal GDP increased from about 35 percent at end-March 2013 to about 81 percent at end-March this year and will continue to rise. For comparison, following the three rounds of large-scale asset purchases (LSAPs) in the United States, which now have ended, the Federal Reserve's balance sheet at end-March this year was equivalent to 25 percent of nominal GDP. I think this shows you just how massive the monetary easing conducted by the Bank of Japan is.

II. The Costs of Deflation

As mentioned, the aim of QQE is to overcome the prolonged deflation that has gripped Japan. Even if this deflation has been mild, the fact that it has continued for more than 15 years means that its cumulative costs have been extremely large. Looked at in terms of the price level, an annual inflation rate of minus 0.3 percent over a period of 15 years implies that the price level will fall by around 5 percent, but an annual inflation rate of 2 percent over a period of 15 years means that the price level will rise by around 35 percent. Therefore, I think it is clear that even mild deflation, if it continues for a prolonged period,

will have a large impact on the medium- to long-term decision-making of economic entities.

The problem with persistent deflation is that it gives rise to a vicious cycle in which firms and households -- since they expect prices to fall further and due to heightened uncertainty -- postpone various expenditures, which further prolongs weak growth and deflation. Under such circumstances, with falling prices and heightened uncertainty, postponing expenditures may be the optimal response for individual economic entities; however, from a macroeconomic perspective, it is a typical example of the "fallacy of composition," since it results in prolonging weak growth and deflation. Therefore, to overcome deflation, it is absolutely essential to drastically convert the deflationary mindset. Moreover, merely achieving a positive inflation rate is not sufficient; it is also necessary that a self-reinforcing cycle of strengthening economic activity gains traction with prices increasing moderately.

During the period of deflation, Japan's economy experienced a simultaneous downward shift and flattening of the Phillips curve (Chart 4). If the average inflation rate is low, the opportunity costs of leaving prices unchanged are also low, so that the frequency of price adjustments by firms is likely to fall. Macroeconomic theory suggests that such a decline in the frequency of price adjustments at the micro level is linked to a flattening of the Phillips curve at the macro level.¹

A key question in this context, I think, is whether the flattening of the Phillips curve or, in other words, the decrease in the responsiveness of the inflation rate to economic fluctuations, is simply the result of changes in firms' price-setting behavior. If we look at Japan's experience of prolonged deflation, the decline in the frequency of price adjustments can also be regarded as signaling a weakening in the metabolism of the economy, of which the postponement of expenditure activities by firms and households is only a symptom. If this is the case, it is possible that the change in the shape of the Phillips curve reflects a deterioration in the fundamentals of Japan's economy. Of course, at the moment, this is nothing more than a hypothesis. To examine this hypothesis, we need theoretical and empirical studies taking the interaction of deflation and firms' behavior into account, but to

¹ Laurence Ball, N. Gregory Mankiw, and David Romer, "The New Keynesian Economics and the Output-Inflation Trade-off," *Brookings Papers on Economic Activity*, No. 1, 1988, pp. 1-65.

date there is limited amount of research on this issue. Moreover, when considering the lessons from Japan's prolonged deflation, it is also essential to deepen our understanding with regard to the link between deflation and macroeconomic performance.

III. Formation of Inflation Expectations

Earlier, I mentioned that QQE consists of two elements. One of these was the drastic conversion of the deflationary mindset, and related to this, I would like to consider the formation of inflation expectations in more detail.

When considering the formation of inflation expectations, theoretical and empirical research on forward guidance under zero interest rates provides useful insights. With many central banks grappling with the zero lower bound on policy rates not only as a theoretical possibility but as a problem encountered in practice, research on forward guidance has made considerable progress.² Such research has helped to elucidate that, even in a situation where the zero lower bound has been reached and it is not possible to lower policy rates further, monetary easing effects can be achieved through forward guidance by committing to maintaining zero interest rates, which can be regarded as a mechanism to borrow monetary easing effects from the future (Chart 5).

The first time this mechanism was employed in the actual conduct of monetary policy was with the introduction of the zero interest rate policy commenced by the Bank of Japan in February 1999. At that time, the Bank committed itself to maintaining a zero interest rate until deflationary concern was dispelled, and the impact of that policy was called the "policy duration effect." Backed by growing theoretical research, similar policies were subsequently adopted by central banks of other major advanced economies and have recently come to be referred to as forward guidance.

