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Bank of Japan

History and Theories of Yield Curve Control

*Keynote Speech at the Financial Markets Panel Conference
to Commemorate the 40th Meeting*

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(English translation based on the Japanese original)

Introduction

It is a great honor to have this opportunity to give a keynote speech at the Financial Markets Panel Conference to Commemorate the 40th meeting. The first meeting of the panel was held in March 2009. At that time, the central banks in major countries started to undertake unconventional monetary policy measures in succession to tackle the global financial crisis, and it also was the period when a wide range of policy debates regarding effectiveness of these measures were opened. In addition, the consequences of financial imbalances during the 2000s were gradually surfacing at that time, and the paradigms of monetary policy or financial regulation that had been taken for granted for many years started to be reexamined and revised. I would like to show my greatest respect for all of the continued discussions about financial market and monetary policy that have been held with this panel over the eight years since the global financial crisis.

About five years have passed since my last opportunity to present at this panel, which was at the Financial Markets Panel Conference to Commemorate the 20th meeting in February 2012. In the meantime, in order to achieve the price stability target of 2 percent, the Bank has launched massive monetary easing including the introductions of quantitative and qualitative monetary easing (QQE) in April 2013 and "QQE with a Negative Interest Rate" in January 2016. At the Monetary Policy Meeting held in September 2016, the Bank conducted the "Comprehensive Assessment" of the effects of the monetary easing observed to that point and introduced "QQE with Yield Curve Control" -- namely, a new framework that controls the entire yield curve itself.

It has been generally believed that the central bank can control short-term interest rates but cannot and should not control long-term interest rates. One reaction to the current yield curve control policy has been that this is not in line with conventional thought. Historically, however, this "convention" was established only recently -- namely, in the last twenty years. By contrast, the view that the central bank can achieve its policy goal by interfering in financial markets and directly controlling long-term interest rates has manifested itself repeatedly throughout the course of history. Today, I would like to take this occasion to provide an overview of the history and theories of yield curve control -- in particular, long-term interest rate control -- specifically focusing on the U.S. experience that has been

the center of discussions so far, and then to raise some related issues.

I. History and Theories of Long-Term Interest Rate Control

A Thought of Keynes during the Great Depression

I will start by touching upon a thought of J. M. Keynes, a founder of macroeconomics. Keynes is well known as the person who first advocated the idea of the "liquidity trap," which is a state that emerges after interest rates drop to low levels where demand toward liquidity explodes to infinity and actual interest rates hit a floor. For the case of the United States at the time of the Great Depression, however, it is likely that he did not believe the economy was caught in a liquidity trap, and the Federal Reserve Board (FRB) could cut long-term interest rates further by actively interfering in the government bond markets. For example, in his open letter to President Roosevelt in 1933, Keynes wrote, "I see no reason why you should not reduce the rate of interest on your long-term Government Bonds to 2½ per cent or less with favourable repercussions on the whole bond market, if only the Federal Reserve System would replace its present holdings of short-dated Treasury issues by purchasing long-dated issues in exchange" (Chart 1).¹ In the letter, he emphasized the effectiveness of the proposal: "Such a policy might become effective in the course of a few months, and I attach great importance to it." Clearly, he believed that the central bank should take an active approach toward long-term interest rates, at least in such a crisis period as that of the Great Depression.

Despite the proposal, the FRB at that time took the stance of letting long-term interest rates be determined by market forces, and a large-scale market operation in line with the proposal made by Keynes was not implemented.

Interest Rate Cap Policy upon Entry into World War II

The economic circumstances surrounding the FRB changed drastically with the outbreak of World War II in 1941. Concerns over expansion of the government budget deficit and increases in inflation formed among participants in the government bond market, and this exerted upward pressure on long-term interest rates. The Treasury and the FRB, intending to stabilize the government bond markets and curb the cost of financing expenses for the war,

¹ John M. Keynes, "An Open Letter to President Roosevelt," 1933.

arranged a framework that set caps on long-term and short-term bond yields (Chart 2). Under this framework, long-term yields were capped as the government bond issuance by the Treasury was conducted with a cap of 2.5 percent, together with market operations such as the government bond purchase conducted by the FRB that aimed to maintain the cap. Short-term yields were capped through purchases of three-month Treasury Bills by the FRB with a fixed rate of 0.375 percent. Although the FRB's government bond holdings had increased at a rapid pace, the credibility of its commitments to the bond yield caps was maintained throughout the war.

The yield curve during the war could not be maintained when consumer price growth rates increased to about 20 percent with the lift of price controls after the war. The purchasing rate of three-month Treasury Bills was gradually raised toward 1948 and the cap on short-term interest rates was in effect abolished. In contrast, the cap on long-term interest rates was maintained until the beginning of the 1950s, reflecting the intensifying East-West confrontation. President Truman at that time even wrote a letter to Chairman McCabe of the Board of Governors, pointing out that the collapse of the government bond prices is "exactly what Mr. Stalin wants."

Government Bond Price-supporting Policy in the United Kingdom

Policies that support the government bond price were not unique to the United States. In the United Kingdom as well, the Bank of England (BOE) had conducted government bond purchases to support the government bond price after the war. That is, from the period immediately after the end of the war to 1947, the BOE gave aggressive buying support to the bond price, explicitly setting the target long-term interest rate at 2.5 percent (Chart 3). In the subsequent years, the target was no longer set explicitly, as monetary policy implementation became more centered on control of the official Bank Rate. However, the government bond purchases that aimed to curb the pace at which the government bond interest rates rise were conducted intermittently for more than twenty years until 1971. Consequently, the government bond holdings by the BOE have increased monotonically.

