

The top half of the cover features a photograph of the Bank of Japan's logo. The logo consists of the Japanese characters "日本銀行" (Nippon Ginkō) in a stylized, bold font, with "BANK OF JAPAN" written in English below it. The text is illuminated in a bright yellow or gold color against a dark blue background. The logo is slightly tilted and appears to be part of a larger architectural structure.

日本銀行
BANK OF JAPAN

The Bank of Japan's Yield Curve Control Policy

Motivation, Design, Implementation and Implications

Columbia SIPA Capstone
Federal Reserve Bank of New York
Spring 2018

Juan Pablo Bricchetti
Yangyang Feng
Alberto Gomez
Lorenzo Ligato
Daisuke Maruichi
Mengxue Mei

Faculty Advisor: Prof. Richard Clarida

Client: Markets Group, The Federal Reserve Bank of New York (FRBNY)

Faculty Advisor: Professor Richard Clarida

Co-authors:

Juan Pablo Brichetti

Yangyang Feng

Alberto Gomez

Lorenzo Ligato

Daisuke Maruichi

Mengxue Mei

DISCLAIMER:

This study consists of literature reviews of existing studies and does not provide personal, new or original analysis. It does not represent the views of Columbia University or the Federal Reserve Bank of New York. The views expressed herein should be attributed to the authors and not to the FRBNY, Columbia University, or Professor Richard Clarida. Contact details for the authors are: Juan Pablo Brichetti jb3967@columbia.edu, Yangyang Feng yf2401@columbia.edu, Alberto Gomez ag3732@columbia.edu, Lorenzo Ligato ll2693@columbia.edu, Daisuke Maruichi dm3235@columbia.edu, Mengxue Mei mm4751@columbia.edu.

Table of Contents

ACKNOWLEDGEMENTS	5
ABBREVIATIONS.....	6
CHAPTER I: OVERVIEW AND EXECUTIVE SUMMARY	7
1.1 Japan’s Fight Against Deflation.....	7
1.2 Our Focus	8
1.3 Chapter Overview	8
1.4 Key Findings	9
CHAPTER II: BEFORE YCC - QQE AND NEGATIVE RATE POLICY REACH THEIR LIMITS.....	11
2.1 QQE and Expansion since April 2013	11
2.1.1 <i>Political and Economic Context</i>	11
2.1.2 <i>Design and Implementation of Bank of Japan’s QQE program</i>	14
2.1.3 <i>Transmission Mechanisms</i>	15
2.1.4 <i>BOJ, ECB, and Fed Quantitative Easing Program Comparison</i>	16
2.1.5 <i>Initial Economic Impacts of Bank of Japan QQE Program</i>	17
2.1.6 <i>The Expansion of QQE Program</i>	21
2.1.7 <i>Moving Forward to NIRP: Effects and Limitations of QQE Program</i>	22
2.2 QQE with NIRP since January 2016.....	25
2.2.1 <i>Overview</i>	25
2.2.2 <i>Design and Objective of NIRP</i>	26
2.2.3 <i>Market Impact of the NIRP</i>	27
2.2.4 <i>QQE with NIRP Reach Limits</i>	31
2.2.5 <i>Comparative Study on NIRP: Japan VS. Europe</i>	37
2.2.6 <i>Conclusion</i>	39
CHAPTER III: DESIGN, COMMUNICATION, AND IMPLEMENTATION OF QQE WITH YIELD CURVE CONTROL.....	40
3.1 The Design of QQE with Yield Curve Control.....	40
3.1.1 <i>The Framework of QQE with YCC</i>	40
3.1.2 <i>Interpretation of the New Framework</i>	41
3.1.3 <i>Effectiveness of the Design</i>	44
3.2 The Communication of QQE with YCC.....	46
3.2.1 <i>Contradictions in JGB Purchases Amount</i>	46
3.2.2 <i>Redundant Forward Guidance</i>	46
3.2.3 <i>Naming of the Policy</i>	47
3.3 Implementation of the YCC.....	47
3.3.1 <i>The Four Trials of the Fixed-Rate Purchase Operations</i>	47
3.3.2 <i>Effect of the Fixed-Rate Purchase Operations Targeting Short-Term JGBs</i>	48

3.3.3 <i>Effect of the Fixed-Rate Purchase Operations Targeting Long-Term JGBs</i>	49
3.4 Conclusion.....	49
CHAPTER IV: IMPLEMENTATION AND MARKET IMPACT OF QQE WITH YIELD CURVE CONTROL	51
4.1 Market Reaction	51
4.1.1 <i>Currency, Equity, and Bond Markets</i>	51
4.1.2 <i>Fixed Rate Market Operations</i>	52
4.1.3 <i>Curve Flattening</i>	53
4.1.4 <i>Flexibility</i>	53
4.1.5 <i>Market Liquidity and Volumes</i>	54
4.2 Market Interpretation	56
CHAPTER V: IMPLICATIONS FOR THE FEDERAL RESERVE	60
5.1 Introduction	60
5.2 Review of Monetary Policies in the Fed’s Toolkit	60
5.3 What Would a Fed-Sponsored YCC Look Like?	61
5.4 How does YCC Fit into the Fed’s Toolkit?	68
5.4.1 <i>Benefits and Advantages</i>	68
5.4.2 <i>Risks and Challenges</i>	73
5.5 Conclusion.....	76
WORKS CITED	77

ACKNOWLEDGEMENTS

The authors would like to thank the individuals who have guided the group throughout the Spring 2018 semester and who have shared their valuable knowledge and expertise.

We would like to firstly thank our SIPA faculty advisor, Professor Richard H. Clarida, for his invaluable insight and guidance. We would also like to thank members of the Markets Group at the Federal Reserve Bank of New York, especially Jeffrey Levine, for their feedback. We would lastly like to express our appreciation to SIPA's Office of Academic Affairs.

ABBREVIATIONS

Abbreviation	Meaning
BOE	Bank of England
BOJ	Bank of Japan
CME	Comprehensive Monetary Easing
CP	Commercial Paper
CPI	Consumer Price Index
ECB	European Central Bank
ETF	Exchange-Traded Funds
EUR	Euro
Fed	Federal Reserve System
FOMC	Federal Open Market Committee
GPIF	Government Pension Investment Fund
G-SIBs	Global Systemically Important Banks
JGB	Japanese Government Bond
JPY	Japanese Yen
J-REIT	Japan Real Estate Investment Trust
LSAP	Large-Scale Asset Purchases
NIRP	Negative Interest Rate Policy
QE	Quantitative Easing
QQE	Quantitative and Qualitative Monetary Easing
USD	United States Dollar
YCC	Yield Curve Control

CHAPTER I: OVERVIEW AND EXECUTIVE SUMMARY

1.1 Japan's Fight Against Deflation

Japan's long-lasting deflation/low inflation has been a severe problem for the Japanese economy for decades. Since 1995, the inflation rate in Japan has continuously been around zero or even below, indicating the country's weak economic performance.¹ The Bank of Japan (BOJ) has made a series of attempts to tackle the weak price growth, in a quest to fulfill its mandate of maintaining price stability and provide the foundation for the nation's economic activity.²

In January 2013, the BOJ established a price stability target that aims to achieve the inflation rate of 2 percent at the earliest possible time by raising the expected inflation rate.³ Shortly afterwards, in April 2013, a reflating-minded new Governor Haruhiko Kuroda led the BOJ to initiate Quantitative and Qualitative Monetary Easing (QQE). As a result, short-term interest rates were initially targeted around 0 percent and ultimately went into negative territory in January 2016.³

Nonetheless, concerns started to emerge about the side effects associated with QQE. Because of an excessive decline and flattening of the yield curve under QQE with Negative Interest Rate Policy (NIRP), the risk of a pullback in financial intermediation and the destabilization of the financial system through downward pressure on financial institutions' profits became problematic.³ If these risks were to materialize, the transmission mechanisms of monetary easing would be hampered, and it would become more difficult for the BOJ to achieve price stability and sustainable economic growth in a self-fulfilling manner.³

Additionally, even after three years since QQE was implemented, the inflation rate was still below 2 percent. The initial timeline to achieve the price stability target was around two years after the introduction of QQE and, by mid-2016, market participants were fully cognizant of the delay.⁴

Bearing these issues in mind, in September 2016, the BOJ moved one step further, introducing QQE with Yield Curve Control (YCC)—a new program that targets both short-term and long-term policy interest rates.³ This new policy framework was established as an evolution of QQE, consisting of mainly two components. The first one is YCC, which was introduced in hopes of realizing the combination of interest rates levels that were deemed most appropriate for approaching the price stability target of 2 percent, while also considering the effects on the functioning of financial intermediaries.³

¹ World Bank. "[Inflation, consumer prices \(annual %\)](#)."

² Bank of Japan. "[Outline of Monetary Policy](#)."

³ Nakaso, Hiroshi. "[Evolving Monetary Policy: The Bank of Japan's Experience](#)." Bank of Japan. October 19 2017.

⁴ Kaneko, Kaori. "[BOJ likely to push back timeframe for inflation target again: Reuters poll](#)." Reuters. July 18 2017.

The second component is an inflation-overshooting commitment, which was aimed at anchoring inflation expectations at 2 percent. With this, the BOJ committed to expanding the monetary base until the year-on-year rate of increase in the observed consumer price index (CPI) would exceed 2 percent and stay above that level in a stable manner.³

It has been more than a year since QQE with YCC was first implemented. However, the inflation rate is still below 2 percent, and the BOJ had to push back the timing for achieving its ambitious price stability target in July 2017.⁵ This was, in fact, the sixth time the BOJ had to postpone the price target timeframe, and currently, the BOJ expects to hit its target during the fiscal year ending in March 2020.⁵

1.2 Our Focus

One of the major issues we aim to clarify in this paper is why the Japan chose to move forward with YCC. While other major central banks such as the Federal Reserve System (Fed) and the European Central Bank (ECB) adopted monetary easing measures similar to QQE, the BOJ was the only central bank who found it necessary to turn to YCC. Our analysis will focus on the reasons behind this decision.

Another focus of this paper is to provide policy implications for the Fed. While the BOJ is the only major central bank who is implementing YCC at the moment, the Fed has conducted their version of YCC in the past. In addition, although never implemented, there has been some consideration by the Fed to treat YCC as a potential policy option in the aftermath of the Global Financial Crisis. These examples indicate that YCC is, in fact, relevant to Fed and it could be a possible tool for its future monetary operations. In this paper, we attempt to provide the Fed with a framework through which to consider YCC in light of the BOJ's experience.

1.3 Chapter Overview

Chapter II: "Before YCC - QQE and Negative Rate Policy Reach Their Limits" covers the period from the inception of QQE in April 2013 to the beginning of YCC in September 2016. This chapter discusses the background, objectives, rationale, and market impact of QQE and its transition to QQE with NIRP. Special emphasis is placed on the limitations of QQE with NIRP and, particularly, the issues around the flattened yield curve and profitability deterioration of financial institutions. With this analysis, we attempt to identify the reasons the BOJ chose to proceed with YCC while no other major central banks have done so.

⁵ Kihara, Leika, and Tetsushi Kajimoto. "[BOJ pushes back inflation target for sixth time, keeps policy steady.](#)" Reuters. July 19 2017.

Chapter III: “Design and Communication of YCC” first explains in detail the design of YCC and the implementation tools YCC utilizes. Furthermore, it provides a comparison of what the BOJ has officially communicated within this framework and what the BOJ has done in practice. Our analysis will aim to summarize the advantages and disadvantages for the BOJ in implementing YCC.

Chapter IV: “Implementation and Market Impact of YCC” explains the BOJ’s actual implementation of YCC in detail. Here, the focus will be on the amount of assets purchased by the BOJ, as well as how the new YCC market operation tools—named Fixed-Rate Purchase Operations—have been mobilized for implementation. Finally, this chapter will investigate the market impact of YCC, including the effect on the shape of the yield curve and the profitability of financial institutions.

Chapter V: “Implications for the Fed” first reviews the monetary policy tools in the Fed’s toolkit. Then, this chapter analyzes the Fed’s YCC experience in the past and recent YCC considerations. After these steps, this chapter aims to explain how YCC could fit into the policy toolkit of the Fed by summarizing advantages and disadvantages of a Fed-sponsored YCC.

1.4 Key Findings

After the introduction of QQE with NIRP, Japan has seen a fall in Japanese Government Bond (JGB) yields all across the yield curve, with the nominal long-term interest rates declining substantially and the 10-Year JGB yield going into negative territory. Because of the flattened yield curve, as well as Japan’s de-facto zero lower bound of interest rate on deposit, banks started to suffer from compression of their lending margins. Japan’s major money market funds also stopped accepting new investments as it became difficult to make profits under the flattened yield curve.

In response to this new challenge, Japanese banks started to search for higher profit opportunities such as international expansion, subordinate loans, mortgage loans, and card loans. Money markets funds also began to take more risks by shifting the focus toward medium- and long-term foreign bonds investments and risky assets such as stocks. We argue in this report that the flattened yield curve under QQE with NIRP posed a threat to Japan’s financial stability through increased risk-taking by financial institutions and, ultimately, led to the BOJ’s decision to adopt YCC.

Since its inception in September 2016, YCC has allowed the BOJ to control the yield curve more effectively. The amount of JGBs the BOJ had to purchase has decreased, and fixed-rate purchase operations have been utilized successfully to stabilize the yield curve. This is partially due to the credibility of the BOJ and its communication strategy, as it was perceived by market participants.