It is well known that in standard macroeconomic models, macroeconomic variables respond strongly to forward guidance by the central bank, giving rise to substantial policy effects. Thus, from a theoretical perspective, a commitment to continuing with zero interest rates for

² Gauti Eggertsson and Michael Woodford, "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity*, No. 1, 2003, pp. 139-211.

a prolonged period not only allows borrowing unlimited monetary easing effects from the future, but such policy effects also materialize immediately. However, these predictions are at odds with the effects actually observed in practice -- a phenomenon that has been described as the "forward guidance puzzle."³

When considering this puzzle, two factors are important. The first is that in standard macroeconomic models, there are no limits to consumption smoothing over time due to the large intertemporal elasticity of substitution and the absence of borrowing constraints. The second is that inflation expectations respond instantaneously to any change in policy.

It is this latter point -- the speed with which inflation expectations respond -- that I would like to focus on next. In theoretical models assuming a forward-looking Phillips curve, inflation expectations respond instantaneously if the commitment regarding future monetary easing is credible. However, inflation expectations observed in practice are highly sticky and change only slowly. This means that in the actual formation of inflation expectations, the backward-looking component determined by actual inflation rates observed in the past plays a large role. Moreover, in standard theoretical models, it is assumed outright that the commitment to monetary easing is perfectly credible, which potentially gives rise to a discrepancy between such theoretical models and reality.

If we consider Japan's experience, with inflation expectations having declined in the deflationary period, what plays an extremely important role in the process of overcoming deflation is to push inflation expectations back up to close to the target inflation rate and to re-anchor them there. How to do this, including how to deal with the impact of the backward-looking component of inflation expectations, is a challenge that is not necessarily addressed by theory. Moreover, with not only the Bank of Japan but many other central banks around the world currently having nearly exhausted conventional monetary policy means -- that is, lowering short-term interest rates -- responding to deflationary pressures and firmly stabilizing inflation expectations at the desired level represents an

³ Marco Del Negro, Marc Giannoni, and Christina Patterson, "The Forward Guidance Puzzle," Staff Reports 574, Federal Reserve Bank of New York, 2012.

unprecedentedly difficult challenge. In this sense, the formation of inflation expectations can be regarded as an "old new" issue of debate.

IV. Large-Scale Purchases of Financial Assets

Next, I would like to talk about pushing down the entire yield curve through massive JGB purchases, which is another element of QQE.

As is well known, although the market operations of a central bank -- by exchanging monetary base for government bonds -- are transactions in financial assets that are not perfect substitute, they should be neutral with regard to price formation if arbitrage in financial markets operates fully.⁴ However, if arbitrage in financial markets for some reason is imperfect, the market operations of the central bank will affect term premiums.⁵ Moreover, it is likely that such financial market imperfection will become more severe during times of financial crisis.

In practice, if we look back at the response of central banks in the United States and Europe immediately after the collapse of Lehman Brothers, we find that the most important issue was the stabilization of financial markets and the financial system, and central banks to this end provided large amounts of liquidity and intervened in financial markets that showed signs of malfunction. Subsequently, with financial markets having calmed down to some extent, central banks continued with large-scale asset purchases with the aim of stabilizing the macroeconomy and avoiding deflation by pushing down various premiums in financial markets. Furthermore, another important component of QQE, as mentioned earlier, was to raise inflation expectations by influencing forward-looking expectations formation.

A number of studies employing New Keynesian models -- the standard type of macroeconomic models employed to analyze monetary policy issues -- have sought to incorporate various kinds of financial market imperfections to examine the impact of such

⁴ Neil Wallace, "A Modigliani-Miller Theorem for Open-Market Operations," *American Economic Review*, Vol. 71, No. 3, 1981, pp. 267-274.

⁵ Franco Modigliani and Richard Sutch, "Innovations in Interest Rate Policy," *American Economic Review*, Vol. 56, No. 2, 1966, pp. 178-197.

quantitative easing.⁶ However, I think that to date it is not sufficiently clear under what circumstances and through which mechanisms quantitative easing is effective. In fact, former Fed Chairman Bernanke has quipped that "[t]he problem with QE is it works in practice, but it doesn't work in theory." Given that different countries and regions have different financial systems, I think that when examining the impact of quantitative easing it is necessary not only to focus on the financial markets in which large-scale asset purchases are conducted but also to explicitly take into account such differences, for example in the transmission mechanisms in the financial systems.