What can we learn from the government bond price-supporting policies in the United States and the United Kingdom? One observation is that it was possible for the central banks to

curb the long-term interest rates unless severe inflation did occur. But it is important to add that these policies worked as financial repression for the sake of the government bond management, and they are different from our yield curve control policy that actively manipulates the long- and short-term interest rates in order to achieve the price stability target. In these two countries, on the one hand, the central banks conducted large-scale purchases of the long-term government bonds and thus the long-term bond yields stayed low, which ensured that the Domar stability condition held and helped contain otherwise explosive government debt accumulation. On the other hand, monetary policy was constrained by the government bond price-supporting policy that constituted a part of the government debt management policy. To a greater or lesser degree depending on countries or the state of the economy, these policies exerted continued inflationary pressure on the economy.

Establishment of Accord and "Bills Only" Policy

Let's get back to the United States. In the early 1950s, the force of inflation gained strength with the intensifying Korean War. Meanwhile, in 1951, the FRB and the Treasury jointly released a statement that put an end to the government bond price-supporting policy for long-term government bonds. This is what is commonly referred to as the "Accord" (Chart 4).

The Accord is interpreted as an end to the crisis regime of macroeconomic policy implementation and a revival of active monetary policy. Given that the constraint of the government bond price-supporting policy originating from the government bond management policy objective was now gone, it became possible for the FRB to pursue price stabilization policy. In 1953, the FRB advocated that the goal of monetary policy is price stabilization, and it employed a "bills only" policy that stated that the target of the market operation of the FRB would be confined to Treasury Bills. It is notable there that the "bills only" policy is different from today's short-term interest rate control, and is based on the idea that both short-term and long-term interest rates should be determined by market forces. Treasury Bills were large in terms of the amounts outstanding and transaction volume. By limiting the scope of securities transacted under market operations only to Treasury Bills, the FRB intended to influence reserve amounts held by commercial banks moderating the

direct effects of market operations on the entire term structure of interest rates.

Controversy on Operation Twist

In the 1960s, the "bills only" policy confronted a serious challenge. Increasing concerns at that time for the prospects of the dollar triggered an upsurge in the gold price and significant capital of gold and short-term funds to overseas, which in turn led to calls for immediate measures to defend dollars. The domestic economy was witnessing a severe recession. For President Kennedy, who had just taken office, improvement in the balance of payments and recovery in the domestic economy constituted the central agenda of the economy policy. Under these economic circumstances, the FRB started a program coined Operation Twist in 1961 (Chart 5). The purpose of this program was to reduce capital outflows by keeping short-term interest rates high and to stimulate the domestic economy by cutting long-term interest rates, selling short-term bonds, and purchasing medium- to long-term bonds.

There were mixed views, however, on whether such an operation would be effective, particularly in view of the fact that the government bond market had developed markedly from the period of the Great Depression and the period just after the end of the war. Theoretically, Operation Twist was expected to be effective if the markets for long-term bonds and short-term bonds were segmented and the two classes of bonds were imperfect substitutes, as stated by the "market segmentation theory" and/or the "preferred habitat hypothesis" stressed by Keynesian economists such as J. Tobin and F. Modigliani. Such a policy turns out to be ineffective from the viewpoint of the "expectations hypothesis," which was gaining popularity as the term structure theory of interest rates at that time. This is because long-term bonds and short-term bonds are highly substitutable in this case. The conflict of the two opposing views sparked a controversy that involved practitioners and academics.

During the time of this controversy, several empirical studies were conducted analyzing the effectiveness of Operation Twist on interest rates. The dominant view formed at that time was that the role of Operation Twist on interest rates was minimal. This was possibly due to the fact that the study by Modigliani, an advocate of the "preferred habitat hypothesis,"

indicated that the program did not affect interest rates in a statistically significant manner.²

Implications of the controversy for future generations were substantial. It seems that, after the controversy, the view that the central bank can control short-term interest rates but not long-term interest rates has gradually spread.

The Era of Monetary Targeting

In the late 1960s, Keynesian economics, which until that time constituted mainstream thoughts about macroeconomics in academic circles, declined in popularity as they failed to provide an effective prescription for the persistent increase of inflationary pressure. Monetarism instead gained strength in the 1970s and 1980s. This paradigm shift can be seen in the speech titled "The Role of Monetary Policy" by M. Friedman as his presidential address to the American Economic Association in 1967.³

A paradigm shift also has occurred in the practice of monetary policy implementation, in the form of the emergence of monetary targeting that positioned money stock as the intermediate target of policy implementation (Chart 6). In 1970, the FRB announced that it would attach a higher weight to monetary aggregates and banks' credit. In 1975, the FRB started to release figures for the growth rate of money stock over the next one year and its range. It then started to describe developments in the relationship between the target of money stock growth and the economic outlook biannually in the *Monetary Policy Report* to the Congress following the instruction of the Full Employment and Balanced Growth Act -- informally called Humphrey-Hawkins Act -- that was signed into law in 1978. Furthermore, in 1979, Chairman Volker adopted new market operation procedures through which the FRB would aim to control growth rates of M1 by manipulating nonborrowed reserves.

In the 1970s and 1980s, other major central banks adopted some forms of monetary targeting aimed at curbing inflation. For instance, the Bundesbank in West Germany announced in 1974 that it would follow monetary targeting and set the target for the central

² Franco Modigliani and Richard Sutch, "Innovations in Interest Rate Policy," *American Economic Review*, Vol. 56, No. 1/2, 1966, pp. 178-197.