The Fed's historical experience seems to support the proposition that the Fed is able to peg or cap Treasury bond prices and yields at places other than the shortest maturities. This experience has naturally led the Fed to consider YCC as a potential monetary policy tool in the aftermath of the Global Financial Crisis. In this paper, we argue that YCC can bring about several benefits to the Fed. YCC would allow the Fed to target interest rates on Treasury securities closer to the level which the Fed considers appropriate given the prevailing economic conditions. With clear communication of interest rate targets and the credibility of the Fed's operations, YCC could allow the Fed to lower the magnitude of asset purchases required to keep the interest rates close to the target.

On the other hand, there are also potential risks around YCC. There could be a large increase in the size of the Fed's balance sheet, which might cause the Fed to lose control of its balance sheet. In addition, interest rate targeting under YCC could amplify macroeconomic shocks. Finally, exiting from YCC might be associated with large capital losses. In order to mitigate these risks, a Fed-sponsored YCC would require skillful communication and high credibility amongst market participants.

CHAPTER II: BEFORE YCC - QQE AND NEGATIVE RATE POLICY REACH THEIR LIMITS

The objective of Chapter II is to describe the monetary policy stance and the political and economic conditions that led to the implementation of the YCC policy by the BOJ in September 2016, after three years of implementing other unconventional monetary policies under BOJ Governor Haruhiko Kuroda.

2.1 QQE and Expansion since April 2013

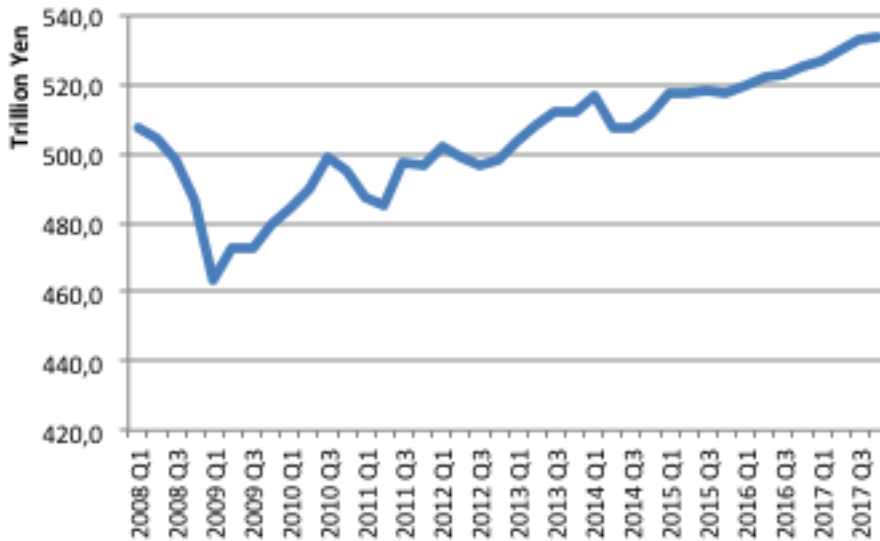
The QQE program of the BOJ was introduced in April 2013, five years after the beginning of the Global Financial Crisis of 2008-09. The goal of the following sections is to describe the key developments that led to the implementation of the QQE program, the actual and expected results and the reasons behind the BOJ's decision to move forward with the YCC program in September 2016.

2.1.1 Political and Economic Context

The decision of implementing a QQE program was made in the context of a broader economic policy initiative known as Abenomics, named after Japan's Prime Minister Shinzo Abe, who took office in December 2012. This policy initiative included what was known as “the three-arrow approach:” the first arrow was the introduction of an aggressive monetary policy with the intention to end deflation; the second arrow was the implementation of a fiscal stimulus in the short-term that would be followed by a fiscal consolidation in order to avoid further concerns over debt sustainability that could hurt the effectiveness of the program; the third arrow was a structural reform to enhance economic growth by increasing private investment and infrastructure expenditure.

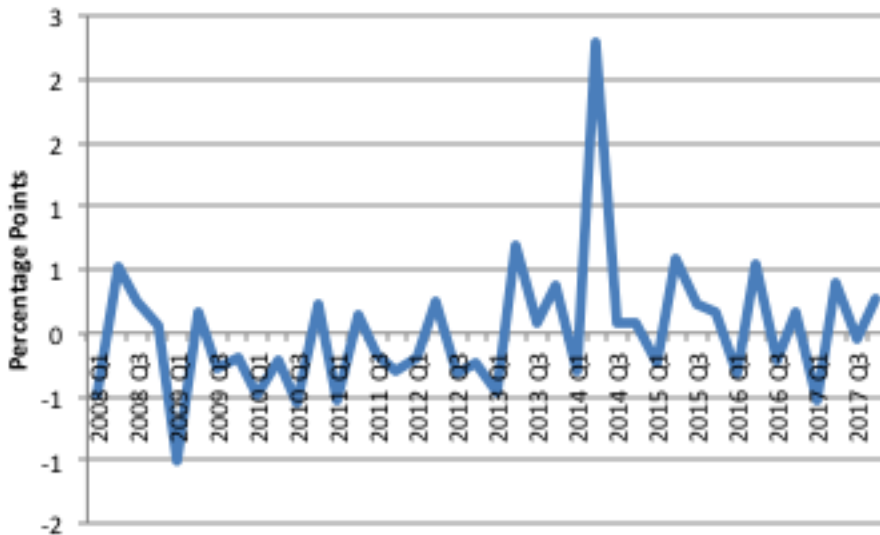
This plan was designed to enhance Japan's sluggish economic growth and to end the recurrent deflation (**Figure 1, Figure 2**). The complementarity of the three arrows was key to the success of the plan: an increase in the inflation rate—led by a boost in aggregate demand through fiscal expansion and monetary easing—was expected to reduce the real interest rate, thus stimulating consumption and exports (via a depreciation of the yen). Investment was expected also to react to lower interest rates, increase in economic activity and structural reforms, thereby guaranteeing the sustainability of the economic growth in the medium and long-term. Moreover, the expected fiscal consolidation once the economic activity recovered, the increase in growth rates and the reduction of real interest rates were expected to improve Japan's debt sustainability.

Figure 1: Real GDP



Source: Federal Reserve Bank of St. Louis. “[FRED Economic Data.](#)”

Figure 2: CPI Excluding Food and Energy



Source: Federal Reserve Bank of St. Louis. “[FRED Economic Data.](#)”

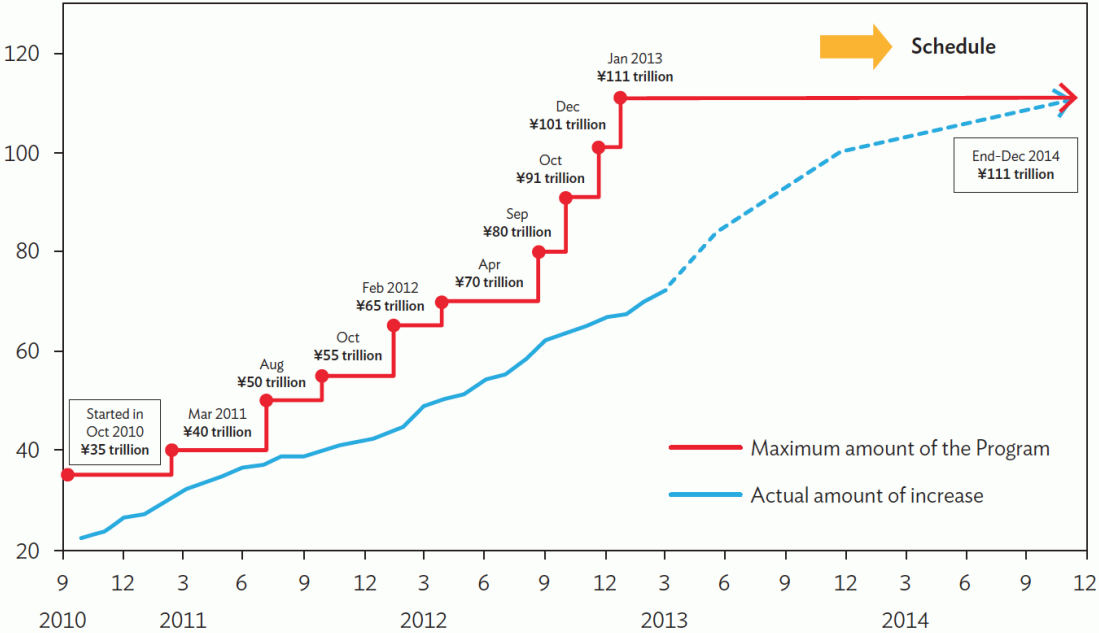
In order to accomplish this aggressive monetary easing, the Policy Board of the Bank of Japan decided to change its monetary framework known as Comprehensive Monetary Easing (CME), in place since October 2010, to QQE in April 2013.

The main element of CME, besides lowering the uncollateralized overnight rate (the BOJ’s policy rate) to a range between 0 percent and 0.1 percent, was to establish a close-end Asset Purchase Program in order to put downward pressure on longer-term interest rates. These rates had remained

positive despite the reduction of short-term interest rates. The objective was not only to generate inflation, but also to stimulate inflation expectations and enhance economic activity. The implementation of this policy included buying JGBs with a remaining maturity of 1-2 years, as well as other risky assets such as commercial papers (CP), corporate bonds, exchange-traded funds (ETFs) and Japan real estate investment trusts (J-REITs) in hopes of reducing the risk premium, supporting risk assets markets and, ultimately, inducing a portfolio rebalancing effect.

Over time, the CME underwent several changes: in April 2013, the BOJ decided to extend the remaining maturity of JGBs from two to three years and, in January 2013, the Bank decided to adopt an open-ended assets purchase method. The total amount of assets purchases increased from 22 trillion yen to 73 trillion yen by April 2013 and was expected to reach 111 trillion yen at the end of 2014—a quantity that was expected to be kept constant from 2015 onwards (**Figure 3**).

Figure 3: Asset Purchase Program under Comprehensive Monetary Easing (CME)



Source: Shirai, Sayuri. “[Mission Incomplete: Reflating Japan's Economy](#).” ADB. 2017.

By the beginning of 2013 the CME framework had shown several limitations in reaching its goal of an inflation rate in “a positive range of 2 percent or lower, with the midpoint around 1 percent”.⁶ The inflation rate had remained slightly negative or near zero during the duration of the program, household expected inflation had not risen, the yen had appreciated and stock prices had remained stagnant. Moreover, the yield curve flattened for the maturities bought by the BOJ, hurting the Bank’s credibility and the capacity of the framework to achieve its targets. In light of these limitations, the new leadership of the BOJ decided to take action and introduce QQE.

⁶ Shirai, Sayuri. “[Mission Incomplete: Reflating Japan's Economy](#).” ADB. 2017.

2.1.2 Design and Implementation of Bank of Japan's QQE program

On April 4, 2013, after the meeting of the Policy Board, the BOJ released a memo describing the new policy framework known as QQE. The new framework was designed to accomplish a new inflation target of “2 percent in terms of the year-on-year rate of change in the consumer price index (CPI) at the earliest possible time, with a time horizon of about two years”.⁷

The new QQE framework incorporated a forward guidance component regarding the duration of the new monetary policy. In the memo the BOJ stated:

“The Bank will continue with the quantitative and qualitative monetary easing, 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 both upside and downside risks to economic activity and prices, and make adjustments as appropriate.”

The BOJ's statement not only represented a shift from the previous midpoint target (from 1 percent to 2 percent), but also reinforced its message by establishing a time span to reach the target. Nonetheless, the forward guidance maintained its previous state-contingent component: the policy would be pursued depending on the risk of economic activity and prices, leaving space to “*make adjustments as appropriate.*” This announcement signaled a clear commitment to the BOJ's monetary policy stance and the price stability goal, reinforcing the credibility of the policy.

The framework chosen to reach this objective was an aggressive QQE based on three components:

1. Changing the policy target from the uncollateralized overnight rate to monetary base control, which would be increased at a pace of 60-70 trillion yen annually and with the target of doubling it (to a level of 60 percent of GDP) by the end of 2014.
2. Along with the target of increasing the monetary base, the memo specified an increase in the purchases of JGBs (50 trillion yen), ETFs (1 trillion yen), and J-REITs (30 billion yen).
3. An extension of the remaining maturity for JGBs purchases up to 40 years, targeting an average maturity of 7 years compared with the 3-year average maturity of the JGBs held at the BOJ at the time of the decision.

The implementation of the QQE program imposed several changes on Japan's monetary policy. The most important change was to switch the policy target from the policy rate to the monetary base, turning the focus to quantity. This change also implied the expansion of the asset purchase program, which now focused exclusively on the purchase of JGBs, ETFs, and J-REITs—instead

⁷ Bank of Japan. “[Introduction of the "Quantitative and Qualitative Monetary Easing"](#).” April 4 2014.

of commercial papers and corporate bonds—in order to keep the support for risky assets markets and, therefore, the portfolio rebalancing effect. Finally, the extension in the average maturity of the JGB purchases was intended to cause the yield curve to flatten, especially at the longer-term maturities. The mechanisms through which all these changes were expected to affect inflation and economic activity will be described in the following section.

2.1.3 Transmission Mechanisms

The main expected effects of the QQE framework were: the reduction of long-term interest rates, the reduction of the real interest rates, the portfolio rebalancing effect, the assets price effect, and the impact on the value of the yen.