V. Monetary Policy Rules

I would now like to slightly change the topic and consider unconventional monetary policy and monetary policy rules.

One of the areas in which there has been considerable progress since the 1990s in theoretical and empirical research on monetary policy is research on policy rules, of which the Taylor rule is a prime example.⁷ Studies in this area highlight the importance of systematically setting policy rates in line with changes in the macroeconomy in order to maximize monetary policy effects. Put differently, they indicate that in order to ensure the effectiveness of monetary policy, the important thing is not to cause unanticipated shocks, but to maintain consistent and predictable policy responses (Chart 6).

These considerations regarding the conduct of monetary policy essentially also apply to the conduct of unconventional policies. This means that, in order to raise the effectiveness of monetary policy, it is important to show in advance the policy options the central bank can use to address an exogenous shock to the economy large enough for interest rates to hit the zero lower bound. However, looking back at Japan's experience since the late 1990s and the policy response in the United States and Europe following the collapse of Lehman Brothers, central banks essentially stumbled along in devising new policy measures to respond to the

⁶ See, for example, Mark Gertler and Nobuhiro Kiyotaki, "Financial Intermediation and Credit Policy in Business Cycle Analysis," in Benjamin Friedman and Michael Woodford, eds., *Handbook of Monetary Economics*, Vol. 3A, 2010.

⁷ The pioneering study in this area is John B. Taylor, "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, Vol. 39, 1993, pp. 195-214.

situation and problems facing them at the time.

Since in practice the world is full of uncertainty, it is difficult to present policy options for all contingencies in advance. Moreover, because policy responses to unanticipated events are formulated by taking not only financial and economic circumstances but also various structural and institutional constraints into account, they tend to consist of a complex package of policies.

The issue of what kind of institutional framework should be built in order to achieve an efficient allocation of resources in circumstances where such uncertainty is great and it is necessary to deal with complex challenges falls into the arena of incomplete contract theory.⁸ Research in this field has made rapid progress in recent years and the findings are applied in practice in a growing range of areas, such as firm organization, financial contracts, and legal systems. I think that, by employing the new understanding gained and considering a possible policy framework for comprehensive policy rules -- including in response to crises -- as well as the application of such rules, it may be possible to expand the research frontier of monetary policy.

VI. Long-Term Equilibrium

While it is premature to talk about the timing of an exit from "QQE with a Negative Interest Rate" and how to go about it, I would finally like to take the valuable opportunity of speaking here today to say a few words about the relationship between Japan's economy and monetary policy once deflation has finally been overcome.

Standard models analyzing monetary policy take the trend growth rate and the inflation rate in steady state as given and focus on economic fluctuations around the trend. The central interest of monetary policy analysis employing such models is how to smooth cyclical economic fluctuations and to stabilize the inflation rate near the target level. Standard macroeconomic models generally make simplifying assumptions: short-term models focusing on business cycles take the potential growth rate as exogenously given, while

⁸ A standard textbook in this field is Patrick Bolton and Mathias Dewatripont, *Contract Theory*, The MIT Press, 2005.

long-term economic growth models examining the determinants of the potential growth rate ignore short-term economic fluctuations, since it is assumed that these are smoothed out over time and do not affect long-term economic growth.

Similar simplifying assumptions are made in the analysis of unconventional monetary policy. When unconventional monetary policies are analyzed using standard theoretical macroeconomic models, it is assumed that even if there is a shock large enough for interest rates to hit the zero lower bound the economy returns to its steady state as the shock dissipates. In other words, such analyses of unconventional monetary policies examine how the impact of a large shock is smoothed out and absorbed over time.

However, if there is a downward shift in the steady state and the natural rate of interest, which reflects long-term growth expectations, shifts down permanently, the stimulative effects of a decline in real interest rates on economic activity will weaken and the effectiveness of monetary policy will be substantially hampered. Moreover, if there is substantial uncertainty regarding the level of the natural rate of interest, this would make it difficult to assess the degree of monetary easing or tightening required and it would increase uncertainty over the future course of monetary policy. In addition, since the decline in the potential growth rate is likely to also lower expected permanent incomes, it will give rise to a negative income effect, which likely will exert downward pressure on economic activity.