³ Milton Friedman, "The Role of Monetary Policy," *American Economic Review*, Vol. 58, No. 1, 1968, pp. 1-17.

bank money stock. The BOE introduced monetary targeting in 1976. Regarding Japan, the Bank of Japan did not introduce a rigid monetary targeting but announced in 1975 that money stock was an information variable, which is useful in monetary policy implementation, and started to release a forecast of money stock growth in 1978.

Obviously, under monetary targeting regimes, interest rates are determined by market forces. When central banks tried to control monetary aggregates, short-term interest rates fluctuated substantially and the volatility of long-term interest rates increased. Related to this point, it is important to note that, from the Monetarists' point of view, interest rates are not necessarily considered an important transmission channel of monetary policy. For instance, in the St. Louis model, a stylized econometric model of Monetarism, neither short-term nor long-term interest rates were included.

A Shift to Short-Term Interest Rate Control

When pursuing monetary targeting policy, it is essential that the relationship between money stock and other economic variables, such as real GDP or prices, which is the ultimate goal of monetary policy, is stable or predictable. However, the once-observed stable relationship between these variables was destabilizing in the 1980s, possibly because of financial liberalization and technological innovation in the area of financial transactions.

If the stable relationship fails to hold, there is no gain from setting money stock as the intermediate target in terms of increasing the transparency and accountability of monetary policy implementation and achieving credibility on monetary policy. The FRB therefore gradually started to walk away from monetary targeting and shifted to interest rate control. In 1982, it ended the nonborrowed reserves targeting and tilted toward focusing on moderating fluctuations in the federal funds rate, and it stopped setting the target goal of M1 in 1987. During the 1990s, in 1993, Chairman Greenspan said in a testimony that, "The historical relationships between money and income, and between money and the price level have largely broken down, depriving the aggregates of much of their usefulness as guides to policy," and in 1995, the FRB announced that it would release the target range for the federal funds rate, which marked the end of the transition to the regime of short-term interest rate control.

Shifts from monetary targeting to short-term interest rate control have advanced in other major central banks as well. The BOE abandoned the monetary target when it joined the European Exchange Rate Mechanism (ERM) in 1990, and shifted to a regime that controls its policy rate -- the official Bank Rate -- based on broad considerations, in particular the exchange rate stabilization. The BOE then shifted to inflation targeting in 1992 when it withdrew from the ERM, and it adopted the Repo Rate as the policy rate in 1997. With regard to the European Central Bank (ECB) that was established in 1998, monetary targeting adopted by the Bundesbank was not adopted. Instead, the ECB decided to follow the two-pillar approach, where the risks to price stability are assessed by economic and monetary analysis, and to control short-term interest rates based on a wide range of views. The Bank of Japan, after the completion of deregulation of interest rates in 1994, replaced discount rate control with a monetary policy framework that set targets for the overnight call rate in 1995, and it stopped announcing the outlook of money stock in 2006.

While central banks in practice shifted to a policy framework that aims to achieve price stabilization based on short-term interest rate control, Monetarism gradually lost its influence among academics and the New Keynesian economics started to form the mainstream of macroeconomic theory. This paradigm shift also can be seen in the proposition of the Taylor rule by J. B. Taylor at Stanford University in 1993 when the FRB denied the usefulness of monetary aggregates as useful guides to policy.⁴ The subsequent accumulation of policy analysis conducted by New Keynesian economists -- based on the framework that incorporates short-term interest rate control by the central bank as its ingredients -- provided a theoretical basis for a new framework of monetary policy implementation to the central bankers at that time.

Over time, this monetary policy framework based on short-term interest rate control has become known as conventional monetary policy, even though only twenty years have passed since its establishment. In this framework, while long-term interest rates generally have been perceived as a transmission channel of monetary policy, in the dominant view

⁴ John B. Taylor, "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, Vol. 39, 1993, pp. 195-214.

they are considered to be determined by markets.

II. New Challenges after the Global Financial Crisis: Unconventional Monetary Policy

An implicit assumption upon which the conventional monetary policy framework is built is that the policy rate -- namely, the short-term interest rate -- lies well above zero. However, the policy rate reached the zero lower bound in the late 1990s in Japan while fighting deflation, and in 2008 for the United States and the euro area when tackling the global financial crisis. Faced with the difficulty of a further reduction in the short-term interest rate, the central banks -- including the Bank of Japan as the frontrunner -- have developed a policy package typically called unconventional monetary policy (Chart 7).

There have been intensive debates among academics and policymakers, including central bankers, as to what constitutes this unconventional monetary policy. Although there is no agreement about its exact definition, in terms of the target and transmission channel of monetary policy, unconventional monetary policy is loosely described as "policy that extends the scope of what the central bank tries to control beyond the short-term interest rate -- to other financial variables such as premia of long-term and/or risky assets -- and that is implemented once there is no room for a further reduction in the short-term interest rate."⁵ Such a policy includes, for instance, a policy that aims to cut interest rates on those government bonds with longer maturities that still lie above zero percent by purchasing the bonds and providing liquidity to the market on a large scale. Policies referred to as "credit easing" in the United States and qualitative easing by the Bank of Japan aim to affect the risk premia of bonds and equities of private firms. The forward guidance -- a promise of future monetary policy implementation -- also can be categorized in the same class of policy. Because long-term interest rates are essentially the average of short-term interest rates over the horizon plus the term premium, commitments to the future path of short-term interest rates should affect long-term interest rates. A negative interest rate policy is an attempt to remove the barriers of the zero lower bound. In summary, unconventional monetary policy is a series of attempts to surmount difficulties arising from the zero lower bound of

⁵ Masayoshi Amamiya, "Mainasu Kinri Seisaku ni tsuite (On the Negative Interest Rate Policy)," in Japan Center for Economic Research, ed. *Gekiron Mainasu Kinri Seisaku (Debate on the Negative Interest Rate Policy)*, Chapter 1, Nikkei Publishing Inc., 2016 (available only in Japanese).

short-term interest rates.