Regarding the effect on long-term interest rates, the increase in the remaining maturities of JGBs purchases, along with forward guidance, was expected to put downward pressure on long-term interest rates in the short term by reducing the term premium as well as the risk premium. Overtime, the reduction in long-term interest rates was expected to increase aggregate demand, increasing both economic activity and inflation expectations. As the output gap closes and inflation expectations align with the BOJ target of 2 percent, long-term interest rates should incorporate this information and slowly climb higher, thus facilitating the BOJ's exit from QQE.⁶

Another expected effect of the QQE program was to lower the real interest rates. The BOJ expected to achieve this goal through two channels: first, the large scale asset purchases would increase the downward pressure on nominal interest rates by reducing both term and risk premiums; this fact, combined with the increase in expected inflation due to enhanced economic activity, would decrease real interest rates and help to deleverage firms and households, increase investments, improve the sustainability of Japan's government debt and, finally, trigger another round of increase in expected inflation.

QQE was expected to have also a significant impact on financial institutions and investors' incentive to take risk. This phenomenon is known as the portfolio rebalancing effect. As the BOJ increased its purchases of JGBs, the amount of bonds held by financial institutions would decrease, whereas their bank reserves would increase. As the amount and returns of JGBs decline, financial institutions would have the incentive and resources to invest in riskier assets, increasing their price and reducing the returns on such investments. As a result, the balance sheet of financial institutions would improve and a second round of buying riskier assets would be triggered. This effect was expected to increase prices of stocks and real estate and ease the credit market conditions, thus enhancing economic activity.

The last expected effect of QQE was a depreciation of the yen, although this currency effect was not an explicit goal of the BOJ. As the yen becomes a less scarce currency and the interest rate

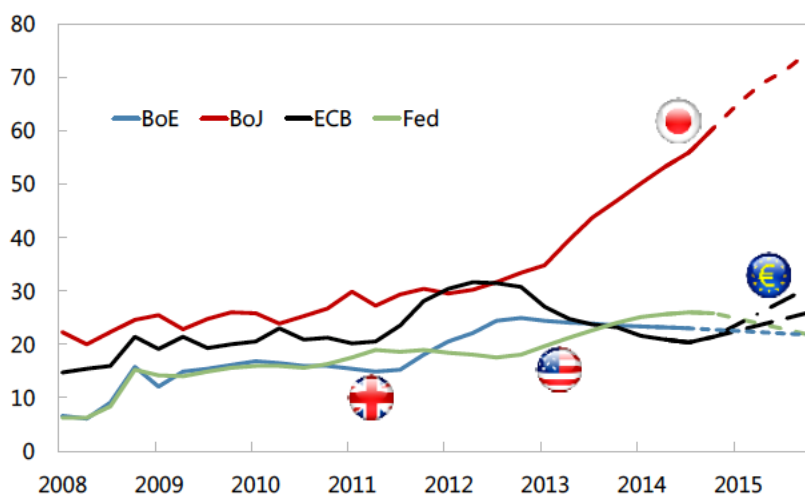
differential increases (due to lower interest rates in Japan but also due to the normalization of monetary policies abroad), a devaluation of the yen against other major currencies (such as the dollar and euro) would be expected. A weaker yen would increase exports and, therefore, stimulate aggregate demand, but also increase domestic inflation due to higher prices of imported goods and services.

2.1.4 BOJ, ECB, and Fed Quantitative Easing Program Comparison

The characteristics of the QQE program of the BOJ diverged from the Quantitative Easing (QE) programs of the Fed and ECB by size, types of assets and remaining maturities of purchases. The different configurations stemmed from the diverse challenges that the three economies were facing, the unique structure of each economy’s financial system, and the constraints each central bank faced in buying certain types of assets. In addition, the BOJ faced three unique characteristics: the relatively late implementation of a significant QE program, a long-lasting deflationary inertia and the lack of credibility associated with previous attempts of using unconventional monetary policies to increase inflation.

Regarding the size of the program, the BOJ program is by far the largest one: by June 2017, it had reached an amount of 500 trillion yen (4.8 trillion dollars), a similar amount as the Fed and the ECB but with a much smaller economy (**Figure 4**).

Figure 4: Central Bank Balance Sheets (in percent of GDP)



Source: Arslanalp, Serkan, and Dennis Botman. “[Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing.](#)” No. 15-186. IMF. 2015.

Furthermore, the composition of assets types and maturities on the balance sheet of the central banks was different: while for the BOJ the total amount of governmental securities represented 85 percent of the total assets,⁸ this figure was 55 percent for the Fed⁹ and 53 percent for the ECB.¹⁰

2.1.5 Initial Economic Impacts of Bank of Japan QQE Program

The initial economic impact of QQE was in line with the predictions of the BOJ’s econometric models (**Figure 5**).

Figure 5: Estimations of the Impact of QQE over Economic and Financial Variables

	Estimations using macroeconomic model		Actual
	Simulation 1	Simulation 2	
Real interest rates	-0.8% points	-0.8% points	slightly less than -1% point
Medium- to long-term inflation expectations	+0.5% points	+0.5% points	-
Stock prices (TOPIX)	+18%	+40%	+40%
Exchange rates (yen/U.S. dollar)	+8%	+25%	+24%
Output gap ³	+1.1% points	+3.0% points	+2.0% points
CPI ⁴ (all items less fresh food, y/y % chg.)	+0.6% points	+1.0% points	+1.0% points
Real GDP	+6 tril. yen	+16 tril. yen	+1 tril. yen
Private consumption	+2 tril. yen	+5 tril. yen	-4 tril. yen
Private non-resi. investment	+3 tril. yen	+7 tril. yen	+3 tril. yen
Nominal compensation of employees	+2 tril. yen	+5 tril. yen	+6 tril. yen
Corporate profits ⁵	+4 tril. yen	+9 tril. yen	+12 tril. yen

Source: Bank of Japan. “[Quantitative and Qualitative Monetary Easing: Assessment of Its Effects in the Two Years since Its Introduction](#).” May 2015.

In first place, JGBs bond yields declined consistently due to the downward pressure of the BOJ’s purchases, which reduced term premia significantly (**Figure 6**). Moreover, inflation expectations

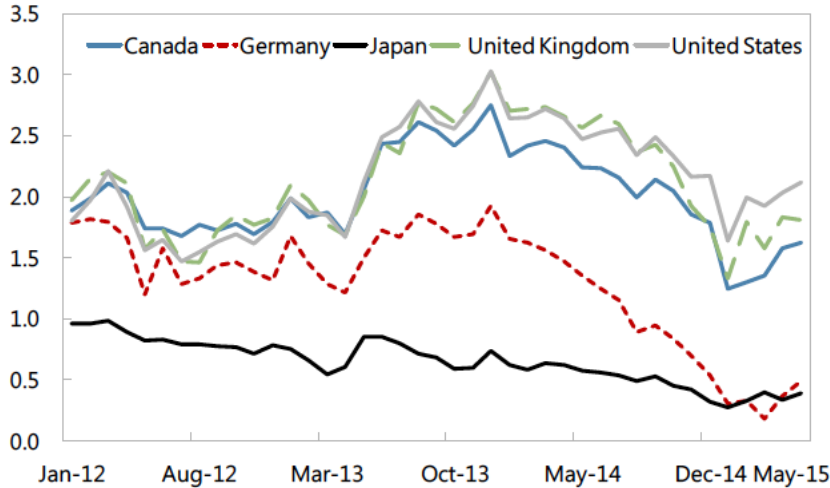
⁸ Bank of Japan. “[Bank of Japan Accounts \(December 31, 2017\)](#).” January 5 2018.

⁹ Board of Governors of the Federal Reserve System. “[Quarterly Report on Federal Reserve Balance Sheet Developments](#).” March 23 2018.

¹⁰ European Central Bank. “[Consolidated balance sheet of the Eurosystem as at 31 December 2017](#).” 2018.

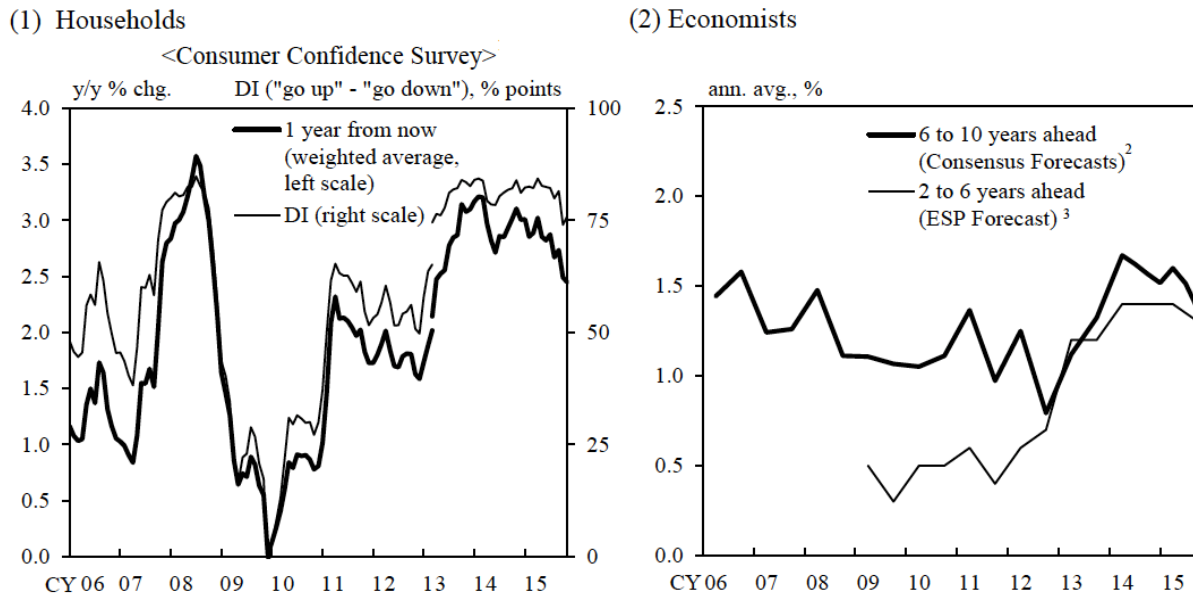
rose until mid-2014¹¹ consistently with the BOJ targets (Figure 7), resulting in negative real interest rates.

Figure 6: Comparison of 10-Year Government Bond Yields



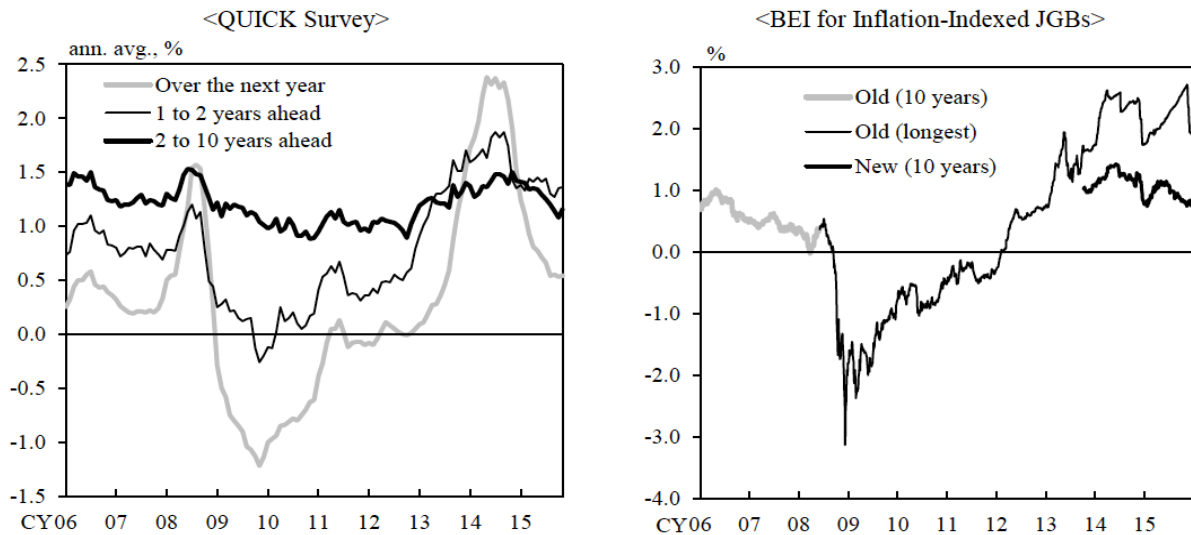
Source: Arslanalp, Serkan, and Dennis Botman. “Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing.” No. 15-186. IMF. 2015.

Figure 7: Inflation Expectations



¹¹ Is hard to find the adequate measure for expected inflation: market-based measures of expected inflation could be distorted by liquidity constrains while survey-based measures have shown a consistent upward bias.

(3) Market Participants



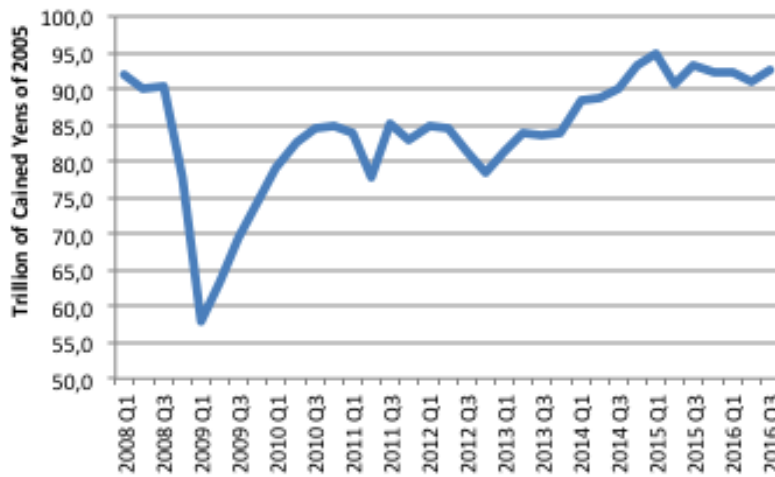
Source: Bank of Japan. “[Monthly Report of Recent Economic and Financial Developments December 2015.](#)” December 22 2015.