In fact, as seen in the "secular stagnation" debate of recent years, there has been active debate in major advanced economies regarding the possibility that, following the large shocks they have suffered, the steady state may have shifted downward due to a variety of factors.⁹ Meanwhile, whereas Japan's potential growth rate until the early 1990s had been in the range of 3 to 4 percent, it subsequently followed a downward trend, falling to around 1 percent in the second half of the 1990s and further to a level below 0.5 percent after the collapse of Lehman Brothers (Chart 7). The natural rate of interest -- that is, the interest rate

⁹ Lawrence H. Summers, "Have we Entered an Age of Secular Stagnation? IMF Fourteenth Annual Research Conference in Honor of Stanley Fischer, Washington, DC," *IMF Economic Review*, Vol. 63, No. 1, 2015, pp. 277-280.

at which the economy neither accelerates nor decelerates -- is likely to also have followed a downward trend in line with the decline in the potential growth rate.

In this sense, the relationship between uncertainty surrounding the medium- to long-term steady state and the conduct of monetary policy can be said to be an issue faced not only by the Bank of Japan, but by all central banks. In order to consider this issue, it is necessary to devise an analytical framework that takes the interaction between long-term economic growth and short-term business cycle fluctuations into account. Doing so is not only of practical importance but should also present an interesting research topic from an academic perspective.

Conclusion

Japan's experience of battling with mild but extremely persistent deflation provides a valuable case study both for academic research on unconventional monetary policy and for the practical conduct of monetary policy by central banks. By making use of this experience, we have made significant progress over the past decade and a half in academic research and the actual conduct of monetary policy. However, it is also true that, as I mentioned today, there still remain gaps between the two. Going forward, I am sure that if academia and central banks continue to join forces in their efforts, this will produce important benefits to both sides.

Thank you.

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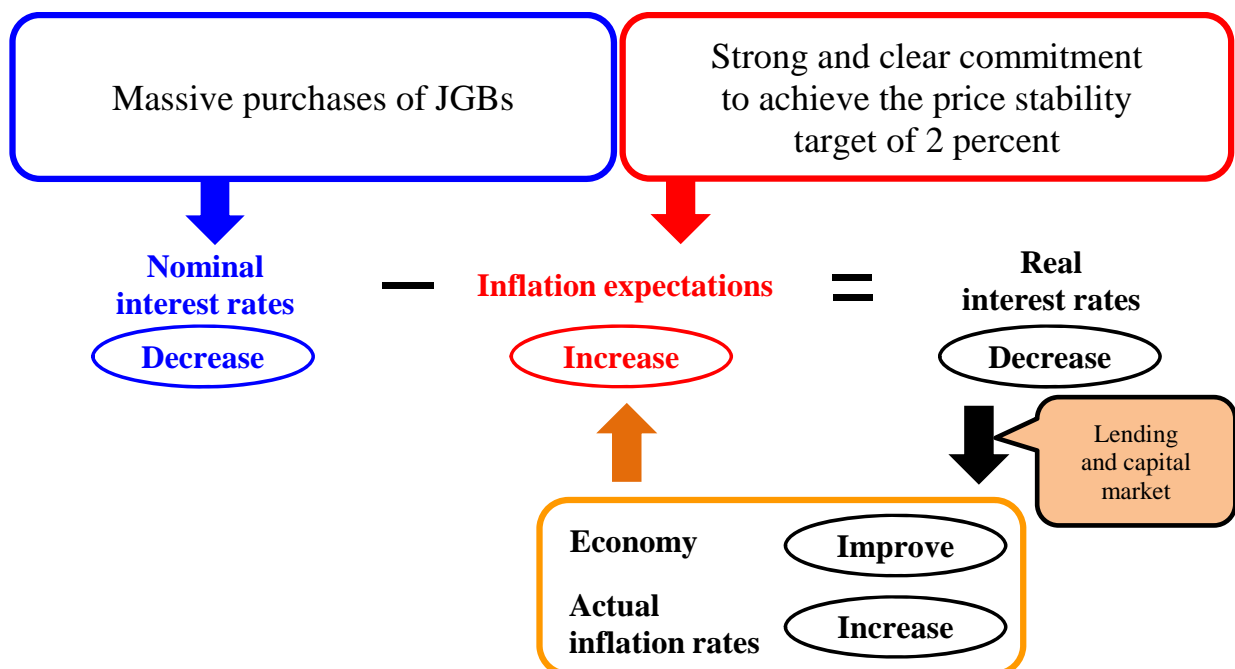
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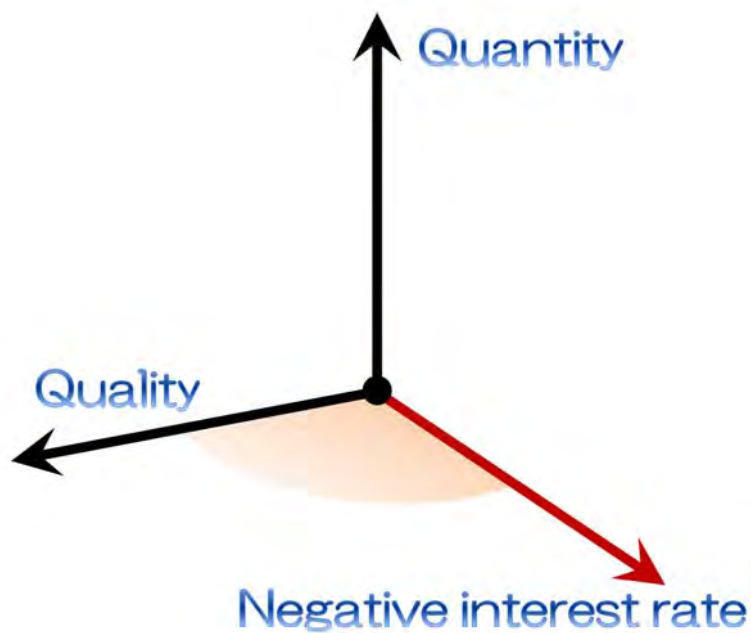
Governor of the Bank of Japan