Can the central bank control long-term interest rates in modern and developed financial markets? This question was at the center of the controversy on the effectiveness of Operation Twist half a century ago. A good number of recent empirical studies have shown that the purchases of long-term government bonds by the central bank lower long-term interest rates in a statistically significant manner (Chart 8).⁶ A potential explanation for this includes the revival of the "market segmentation theory" or the "preferred habitat hypothesis," both of which would emphasize the demands of participants in financial transactions toward government bonds as collateral due to the fact that government bonds are safe and liquid, or those of insurance companies and pension funds that prefer long-term investments. It also is pointed out that asset purchases by the central bank may have signaling effects to market participants that do not have access to perfect information.

The once-accepted view, proposed by Modigliani and Sutch, that the effect of Operation Twist was ambiguous has confronted a challenge recently (Chart 9). In fact, an empirical study by E. T. Swanson, who was at the Federal Reserve Bank of San Francisco, argues that the program was found to be effective in a statistically significant manner based on an event study that exploited high-frequency market data.⁷

In addition, Japan's experience after the introduction of "QQE with a Negative Interest Rate" indicates that purchases of long-term government bonds combined with applications of negative interest rates to part of the Bank's current account balances can exert strong downward pressure on the long-term interest rates. Accumulated experiences in the past and thoughts associated with them serve as a basis of consideration regarding the introduction of yield curve control by the Bank.

III. Issues for Discussion

So far, I have briefly reviewed the history and theories of yield curve control; in particular,

⁶ See, for example, Joseph E. Gagnon, "Quantitative Easing: An Underappreciated Success," *Policy Brief*, PB16-4, Peterson Institute for International Economics, 2016.

⁷ Eric T. Swanson, "Let's Twist Again: A High-Frequency Event-Study Analysis of Operation Twist and Its Implications for QE2," *Brookings Papers on Economic Activity*, Spring, 2011, pp. 151-188.

long-term interest rate control. In closing, based on this review, I would like to raise four issues that may serve as reference for discussions going forward (Chart 10).

First, when discussing long-term interest rate control, it is essential to isolate arguments from practical points of view -- that is, whether or not it is feasible -- and on the basis of normative arguments -- in other words, whether or not it should be done. On the feasibility side, as the first issue, what we learned from various practices of monetary policy implementation and existing empirical studies is that the central bank can bring about a sizable effect on long-term interest rates. Admittedly, however, there are areas where further understanding is called for, such as controllability of the interest rates or their effectiveness as a measure to tackle adverse shocks. Markets and the central banks therefore need to continue accumulating experiences and thoughts in these areas going forward.

The second issue is from the normative perspective; that is, whether or not it should be done. I believe the dichotomy between normal and crisis periods is a good starting point for the normative discussion of long-term interest control. If this dichotomy holds, during the normal periods, the central bank should control the short-term interest rates exclusively and let the long-term interest rates be determined by financial markets so that the price discovery function operates; during the crisis periods -- or phases of overcoming long-lasting deflation, like the case of Japan -- it should employ policy measures that are different from those adopted during the normal periods.

However, it is notable that the recent experiences of major central banks after the outbreak of the global financial crisis indicated that the central bank can have a considerable impact on long-term interest rates even under today's highly developed financial markets. Although a theory that fully accounts for these experiences is yet to be established, they may demand reconsideration of the conventional wisdom regarding the central bank's role in normal times. In fact, some new voices among academics in the United States and the euro area argue that a central bank does not have to restore the status quo ante, or normalize in terms of its balance sheet characteristics and maintain what it has acquired as its new monetary policy measures due to massive balance sheet expansion. Whether the central bank should either revert back to the conventional state or migrate to a new normal, exploiting lessons

learned from the current global financial crisis is the important agenda item that needs to be examined from now on.

The third issue is how to pin down the desirable shape of the yield curve. This issue would arise as a part of immediate tasks once yield curve control policy is undertaken. In implementing conventional monetary policies, a good number of benchmarks help us obtain a clear view of the desirable level of the short-term interest rate, including the aforementioned Taylor rule, the monetary conditions index (MCI), and models that exploit the concept of the natural rate of interest, such as Wicksellian models. We need to extend these benchmarks beyond those of the short-term interest rate to the entire yield curve. Two years ago, the Bank started to explore this area theoretically and empirically, as a research series on "the natural yield curve." We shared some of our findings with the public, but the research is yet to be completed.⁸ Assessing the entire yield curve is a process of complicated and comprehensive evaluations that need to consider broad areas including the functioning of society's financial infrastructure -- for example, insurance and pensions -- as the longer end of the yield curve has close ties with those institutions, apart from the direct effects on economic activities and prices. Reflecting those considerations, in launching the new monetary policy framework, the Bank stipulated that it will take account of "developments in economic activity and prices as well as financial conditions" in monetary policy implementation, aligning these three areas.

Lastly, as the fourth issue, I would like to touch upon the relation between fiscal management and yield curve control. As I noted, yield curve control by the Bank differs from the government bond price-supporting policies once implemented in the United Kingdom and the United States. While these policies aimed to minimize financial costs of the government, the Bank's current policy aims to overcome deflation and achieve the price stability target. Given that the policy directly sets the long-term interest rates as its operational target, however, it is undeniable that the area deeply related to fiscal management expands. Not surprisingly, therefore, there are voices of concern and criticism that the current policy coincides with money finance or monetization, or that the exit

⁸ Kei Imakubo, Haruki Kojima, and Jouchi Nakajima, "The natural yield curve: its concept and measurement," *Bank of Japan Working Paper Series*, No.15-E-5, 2015.

strategy of the policy will be constrained by consideration for fiscal management. It is therefore important that the Bank, bearing in mind those voices as well, gain the understanding of the markets and the public by releasing more carefully than ever the information on the purpose and ways of thinking about monetary policy implementation.