As a result of the monetary easing and the fiscal stimulus, the economic activity recovered and the output gap was reduced to 2 percent points. Private investment, corporate profits and nominal compensation of employees rose, but private consumption did not recover as expected.

Moreover, the yen depreciated vis-a-vis the USD, helping to mitigate deflationary pressures by higher prices of imported goods and services and giving Japanese firms the opportunity to explore the possibility of higher prices.⁶ On the negative side, the elasticity of Japanese exports to the real exchange rate proved to be low as a result of production offshoring, supply-chain dynamics and subdued global growth, which became less investment-intensive. As a result, exports did not rise significantly as expected (**Figure 8**).¹²

¹² Arslanalp, Serkan, and Dennis Botman. “[Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing.](#)” No. 15-186. IMF. 2015.

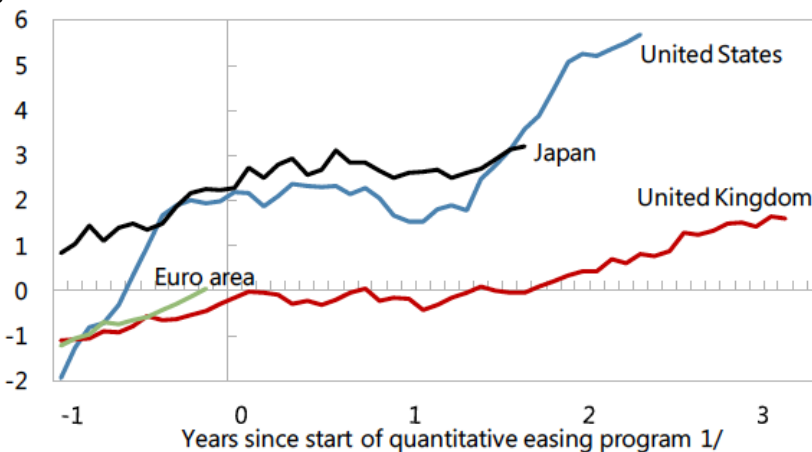
Figure 8: Japanese Real Exports



Source: Federal Reserve Bank of St. Louis. “[FRED Economic Data.](#)”

Regarding the portfolio rebalancing, the effect remained moderate. During the first stage of QQE, domestic banks were the main sellers of JGBs, selling approximately 30 trillion yen from March 2013 to September 2014. This amount covered almost all of the BOJ’s net purchases against the net issuances by the Japanese government. As a result, the effects of portfolio rebalancing remained confined to these institutions and were partially offset by the accumulation of bank reserves at the BOJ. Moreover, even the effect of this portfolio rebalancing on domestic banks was modest. Although bank lending increased in line with other QE policies (**Figure 9**), the actual impact on credit markets was tepid, in particular because of difficulties in finding investment opportunities within the context of stagnant consumption.¹²

Figure 9: Bank Credit Growth to the Non-Financial Private Sector



Source: Arslanalp, Serkan, and Dennis Botman. “[Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing.](#)” No. 15-186. IMF. 2015.

Despite the initial success of QQE in enhancing economic activity, the impact on actual prices remained limited. The strong monetary easing allowed positive inflation during the first year and a half of the implementation of the program; however, during the second semester of 2014, the reduction in crude oil prices—combined with the effect of the consumption tax hike of April 2014—increased deflationary pressures once again, threatening to bring back negative inflation. Within this context, the BOJ announced in October 2014 the expansion of the QQE program.

2.1.6 The Expansion of QQE Program

In the Monetary Policy Meeting of October 31, 2014, the Policy Board of the BOJ decided that the latest developments in prices and economic activity required an adjustment of the monetary policy in order to prevent deflationary pressures. The Policy Board of the BOJ stated:

“Japan's economy has continued to recover moderately as a trend and is expected to continue growing at a pace above its potential. However, on the price front, somewhat weak developments in demand following the consumption tax hike and a substantial decline in crude oil prices have been exerting downward pressure recently. (...) Nevertheless, if the current downward pressure on prices remains, albeit in the short term, there is a risk that conversion of deflationary mindset, which has so far been progressing steadily, might be delayed. To pre-empt manifestation of such risk and to maintain the improving momentum of expectation formation, the Bank judged it appropriate to expand the quantitative and qualitative monetary easing (QQE)”¹³

As a response to those developments, the BOJ decided to increase the purchases of JGBs to 80 trillion yen annually (an increase of 30 trillion yen) and extend within 3 years the average remaining maturity to 8 to 10 years. Moreover, the BOJ decided to increase the purchases of ETFs to 3 trillion yen (an increase of 2 trillion yen) and announced that it would buy ETFs that track the JPX-Nikkei Index 400. Finally, the Bank also increased the total amount of purchases of J-REITs to 90 billion yen.

The announcement of the expansion of the QQE program was indeed a quantitative change to the program, but not a qualitative one. The actions of BOJ were in line with the state-contingent commitment undertaken when the QQE was first launched in April 2013. In this sense, not taking action in the event of economic developments that conditioned the target of 2 percent inflation could have eroded the trust in the BOJ's commitment and reduced the effectiveness of the Bank's monetary policy.

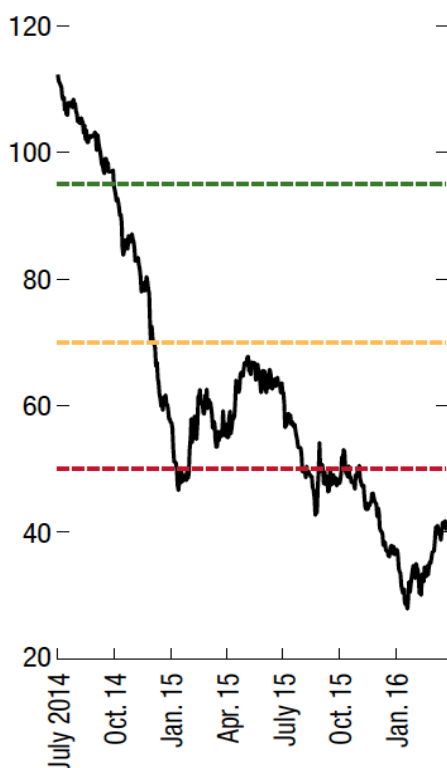
¹³ Bank of Japan. [“Minutes of the Monetary Policy Meeting on October 31, 2014.”](#) November 25 2014.

BOX 1. Shocks to the Japanese economy: Lower oil prices and the tax hike of April 2014

During the Monetary Policy Meeting of the 31st of October of 2014 two main shocks were emphasized as key drivers of the decision to expand the QQE program: the reduction in crude oil prices and the consumption tax hike of April 2014.

The decrease of crude oil prices during 2014

The price of Brent crude oil fell from its peak in June 2014 of 112 dollars per barrel to reach a minimum of 49 dollars per barrel during January 2015 (Figure on the left). For an oil importing country such as Japan, this price decline had two main impacts: first it reduced the value of imports significantly; secondly, as crude is a key input, it produced a significant reduction in the costs for firms, increasing the deflationary pressures on prices.



Source: IMF. "[Global Financial Stability Report](#)." April 2016.

The consumption tax hike of April 2014

On April 2014, the government of Japan moved forward with an increase in the consumption tax rate from 5 percent to 8 percent, the first tax increase since 1997. This measure had already been announced during the launch of the Abenomics plan—together with a further increase to 10 percent in October 2015 (later postponed)—as a key component of the fiscal consolidation proposed to reassure the soundness of the fiscal front in the medium term.

Estimating the impact of the shocks on inflation

According to an econometric estimation by the BOJ using a historical decomposition of simple VAR analysis, the actual impact of the unexpected shock in oil prices contributed to a decrease of 1 percent in inflation during 2015, while the effects of the reduction in economic activity due to the consumption tax hike contributed to a reduction of 0.3 percent.¹⁴

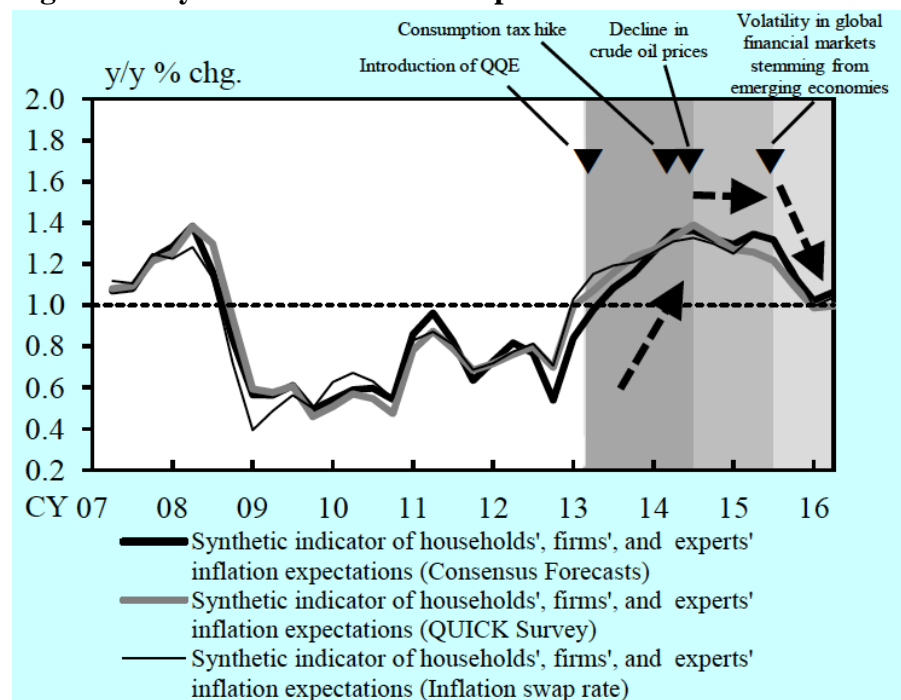
2.1.7 Moving Forward to NIRP: Effects and Limitations of QQE Program

By the end of 2015, several symptoms revealed the need for further monetary stimulus. First, despite the expansion of the QQE program, the inflation expectations after mid-2015 began to converge

¹⁴ Kawamoto, Takuji, and Moe Nakahama. "[Why Did the BOJ Not Achieve the 2 Percent Inflation Target with a Time Horizon of About Two Years? — Examination by Time Series Analysis —](#)." Bank of Japan. July 2017.

to the 1 percent level, after reaching a maximum of 1.4 percent in mid-2014 (**Figure 10**). This development due to exogenous factors such as the decline in oil prices, the consumption tax hike and the slowdown in emerging economies was expected to have negative repercussions on the economic activity through the increase in the real interest rate and was inconsistent with the 2 percent goal of the BOJ.¹⁵

Figure 10: Synthetized Inflation Expectation Indicators

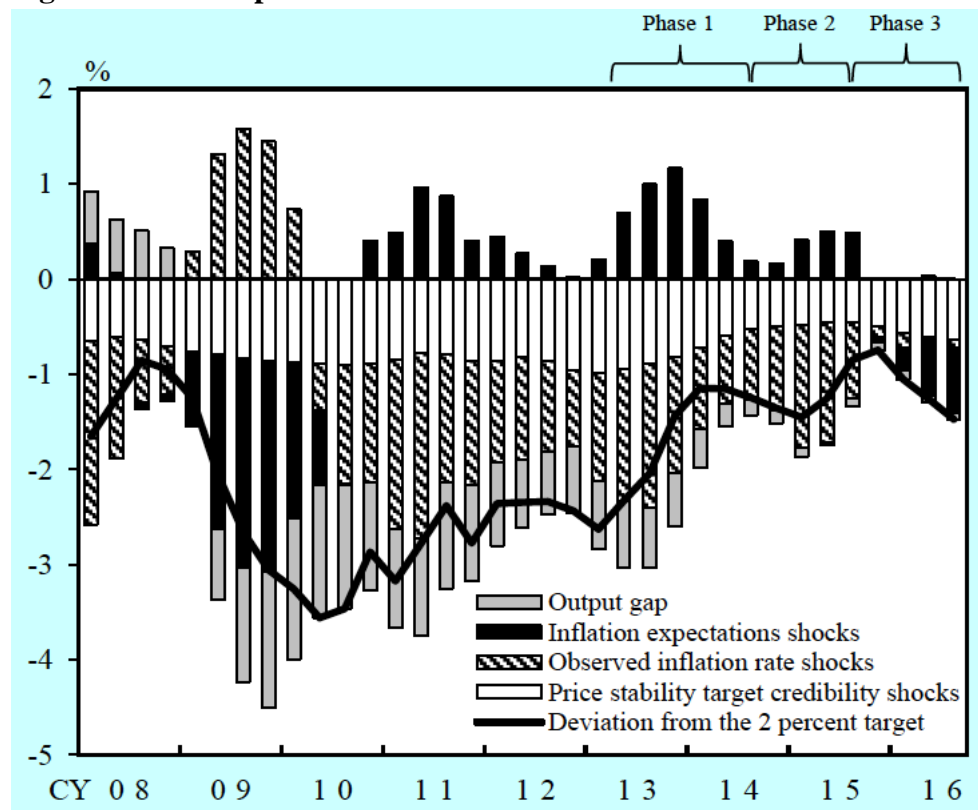


Source: Nishino, Kousuke, Hiroki Yamamoto, Jun Kitahara, and Takashi Nagahata. “[Developments in Inflation Expectations over the Three Years since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\)](#).” Bank of Japan. October 2016.

Despite the absence of an output gap, the divergence between actual and targeted inflation was also widening since mid-2015, mostly due to the reduction in expected inflation (**Figure 11**). Moreover, the second explanatory variable of the gap was the credibility of the price stability target, which limited the possibility and the time frame for not taking action.