Chart 1

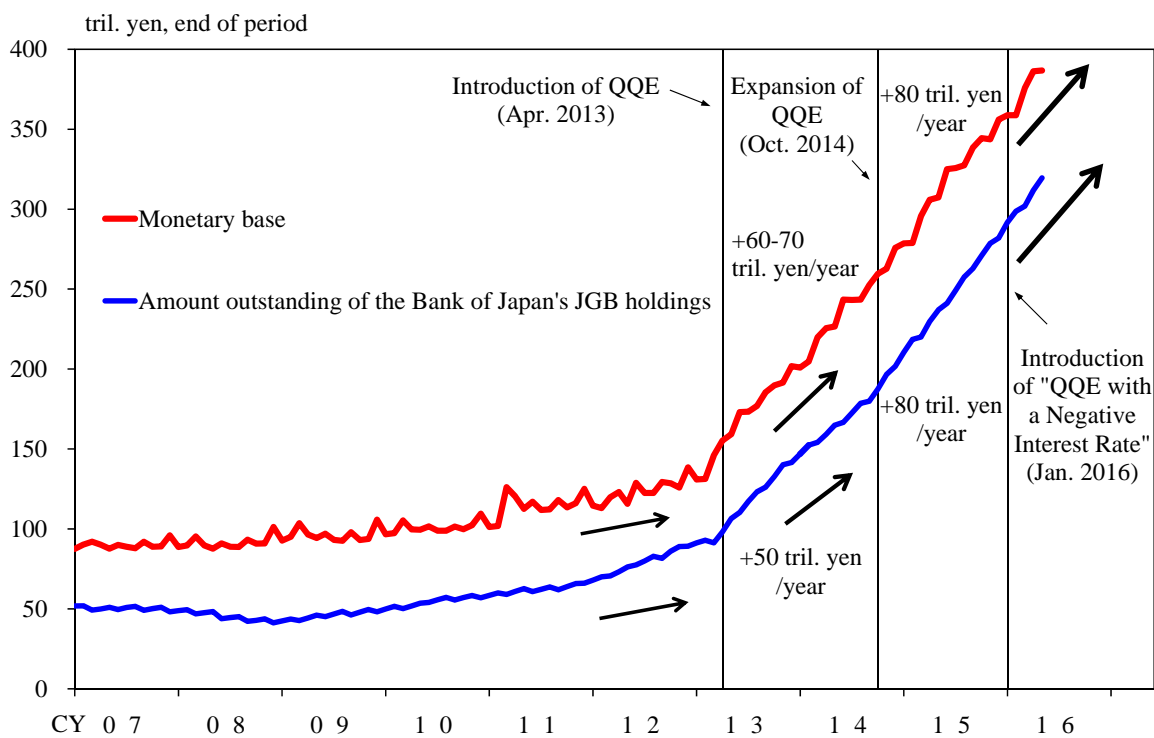
Mechanism of Quantitative and Qualitative Monetary Easing (QQE)