Conclusion

About three months have passed since the Bank introduced the new monetary policy framework together with the release of the "Comprehensive Assessment." At the moment, it seems that the market has digested the newly introduced framework in an orderly manner. In addition, currently, partly because the environments of the global financial market have been shifting in a favorable direction, yield curve controls including those associated with negative interest rates have gradually brought about considerable effects. It is notable, however, as mentioned earlier, that this policy on the one hand is built upon the accumulated experience of the monetary policy implementation in the past, and on the other hand it is a novel and unprecedented policy globally because, to this degree, it is explicit in its aim to control the long- and short-term interest rate system as a whole. Thus, there are areas for which further considerations, both theoretically and empirically, are essential. I would like to conclude my speech, and hope that the Financial Markets Panel will continue to make important contributions to these activities.

Thank you for your attention.

History and Theories of Yield Curve Control

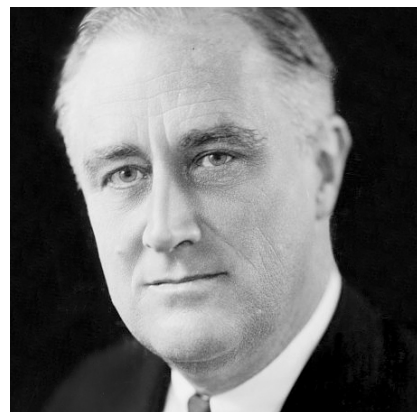
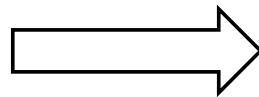
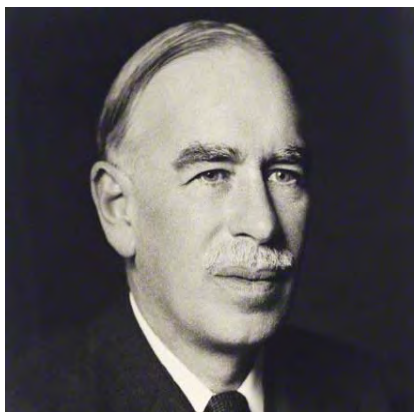
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Masayoshi Amamiya
Executive Director of the Bank of Japan

Chart 1

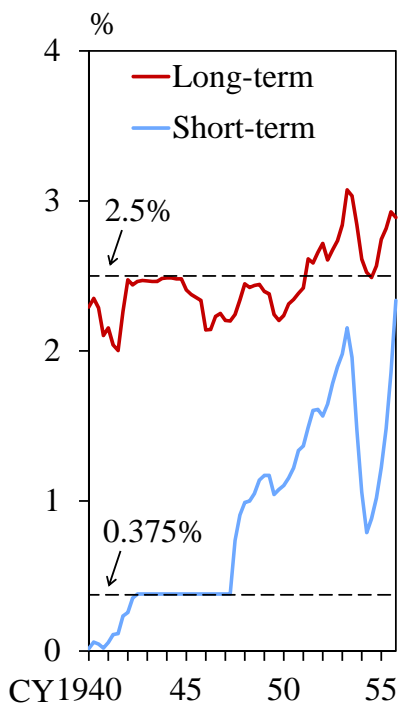
Keynes' Open Letter to President Roosevelt



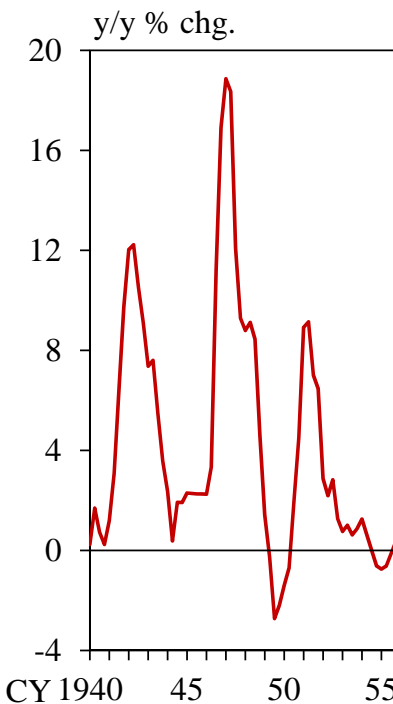
"I put in the second place the maintenance of cheap and abundant credit and in particular the reduction of the long-term rates of interest. . . . I see no reason why you should not reduce the rate of interest on your long-term Government Bonds to 2½ per cent or less with favourable repercussions on the whole bond market, if only the Federal Reserve System would replace its present holdings of short-dated Treasury issues by purchasing long-dated issues in exchange. Such a policy might become effective in the course of a few months, and I attach great importance to it."

The Interest Rate Cap Policy in the U.S.