¹⁵ Nishino, Kousuke, Hiroki Yamamoto, Jun Kitahara, and Takashi Nagahata. “[Developments in Inflation Expectations over the Three Years since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\)](#).” Bank of Japan. October 2016.

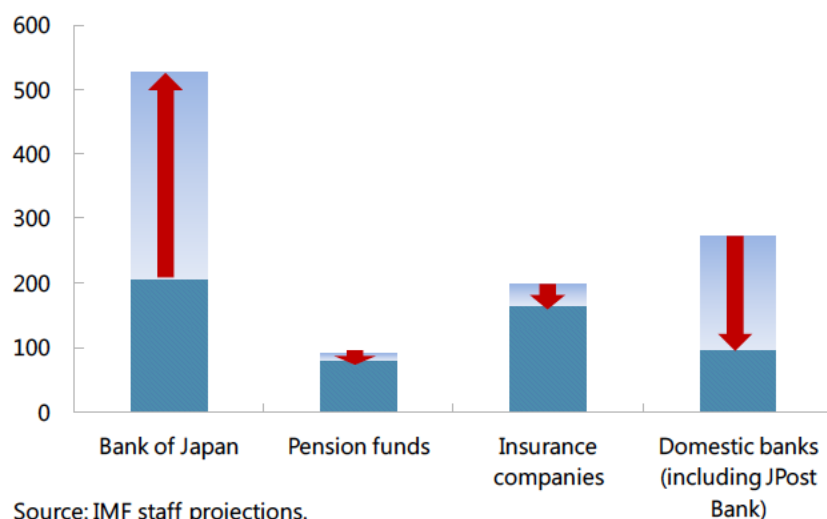
Figure 11: Decomposition of Deviation of the Observed Inflation Rate from the Target



Source: Nishino, Kousuke, Hiroki Yamamoto, Jun Kitahara, and Takashi Nagahata. “[Developments in Inflation Expectations over the Three Years since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\)](#).” Bank of Japan. October 2016.

Furthermore, there were signs in place that the markets for JGBs were experiencing a liquidity problem. This problem was the result of the enhanced effect of the portfolio-rebalancing channel after the expansion of QQE. Indeed, since the expansion of the program, other institutional investors—in particular insurance companies and pension funds—began to sell JGBs to the BOJ. This shift was mainly due to three reasons: first, the JGBs holdings of domestic banks had already declined significantly since the beginning of QQE and these banks were having trouble finding substitutes for collateral reasons; second, the extension of the remaining maturity of the JGBs purchased by the BOJ gave the opportunity to trade their JGBs to insurance and pension funds that had traditionally held longer-term bonds; third, reforms during 2015 allowed pension funds to reallocate resources from JGBs to other high-yielding securities.¹² The incorporation of new institutional investors was a desired effect of the policy: as they are not allowed to hold reserves at the BOJ, the expected spillover effects over the real estate, stock and other assets markets were higher. On the negative side, the increase in liquidity of those institutional investors threatened to increase financial outflows in search of profitability, which could trigger possible effects over the exchange rate.

Figure 12: Potential Portfolio Rebalancing, 2014-2018



Source: Arslanalp, Serkan, and Dennis Botman. “[Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing](#).” No. 15-186. IMF. 2015.

Despite the desirability of an enhance portfolio rebalancing channel, the pace at which the BOJ was buying JGBs was likely to affect the liquidity in the markets, thus increasing volatility and the risk of financial instability. By the end of 2015, some signs of liquidity stress began to appear: trading volumes fell (up to 20 percent in the 10-year JGB markets), volatility in the ask-bid spreads of newly issued bonds increased and the number of transactions in which the buyer of JGBs did not receive the security increased, despite the rise in the use of the Securities Lending Facility put in place by the BOJ.¹²

Moreover, this trend of increasing liquidity concerns was expected to continue as the BOJ maintained its purchases of JGBs over time. By the end of 2015, the BOJ was purchasing nearly 10 percent of the total government bond markets annually, expanding its balance sheet at an unprecedented speed compared to other QE programs. In light of these constraints, the BOJ decided to move forward with the implementation of a Negative Policy Interest Rate in January 2016.

2.2 QQE with NIRP since January 2016

2.2.1 Overview

In the January 2016 Monetary Policy Meeting, the BOJ decided to introduce the "Quantitative and Qualitative Monetary Easing with a Negative Interest Rate" (NIRP). The program aimed at pursuing comprehensive monetary easing in terms of three dimensions: quantity, quality, and interest rate. By doing so, the BOJ planned to achieve the price stability target of 2 percent at the

earliest possible time.¹⁶ Introduced in January 2016, in combination with JGB purchases, NIRP pushed down not only short-term rates but also long-term interest rates substantially.¹⁷

The introduction of NIRP produced significant effects in terms of lowering nominal interest rates, which helped to create more accommodative financial conditions to achieve the price stability target. However, it soon became necessary to consider the impact of NIRP on the functioning of financial intermediaries, as Japan's yield curve began to flatten by more than expected.¹⁸ In particular, concerns centered around the deterioration of commercial banks' profitability and decreasing rates of return on insurance and pension products over the long run, which could abate market confidence and weaken the financial system.

Taking these side effects into account, the BOJ realized the importance of determining the optimal shape of the yield curve to achieve the 2 percent price stability target. As a result, the BOJ introduced the YCC in September 2016, which was designed to enable the Bank to conduct JGB purchases and achieve the 2 percent price stability target in a more flexible and sustainable manner.¹⁸ Moreover, the introduction of YCC caused the yield curve to steepen, which helped offset some of the side effects associated with the NIRP.

2.2.2 Design and Objective of NIRP

The new NIRP policy was designed as a three-tier system. Specifically, the outstanding balance of each financial institution's current account at the Bank would be divided into three tiers: the basic balance, the macro add-on balance and the policy-rate balance. For each account, a positive interest rate, a zero interest rate or a negative interest rate (+0.1 percent, 0 percent, -0.1 percent) would be applied, respectively (**Figure 13**).¹⁶ The BOJ's negative interest rate of minus 0.1 percent was at a fairly modest level compared to its European peers, which moved policy rates deeper into negative territory. When NIRP was introduced, the basic balance, the macro add-on balance and the policy-rate balance that financial institutions held at the BOJ were, respectively, 210 trillion yen, 40 trillion yen, and 10 trillion yen. The policy-rate balance on which the negative rate would be applied only represented less than 4 percent of the total current account balance (**Figure 14**).

Together with large-scale purchases of JGBs, NIRP was intended to lower the short end of the yield curve and exert further downward pressure on interest rates across the entire yield curve¹⁶, in order to stimulate credit creation, corporate investment and household spending and, consequently, lead to economic growth and higher inflation. Meanwhile, the design of the three-

¹⁶ Bank of Japan. "[Introduction of Quantitative and Qualitative Monetary Easing with a Negative Interest Rate.](#)" January 29 2016.

¹⁷ Bank of Japan. "[Comprehensive Assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\).](#)" September 21 2016.

¹⁸ Kuroda, Haruhiko. "['Quantitative and Qualitative Monetary Easing with Yield Curve Control': After Half a Year since Its Introduction.](#)" Bank of Japan. March 24 2017.

tier system was meant to reduce the adverse impact of NIRP on financial institutions' profits and preserve their functioning as financial intermediaries.

Figure 13: Three-tier System of NIRP

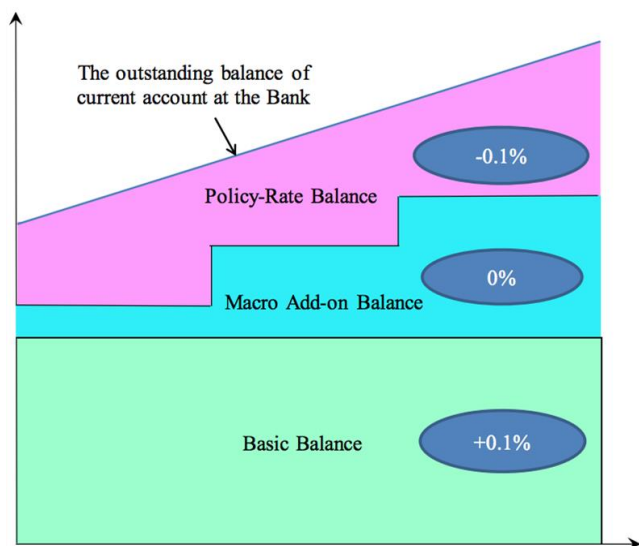
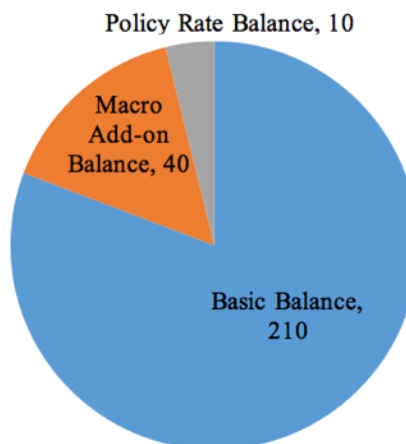


Figure 14: Total Amount of Current Account Balance (tn yen)¹⁹



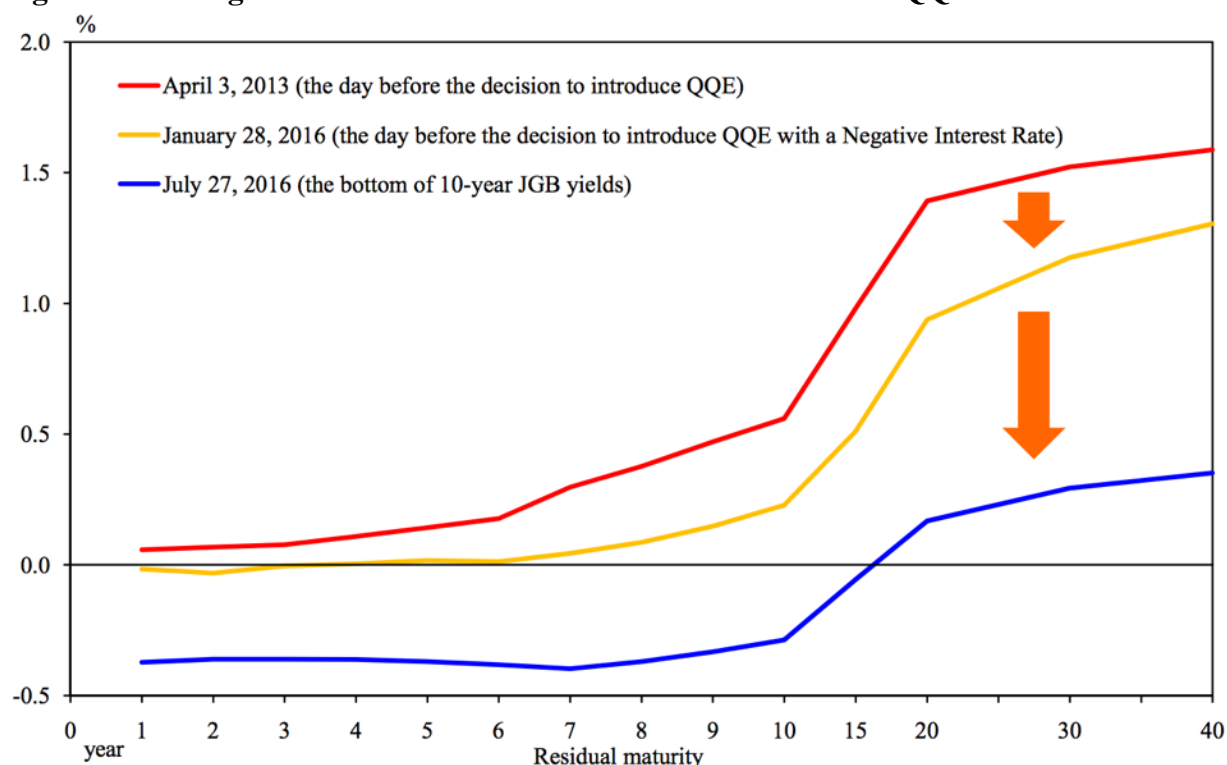
Source: Bank of Japan. “[Key Points of Today's Policy Decisions \(reference\)](#).” January 29 2016.

2.2.3 Market Impact of the NIRP

The BOJ’s large scale purchases of longer-term JGBs under the QQE had already flattened the yield curve before the introduction of NIRP. But NIRP triggered a further flattening of the JGB yield curve (**Figure 15**): yields for JGBs fell across the entire yield curve, with the nominal long-term interest rates declining substantially and the 10-Year JGB yield going into negative territory. It is worth analyzing the underlying transmission mechanism from NIRP to the flattened yield curve. The negative interest rate applied to the current account balance of financial institutions caused a reduction in short-term interest rates, which reduced the incentive for financial institutions to sell their JGBs to the BOJ. Meanwhile, as the BOJ kept the pace of JGB purchases established under QQE, longer-term interest rates were pushed down. Moreover, since a significant part of the yield curve entered into negative territory, super-long-term JGB yields were also driven down, as financial institutions continued to actively search for positive yield.