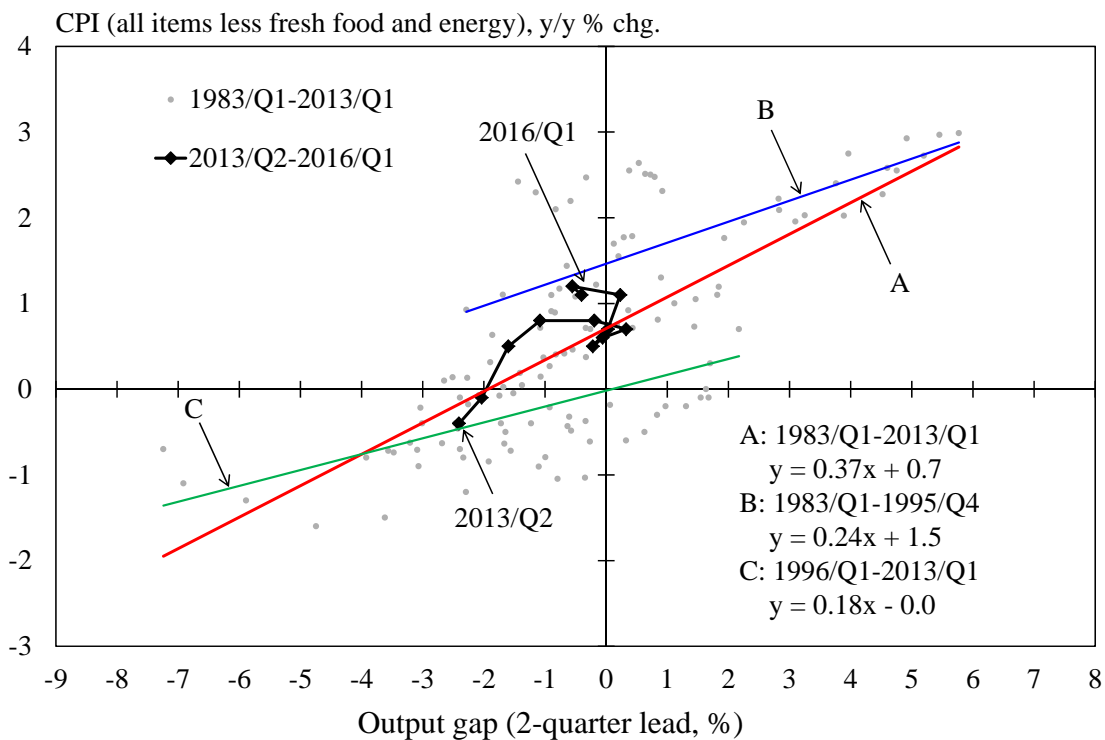
Scope for Additional Monetary Easing in Terms of Three Dimensions