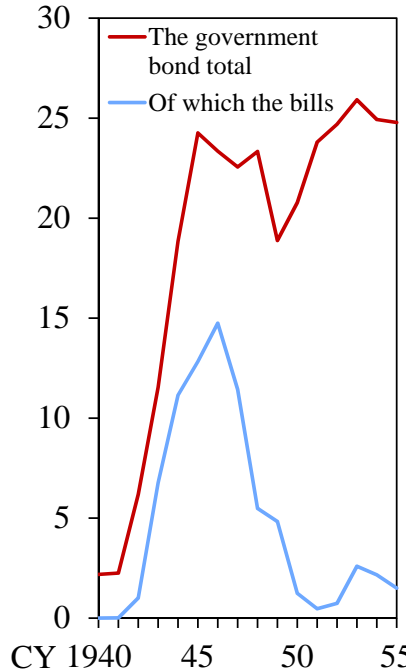
Long- and Short-Term Interest Rates



Consumer Price Index



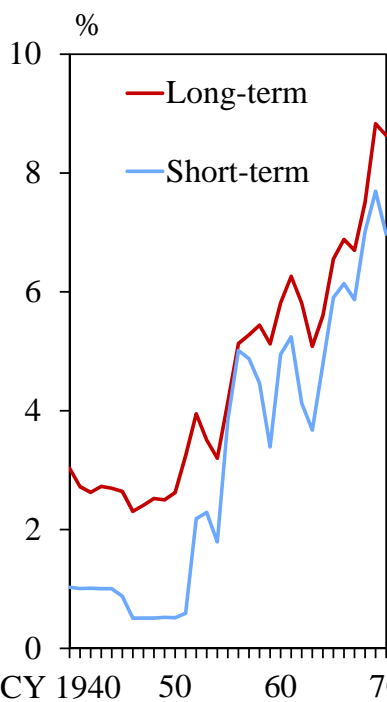
Government Bond Holdings of the FRB
bil. U.S. dollars



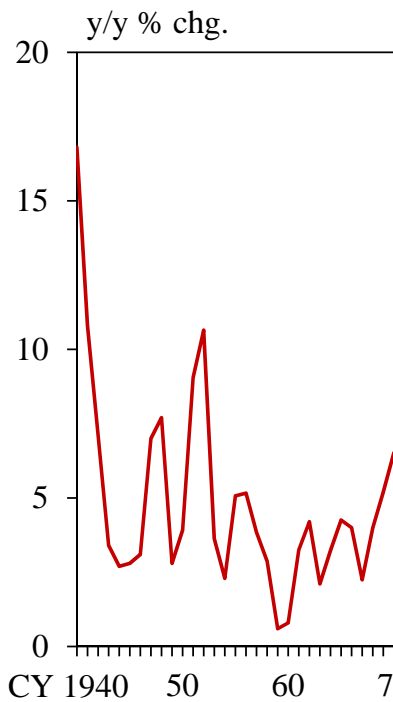
Note: The long-term interest rate is the average of 10-year and over 10-year U.S. Treasury bond yields, and the short-term interest rate is the Treasury Bill rate (3-month).
Sources: Federal Reserve; HAVER.

The Government Bond Price-supporting Policy in the U.K.

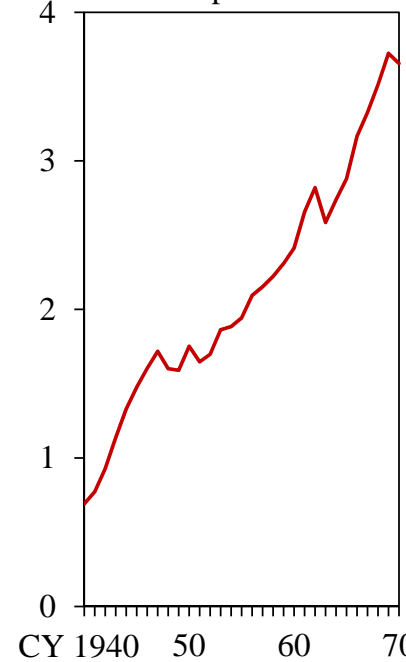
Long- and Short-Term Interest Rates



Consumer Price Index



Government Bond Holdings of the BOE
bil. U.K. pounds



Note: The long-term interest rate is the yield on 10-year British government securities, and the short-term interest rate is the Treasury Bill rate.
Source: Bank of England.

The 1951 "Accord" in the U.S.

-- 1951 Accord --

"The Treasury and the Federal Reserve System have reached full accord with respect to debt-management and monetary policies to be pursued in furthering their common purpose to assure the successful financing of the Government's requirements and, at the same time, to minimize monetization of the public debt."

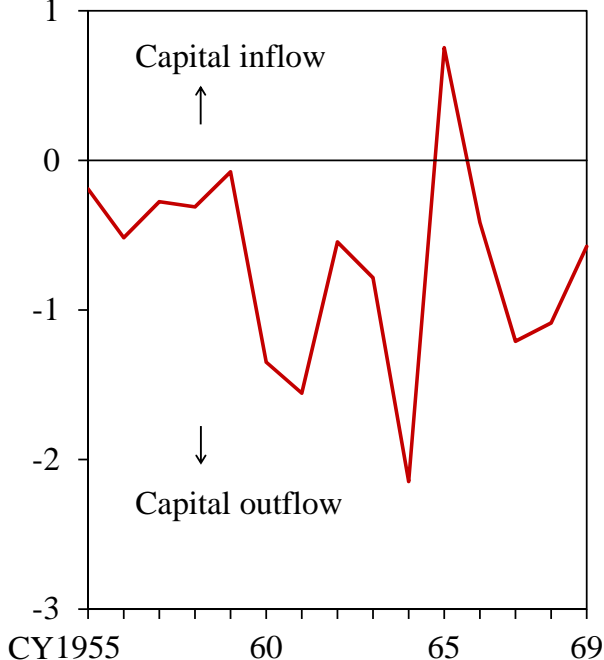
Changes in Monetary Policy after the Accord