¹⁹ Data as of February 2016

Figure 15: Changes in JGB Yield Curve since the Introduction of QQE with NIRP

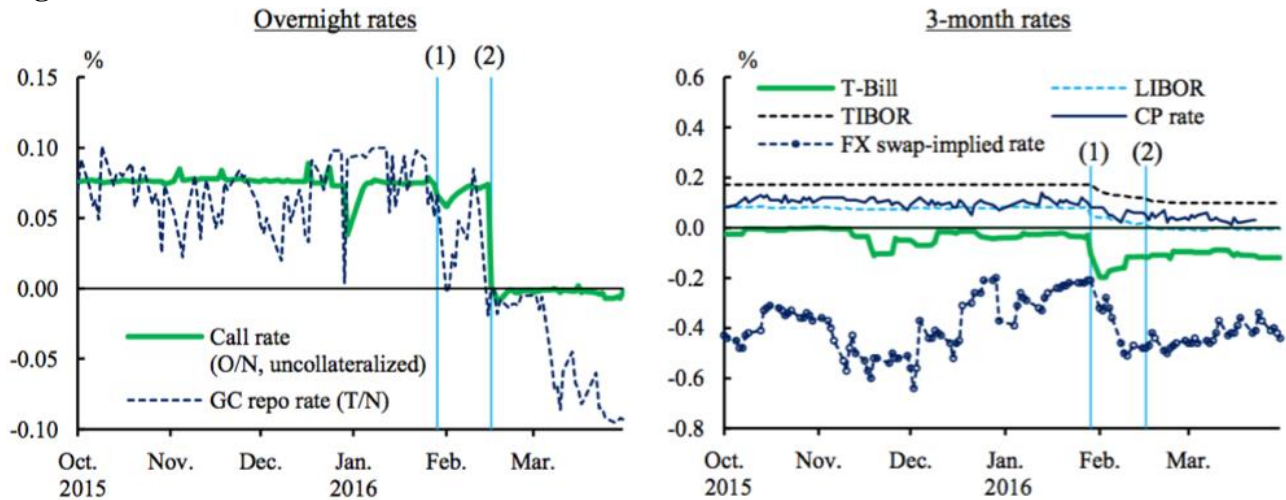


Source: Kuroda, Haruhiko. [“Quantitative and Qualitative Monetary Easing with Yield Curve Control’: After Half a Year since Its Introduction.”](#) Bank of Japan. March 24 2017.

The size of money market transactions declined significantly after the introduction of NIRP. This decline is partly due to the negative short-term interest rates, as well as lacking of IT systems to execute transactions at negative interest rates (**Figure 16, Figure 17**). With NIRP pushing short-term interest rates into negative territory, all 11 major Japanese money market funds stopped accepting new investments and planned to return assets to investors as they were not able to make profits on their short-term investments.²⁰

²⁰ Nikkei Asian Review. [“Japanese money market funds to close as returns prove elusive.”](#) March 8 2016.

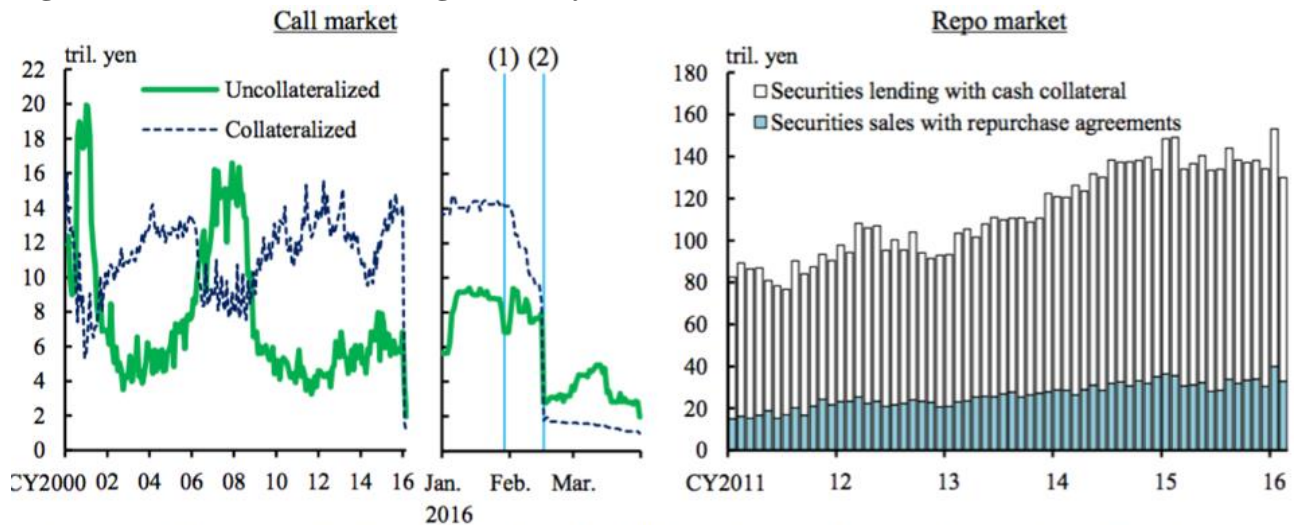
Figure 16: Short-term Interest Rates



Notes: 1. In the left-hand chart, the horizontal axis indicates the start dates of the transactions.
 2. (1) indicates the announcement of introducing QQE with a negative interest rate; (2) indicates the effective start date of the negative interest rate.
 3. The latest data are as of March 23, 2016 for the CP rate; March 31, 2016 for others.

Source: Bank of Japan. “[Financial System Report](#).” April 2016.

Figure 17: Amount Outstanding in Money Markets

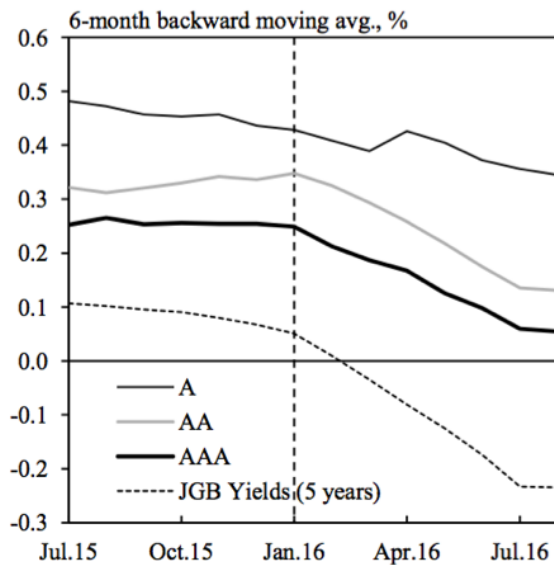


Notes: 1. (1) indicates the announcement of introducing QQE with a negative interest rate; (2) indicates the effective start date of the negative interest rate.
 2. The latest data are as of March 31, 2016 for the call market; end-February 2016 for the repo market.

Source: Bank of Japan. “[Financial System Report](#).” April 2016.

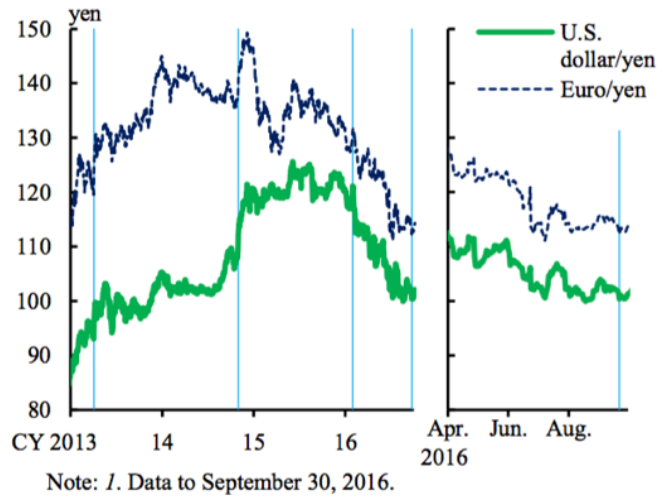
Corporate bond yields fell significantly (**Figure 18**) following the decline in JGB yields under the NIRP, which reflected more accommodative debt financing conditions for domestic Japanese companies.

Figure 18: Issuance Yield for Corporate Bonds



Source: Bank of Japan. “[Comprehensive Assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\)](#).” September 21 2016.

Figure 19: Foreign Exchange Rates



Source: Bank of Japan. “[Financial System Report](#).” October 2016.

Unlike many countries that witnessed currency depreciation after adopting negative interest rates, yen appreciated against other major currencies (USD and EUR) (**Figure 19**) after the introduction of NIRP. The yen appreciation occurred as a result of the strong demand for yen as a safe haven currency. However, concerns started emerging that the currency appreciation would offset the economic stimulus generated through the BOJ’s monetary easing and hurt the value of foreign asset holdings of Japanese financial institutions.

Following the introduction of NIRP, lending rates continued to decrease (**Figure 20**) and hovered around historically low levels, indicating more accommodative credit conditions for corporates and households. Meanwhile, deposit rates declined (**Figure 21**) as well, but not to the extent of the fall in lending rates. Indeed, Japanese deposit rates had been maintained close to zero before the introduction of NIRP, so there was very limited space for deposits rates to decline any further.

Figure 20: Average Contract Interest Rates on New Loans and Discounts

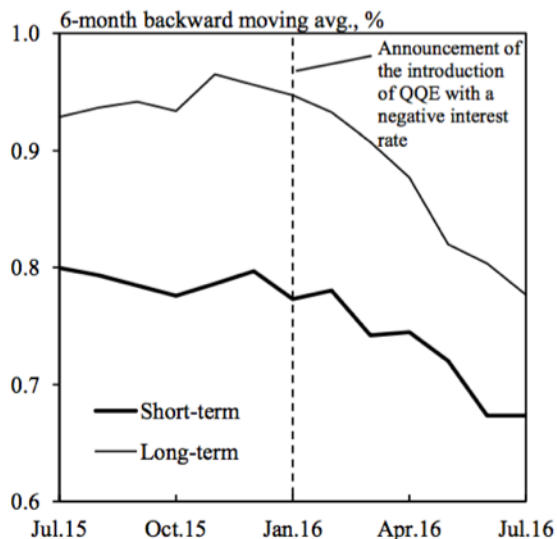
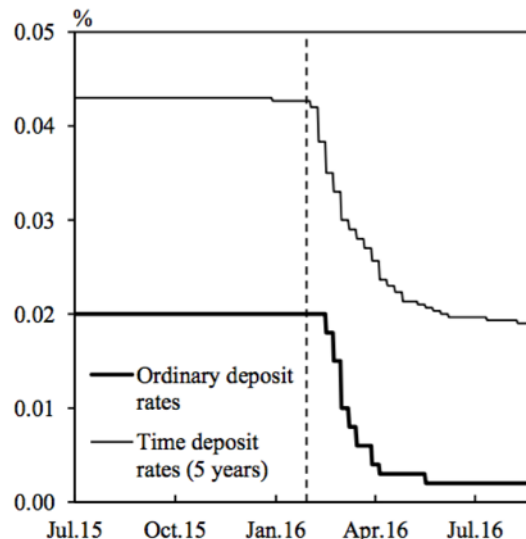


Figure 21: Deposit Rates



Source: Bank of Japan. [“Comprehensive Assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\).”](#) September 21 2016.

2.2.4 QQE with NIRP Reach Limits

2.2.4.1 Profitability deterioration of banks and financial stability concern

As financial intermediaries, banks practice maturity transformation by raising short-term funds and investing in long-term assets. However, after the introduction of NIRP, the significant decrease in lending rates, along with limited decrease in deposit rates (**Figure 22**), put pressure on banks’ lending margins. In other words, the flattening of the yield curve meant that the decrease in banks’ asset returns was greater than the decrease in banks’ funding costs. As a result, banks’ profitability as financial intermediaries was at risk. Moreover, Japanese banks’ structural surplus of deposits over loans (**Figure 23**) amplified the negative effects of lower lending margins. Finally, credit demand was relatively weak given Japan’s economic stagnation so that long-standing competition between financial institutions for limited credit demand further pushed down lending rates and aggravated financial institutions’ profitability problem.

Figure 22: De facto Zero Lower Bound on Deposit Rates

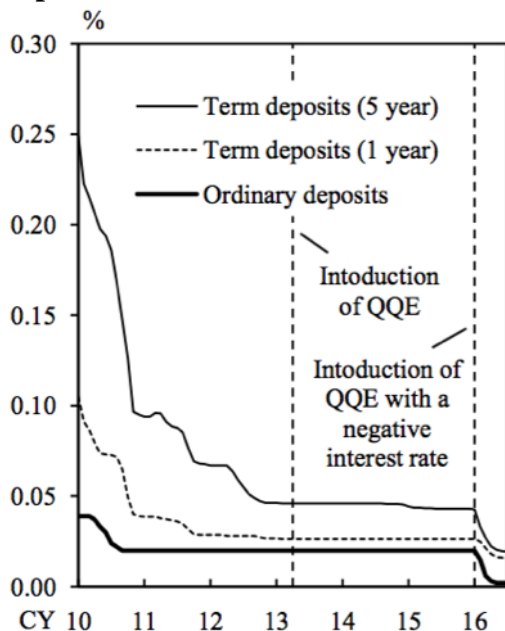
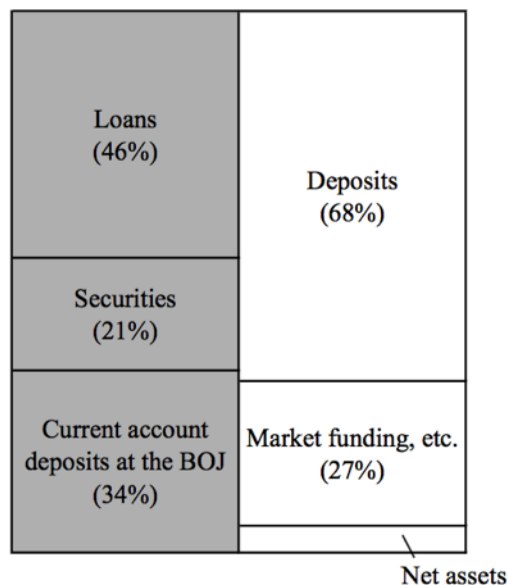


Figure 23: Japanese Banks' Structural Surplus of Deposits over Loans²¹



Source: Bank of Japan. “[Comprehensive Assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing \(QQE\)](#).” September 21 2016.