Expansion in the Monetary Base and JGB Holdings

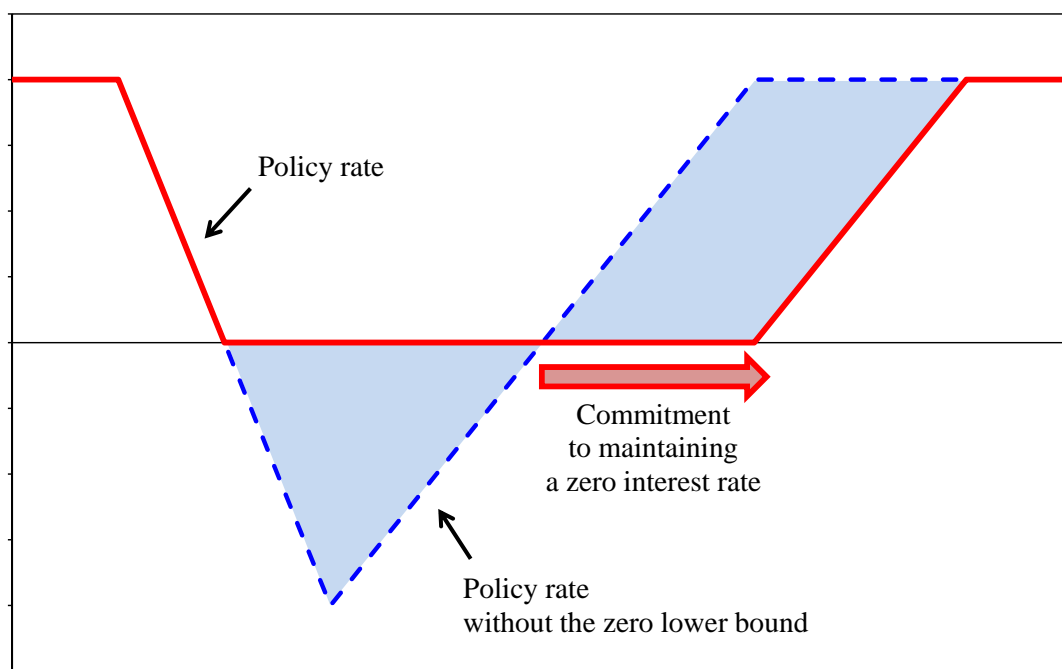


Phillips Curve



Sources: Ministry of Internal Affairs and Communications; Cabinet Office, etc.

Forward Guidance



Progress in Academic Research on Monetary Policy Rules

Standard Policy Measures

Consistent & Predictable Policy Actions



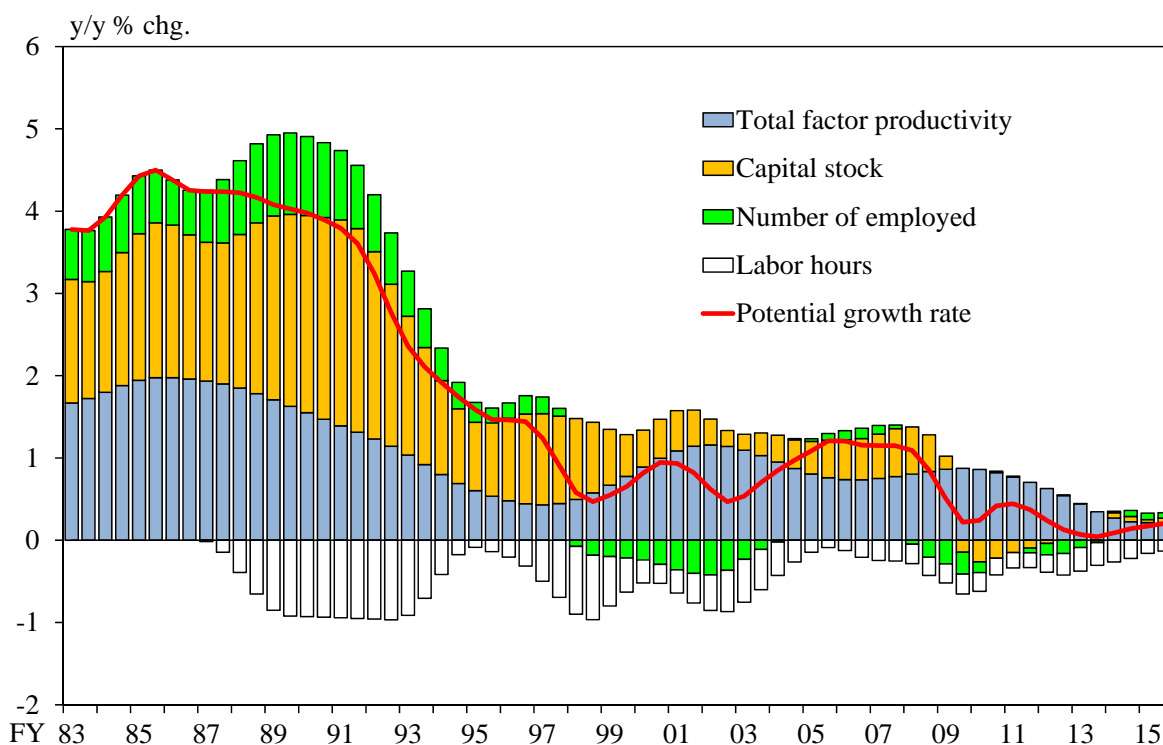
Increase in Policy Effectiveness

Unconventional Policy Measures

Response to Various Uncertainties & Complexities

→ Aspects of Incomplete Contracts

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.