	Before Accord	After Accord
Policy Implementation	<ul style="list-style-type: none"> • Maintain the cap of the bond yield 	<ul style="list-style-type: none"> • Stabilize prices
Involvement in Government Bond Market	<ul style="list-style-type: none"> • Purchase the short-term government bonds at a specific rate • Maintain the cap of the long-term bond yield 	<ul style="list-style-type: none"> • Bills Only Policy • Interest rate structure is formed by market forces
Balance Sheet	<ul style="list-style-type: none"> • Shift from the gold reserve to the government bond holding 	<ul style="list-style-type: none"> • Keep holding mainly the government bonds at the same amount

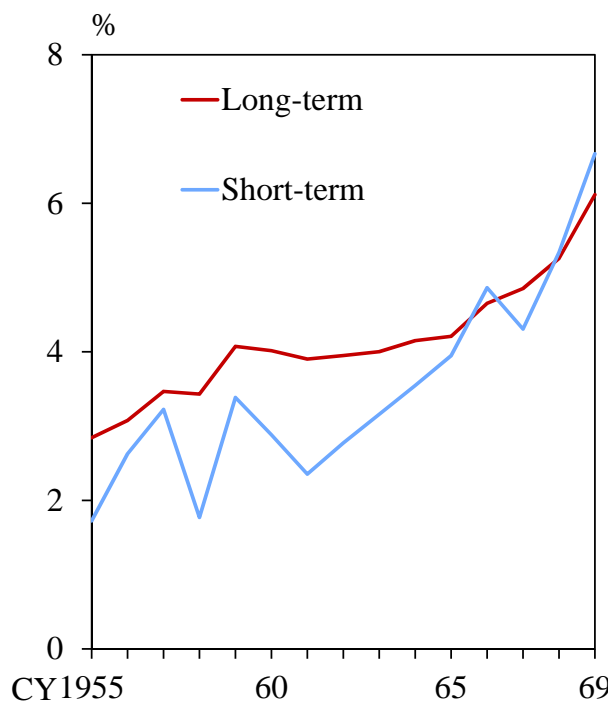
Sources: Federal Reserve; U.S. Department of the Treasury.

Controversy on Effectiveness of Operation Twist in the U.S.

Balance of Payments
(Short-Term Private Capital, Net)
bil. U.S. dollars



Long- and Short-Term Interest Rates



Note: The long-term interest rate is the average of 10-year and over 10-year U.S. Treasury bond yields, and the short-term interest rate is the Treasury Bill rate (3-month).
Sources: HAVER; Government of the United States.

The Era of Monetary Targeting and the Shift to Short-Term Interest Rate Control

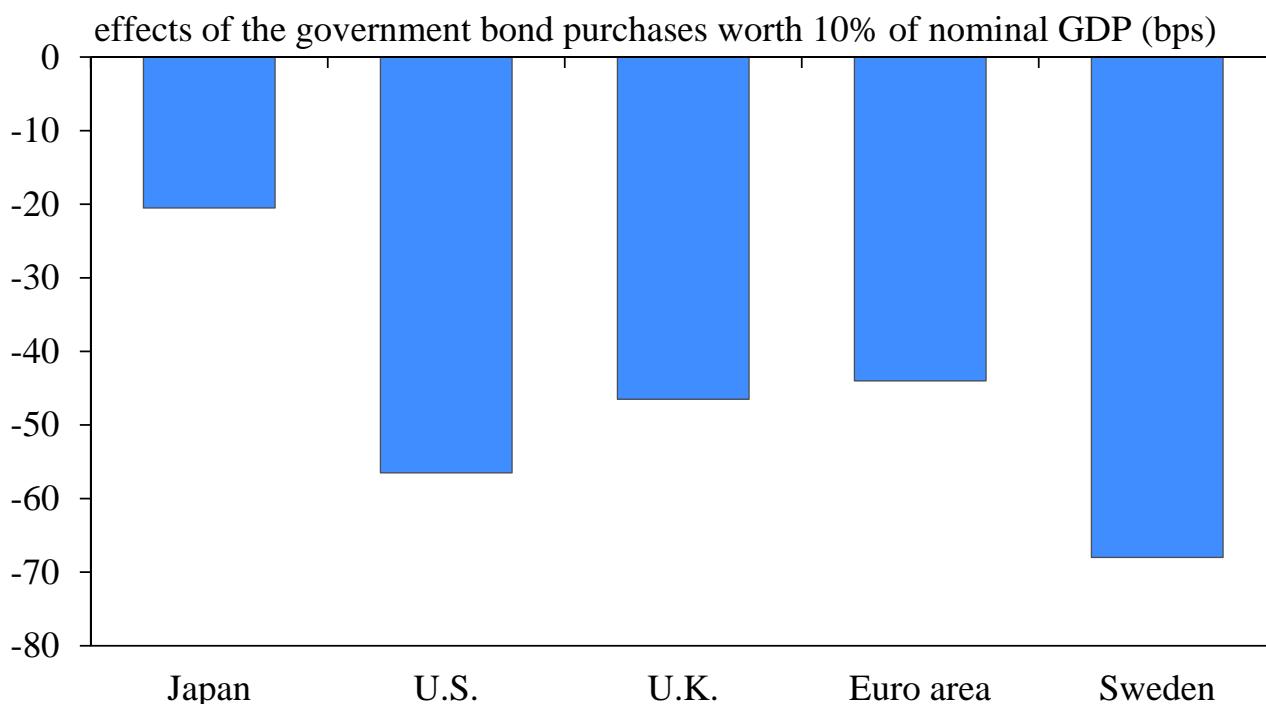
	United States/FRB	Euro area/ECB	United Kingdom/BOE
1970s	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Monetary targeting</div> <ul style="list-style-type: none"> Statement in the directive of the desire to moderate growth in money and bank credit (1970) Announcement of the growth ranges for M1, M2, M3, and bank credit (1975) Humphrey-Hawkins Act passed (1978) Adoption of the growth targets for M1, M2, M3, and bank credit (1979) Adoption of nonborrowed reserve targeting (1979–1982) 	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">((West) Germany/Bundesbank)</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Monetary targeting</div> <ul style="list-style-type: none"> Central bank money stock targeting (1974–) 	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Monetary targeting</div> <ul style="list-style-type: none"> M3 targeting (1976)
1980s	<ul style="list-style-type: none"> Lapse of the growth target of M1 (1987) 	<ul style="list-style-type: none"> M3 targeting (1988–) 	<ul style="list-style-type: none"> M0 and M3 targeting (1984–) Lapse of M3 targeting (1987)
1990s 2000s	<ul style="list-style-type: none"> Chairman's testimony concerning the downgrading of M2 (1993) <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Monetary policy without any nominal anchor based on FF rate control</div> <ul style="list-style-type: none"> Announcement of the FF rate target (1995) 	<ul style="list-style-type: none"> Extension of the time horizon for monetary targeting to two years (1996) Start of ECB (June 1998–) <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Stability-oriented Two-Pillar Strategy</div> <ul style="list-style-type: none"> Adoption of Two-Pillar Strategy (1999–) 	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Policy implementation focusing on exchange rate stability</div> <ul style="list-style-type: none"> United Kingdom joined the ERM (1990) United Kingdom left the ERM (1992) <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Inflation targeting</div> <ul style="list-style-type: none"> Adoption of Repo Rate as the policy rate (1997) The monitoring ranges for M0 and M4 lapsed (1997)
Global Financial Crisis (2008)			