To fully understand the various impacts of NIRP on different types of banks in Japan, we need to take a closer look into the structure of Japan’s banking system. Japan has a bank-based financial system, with commercial banks holding half of total financial assets in Japan. The Japanese banking sector mainly consists of city banks—three of which are mega banks classified as global systemically important banks (G-SIBs)—as well as trust banks, regional banks, Shinkin banks (credit unions), credit associations, and credit cooperatives.²² City banks and other large banks have nationwide networks and international businesses and enjoy a diversified set of revenue streams. By contrast, regional banks are mainly domestic-focused and rely greatly on domestic retail funding, with most of their revenues coming from lending and fees.

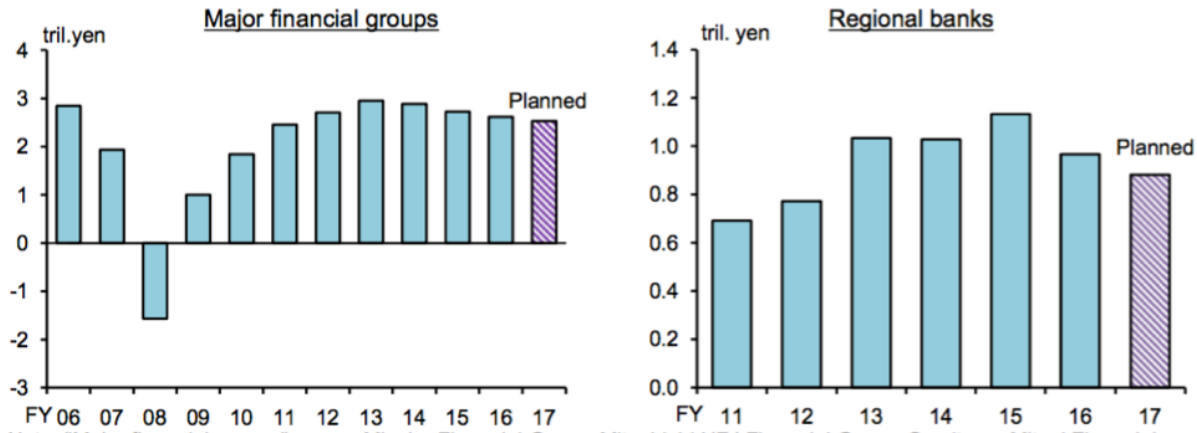
Generally speaking, the Japanese banking sector faced declining profits after the introduction of NIRP (**Figure 24**). Most of the decline in banks’ net income was due to compression of lending margins and the associated lower net interest income (**Figure 25**). Different types of banks were affected differently by NIRP due to the segmentation of Japanese banking system. For Japanese city banks, around 40 percent of their yen funding was domestic retail funding, while the ratio for regional banks was over 60 percent as of the end-December 2016.²² Unlike wholesale funding (which is more stable and relationship-based), retail funding was more volatile and highly subject

²¹ Data as of the end of July 2016

²² IMF. “[Financial System Stability Assessment – Japan](#).” July 2017.

to the change in deposit rates. As a result, regional banks faced greater pressure—compared to city banks—to keep the large domestic retail funding in the low interest rate environment.

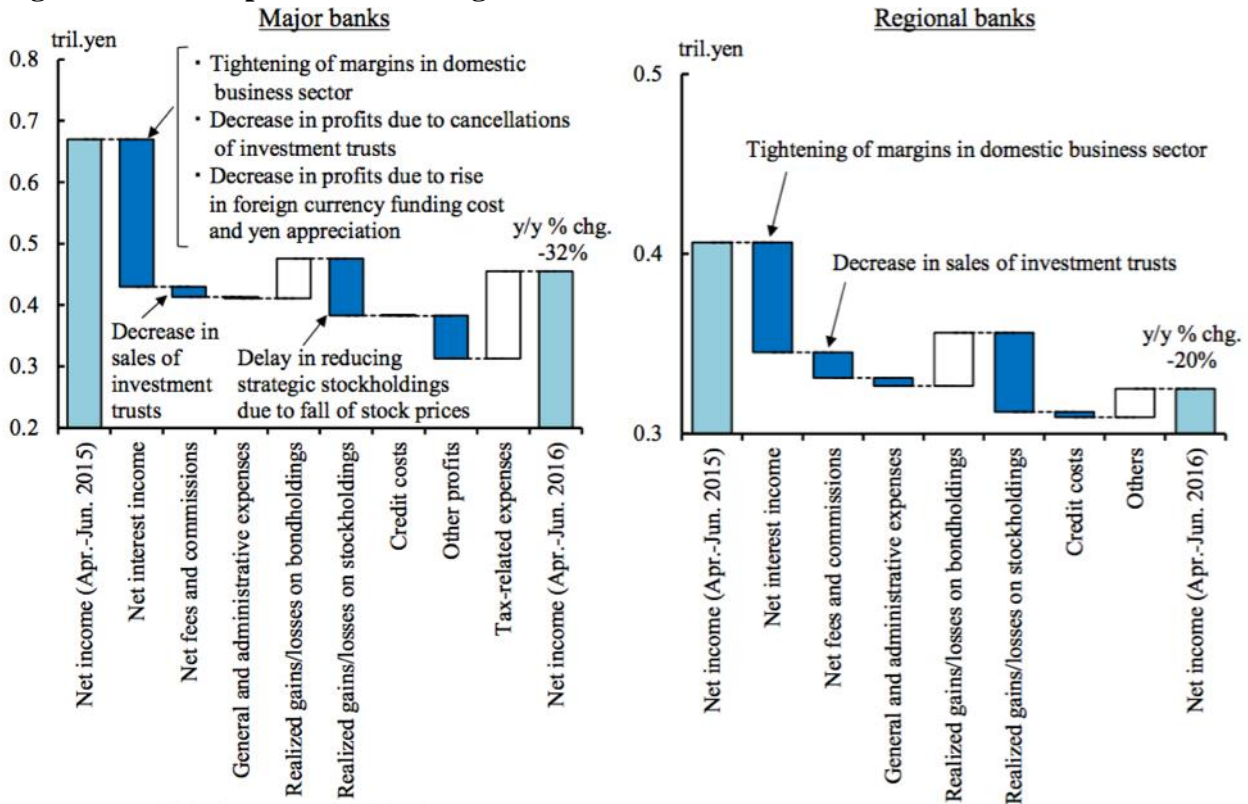
Figure 24: Declining Net Incomes of Banks



Note: "Major financial groups" covers Mizuho Financial Group, Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group, Resona Holdings, Sumitomo Mitsui Trust Holdings, Shinsei Bank, and Aozora Bank.

Source: Bank of Japan. "Financial System Report." October 2017.

Figure 25: Decomposition of Change in Net Incomes

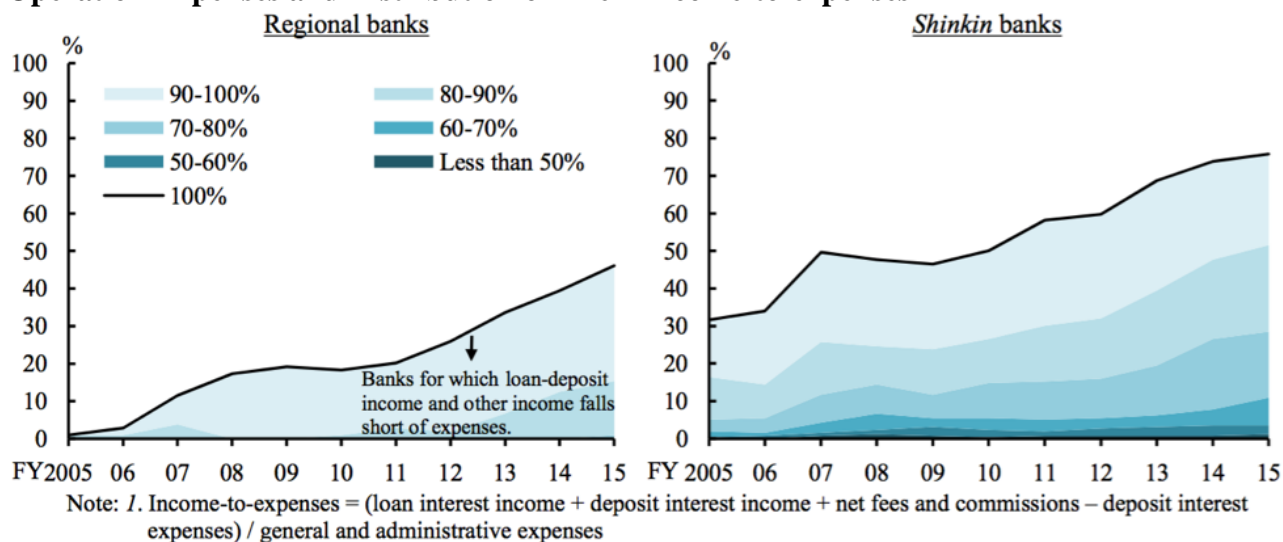


Source: Bank of Japan. "Financial System Report." October 2017.

In response to the declining net interest income, Japanese banks started aggressively pursuing international expansion and shifting their business focus toward higher profit margin products, such as subordinated loans, mortgage loans and card loans. Although Japanese banks were still well-capitalized when BOJ introduced the NIRP, credit extension to borrowers with lower credit ratings could increase risks from potential non-performing loans, and financial institutions' excessive risk-taking could impair the stability of the financial system.

In particular, regulators and policy makers paid special attention to the profitability and asset quality of regional banks and Shinkin banks. With more domestic-focused business model and high reliance on domestic retail funding, these banks had witnessed declining core profits (lending and fees) for a long time, even before the introduction of NIRP. Nearly 50 percent of regional banks and nearly 80 percent of Shinkin banks' core revenues (lending and fees) failed to cover operation expenses (**Figure 26**) in 2015. Even though their capital adequacy ratios were at a relatively high level, investment rebalancing toward risky assets to compensate for declining core profits raised concerns over the quality of their assets and, more broadly, their financial stability.

Figure 26: Percentage of Banks with Core Revenues (Lending and Fees) Fail to Cover Operation Expenses and Distribution of Their Income-to-expenses



Source: Bank of Japan. "[Financial System Report](#)," October 2017.

2.2.4.2 Increasing risk exposure in financial institutions' portfolio rebalancing

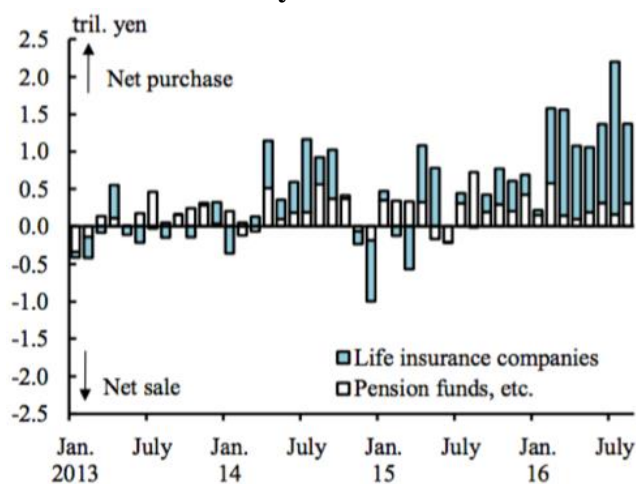
Japan's financial markets witnessed increasing risk exposure under the portfolio rebalancing of institutional investors toward risky assets and overseas assets. Rising medium- and long-term foreign bond investments and investments in risky assets such as stocks (**Figure 27**, **Figure 28**) exposed financial institutions to substantial foreign exchange rate risk, interest rate risk and market risk associated with stockholding.

First, portfolio rebalancing toward overseas assets increased the risk exposure to exchange rate fluctuations. As Japan’s prolonged low interest rate environment reduced returns on most of available domestic assets, institutional investors were more aggressively investing in the global financial markets in search for higher returns. This shift aggravated currency mismatch in their assets and liabilities and, as a result, many of institutional investors suffered losses on their overseas investments when the yen appreciated in 2016.

Second, investments shifting toward longer-term assets caused duration mismatch in assets and liabilities, exposing financial institutions to interest rate risk. In the domestic market, institutional investors’ search for positive yields under NIRP contributed to the flattening of the yield curve. In the global market, as Japanese institutional investors were building up their holdings of medium- and long-term foreign bonds, interest rate risks associated with the Federal Reserve’s rate hike further damaged their assets quality and profitability.

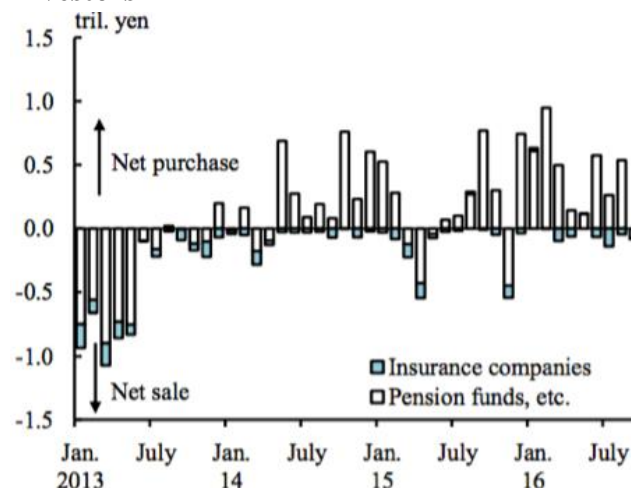
Third, excessive risk-taking and increased investment in risky assets such as stocks and stock investment trusts exacerbated the systemic vulnerability in Japan’s financial system. Regional banks and Shinkin banks were especially aggressive in increasing their holdings of stocks and stock investment trusts, which raised concerns over potential regulatory arbitrage.