Source: Bank of Japan, "The Role of the Money Stock in Conducting Monetary Policy," *Bank of Japan Quarterly Bulletin*, May 2003, etc.

Conventional Monetary Policy and Unconventional Monetary Policy

Conventional Monetary Policy	<ul style="list-style-type: none"> Control of Short-Term Interest Rates (0% or Higher)
Unconventional Monetary Policy	<ul style="list-style-type: none"> Purchases of the Long-Term Government Bonds (Quantitative Easing)
	<ul style="list-style-type: none"> Credit (Qualitative) Easing
	<ul style="list-style-type: none"> Forward Guidance
	<ul style="list-style-type: none"> Negative Interest Rate

The Effects of Purchases of the Long-Term Government Bonds on the Long-Term Interest Rates



Note: The graph shows the median of the estimates reported in existing studies in each country and region.
 Source: Joseph E. Gagnon, "Quantitative Easing: An Underappreciated Success," *Policy Brief*, PB16-4, Peterson Institute for International Economics, 2016.

Reassessment of the Effects of Operation Twist

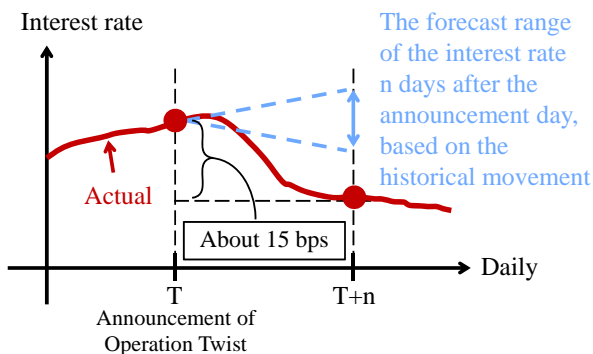
Swanson (2011)

[Data Frequency]

- Daily (high frequency)

[Methodology]

- Examines if the movement of the interest rate after the announcement of Operation Twist is significantly different from the its past movements



Finding: significant effects on lowering interest rates

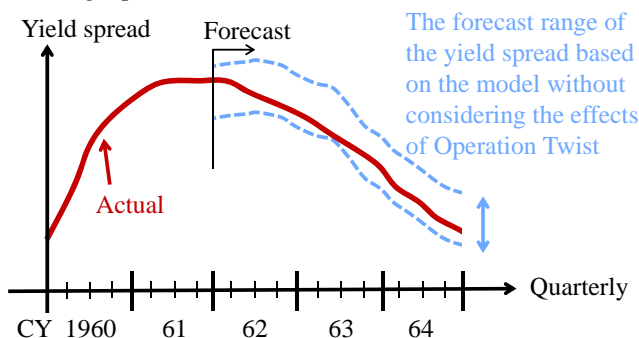
Modigliani and Sutch (1966)

[Data Frequency]

- Quarterly (low frequency)

[Methodology]

- Examines if the model of the yield spread without considering the effects of Operation Twist is able to correctly forecast the actual value of the yield spread during Operation Twist



Finding: No significant effects on lowering interest rates

Note: The graphs are shown for illustrative purposes and do not coincide with the actual numbers documented in the papers.

Sources: Eric T. Swanson, "Let's Twist Again: A High-Frequency Event-Study Analysis of Operation Twist and Its Implications for QE2," *Brookings Papers on Economic Activity*, Spring, 2011, pp. 151-188; Franco Modigliani and Richard Sutch, "Innovations in Interest Rate Policy," *American Economic Review*, Vol. 56, No. 1/2, 1966, pp. 178-197.

Issues for Discussion

- ✓ Controllability of the long-term interest rate
- ✓ Future of the monetary policy: normal vs crisis?
- ✓ Desirable shape of the yield curve
- ✓ Relationship with fiscal management