Figure 27: Medium- and Long-term Foreign Bond Investments by Institutional Investors



Notes: 1. "Pension funds, etc." indicates trust accounts of banks and trust banks.
2. Latest data as at August 2016.

Figure 28: Stock Investments by Institutional Investors



Notes: 1. "Pension funds, etc." indicates banking and trust accounts of trust banks.
2. Latest data as at September 2016.

Source: Bank of Japan. ["Financial System Report."](#) October 2016.

2.2.4.3 Weakened functioning of financial intermediaries at the “reversal rate”

Generally speaking, it is widely recognized that change in short- to medium-term interest rates have the largest impact on economic activities, since most of corporate and household financing

activities are based on short- to medium-term interest rates. Longer-term interest rates, instead, are likely to be more relevant for society's financial infrastructure such as insurance and pensions.²³ As a result, the shape of the yield curve can have a huge impact on the functioning of financial intermediaries.

When both short-term and long-term interest rates fall to extremely low level and the yield curve flattens, the loss of profits for financial institutions can weaken the functioning of financial intermediaries—a phenomenon known as the “reversal rate”. In the words of Governor Kuroda, *“the ‘reversal rate’ refers to the possibility that if the central bank lowers interest rates too far, the banking sector’s capital constraint tightens through the decline in net interest margins, impairing financial institutions’ intermediation function, so that the effects of monetary easing on the economy reverses and becomes contractionary”*.²³

Even though Japanese financial institutions had adequate capital buffers, the prolonged low interest rate environment and the associated erosion of their profits reduced their capacity and incentive for credit extension and weakened their functioning as financial intermediaries over the long run. Whereas major banks and city banks had the capability to accelerate international expansion and further diversify their revenue sources to overcome these challenges, regional banks and Shinkin banks were especially vulnerable to low or negative interest rates because of their limited scale and domestic- or regional-focused operations. As a result, NIRP triggered the “reversal rate” effects on those regional banks and generated contractionary effects on the Japanese economy over the medium- to long-term.

2.2.4.4 Negative impact on market sentiment through life insurances and pensions

Extremely low or negative interest rates reduced returns on many domestic financial assets, while the declining super-long-term interest rates undermined the investment returns on pension and insurance products. The excessive decline in long-term and super-long-term interest rates led to concerns over the rates of return on insurance and pension products, which might have weakened market sentiment and negatively impacted the Japanese economy.²³

Certain features of the Japanese insurance industry made it more susceptible to these negative side effects of NIRP. Japan has a highly-concentrated insurance sector—the world's second largest in terms of size. Life insurance accounts for about 90 percent of the sector with total financial assets of about 75 percent of GDP.²² With an aging population, life insurance companies and pension funds are of significant importance in Japan's financial system and have a huge impact on market sentiment. Extremely low interest rates and a flattened yield curve under the NIRP reduced returns on insurance and pension products, to the extent that people were less willing to invest in them.

²³ Kuroda, Haruhiko. [“Quantitative and Qualitative Monetary Easing and Economic Theory.”](#) Bank of Japan. November 13 2017.

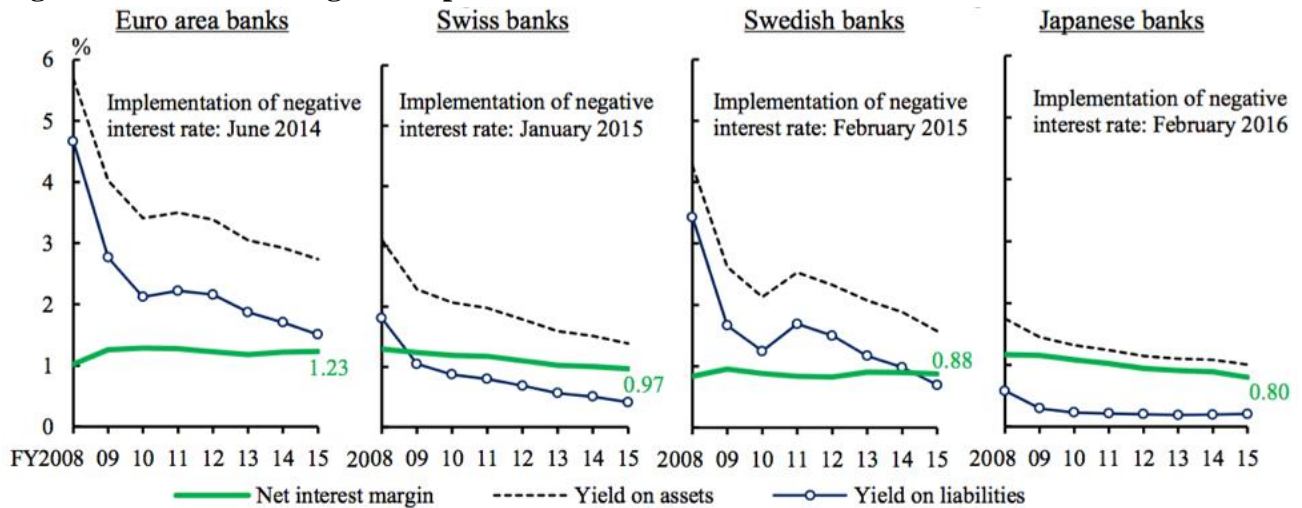
Japanese life insurance companies witnessed declining premium income of 5 percent in 2016, which raised concerns over the sustainability of these institutions' functioning. Meanwhile, low interest rates over the long run increased firms' pension benefit obligations (given the lower discount rate), which further dampened market sentiment.

2.2.5 Comparative Study on NIRP: Japan VS. Europe

In contrast to the BOJ's modest move on NIRP to minus 0.1 percent, European countries such as the Euro area, Switzerland and Sweden were more aggressive on negative interest rates. Unlike in Japan—where the flattening of the yield curve and the deterioration of financial institutions' profitability put significant pressure on the BOJ to introduce YCC—European countries were able to maintain even lower levels of negative interest rates without triggering large damages on their banking system and financial markets.

Japan and European countries had different experiences with NIRP for many economic and financial reasons. First, net interest margins were relatively stable after European countries introduced negative interest rates, while Japanese banks witnessed declining lending margins (**Figure 29**), which hurt their profitability. After introducing the NIRP, the yield on assets declined for European banks, but their funding costs (yield on liabilities) declined at the same pace, so that they were able to maintain a relatively stable net interest margin. By contrast, in Japan, as deposit rates had limited space to decline, the yield on assets decreased more than the yield on liabilities, causing a compression in Japanese banks' net interest margins. European banks were able to reduce the yield on liabilities for several reasons, including: a) their deposit rates were at a much higher level before introducing the NIRP compared to Japanese banks; and b) the share of deposits that were not subject to negative interest rates was much smaller for European banks, compared to Japanese banks that had greater reliance on deposit funding (**Figure 30**).

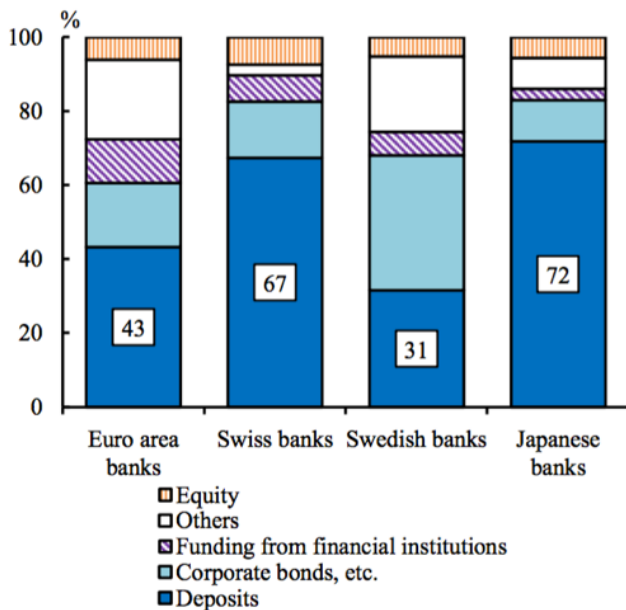
Figure 29: Interest Margin Comparison



Notes: 1. Based on outstanding amounts. Net interest margin is the difference between yield on assets (including loans and securities) and yield on liabilities.
 2. The data label in each chart is the net interest margin as at fiscal 2015.

Source: Bank of Japan. “[Financial System Report](#).” October 2016.

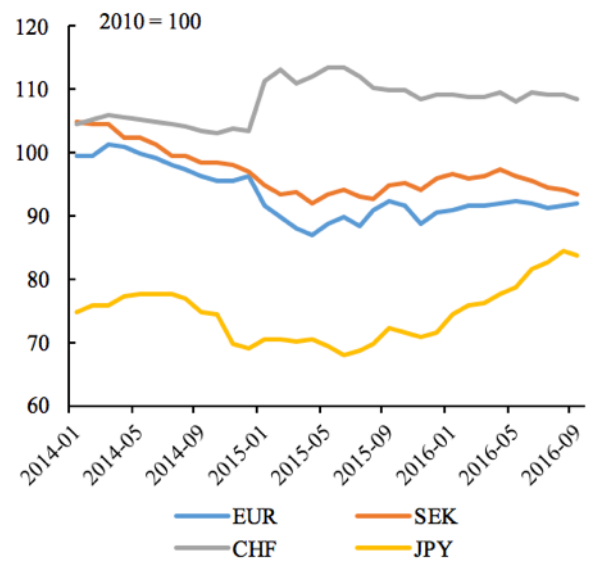
Figure 30: Breakdown of Funding of Banks



Note: 1. Data as at end-fiscal 2015.

Source: Bank of Japan. “[Financial System Report](#).” October 2016.

Figure 31: Real Effective Exchange Rate



Source: BIS. “[Effective exchange rate indices](#).” March 15 2018.

Second, market concentration in the Japanese banking sector was much lower than in European countries. As a result, the long-standing competition among Japanese financial institutions further

reduced lending margins and hurt their profitability. By contrast, market concentration in European countries was relative high, so large European banks could manage to keep their net interest margin. In addition, over the same period, some European countries such as Switzerland and Sweden witnessed a housing boom, which provided support and higher interest incomes on mortgage lending for banks. In Japan, instead, mortgage rates declined together with other lending rates.

Third, exchange rate played an important role in differentiating Japan from European countries. After introducing NIRP, European countries generally benefited from the consequent currency depreciation that stimulated their exports sector. Instead, in Japan, yen appreciated substantially after the introduction of NIRP (**Figure 31**), as investors considered yen a safe haven currency and increased their yen holdings amidst global market uncertainty. These undesirable exchange rate movements ultimately undermined the potential economic stimulus of NIRP in Japan: although NIRP successfully pushed down the yield curve, its impact on economic growth and inflation expectations were limited.

2.2.6 Conclusion

The introduction of NIRP undoubtedly reduced interest rates across Japan's entire yield curve and lowered cost of funding for corporates and households. However, the flattened yield curve raised concerns over the profitability of financial institutions and the sustainability of their functioning as financial intermediaries. As NIRP reached its limits and generated various side effects, the BOJ decided to introduce YCC in hopes of achieving optimal levels and shapes of the yield curve that could maximize the effects of monetary easing on Japan's economy.²⁴

²⁴ Kuroda, Haruhiko. [“Quantitative and Qualitative Monetary Easing \(QQE\) with Yield Curve Control”: New Monetary Policy Framework for Overcoming Low Inflation.](#) Bank of Japan. October 8 2016.

CHAPTER III: DESIGN, COMMUNICATION, AND IMPLEMENTATION OF QQE WITH YIELD CURVE CONTROL

The “Quantitative and Qualitative Easing with Yield Curve Control” (“QQE with YCC”) is an unconventional monetary policy launched by the Bank of Japan in September 2016. Before YCC, the BOJ had launched two phases of unconventional monetary policy, namely QQE and QQE with Negative Interest Rate Program (NIRP). Neither policy had been successful in achieving the policy goal of reaching a 2 percent inflation rate.⁶ The YCC was subsequently designed to abandon the monetary base and, by shifting away from the quantity dimension, avoid a liquidity drain in the JGB market. During the one and a half years since its launch, the YCC has had some success in reviving the Japanese economy. This chapter intends to explain the design, communication and implementation of the BOJ’s YCC policy. By doing so, we hope to illustrate the results of the policy and its effectiveness.

3.1 The Design of QQE with Yield Curve Control

In response to a sluggish economy with a low inflation rate and low inflation expectations, the BOJ launched the third phase of its QQE program—QQE with YCC—in September 2016. YCC was aimed at reaching an inflation rate of 2 percent, by targeting the policy rate at -0.1 percent and the 10-year JGB yield at 0 percent. To achieve the desired yield curve, the BOJ employed diverse operations and tools such as JGB purchases, Fixed-Rate Purchase Operations and Fixed-Rate Funds-Supplying Operations.

3.1.1 *The Framework of QQE with YCC*

The policy statement entitled “New Framework for Strengthening Monetary Easing: Quantitative and Qualitative Monetary Easing with Yield Curve Control” was published on September 21, 2016. The BOJ’s statement consisted of two major components: (a) the introduction of yield curve control on short-term and long-term interest rates and (b) an inflation-overshooting commitment, aimed at complementing and strengthening the Bank’s past monetary easing efforts²⁵ (**Figure 32**).

(a) Yield Curve Control

Guidelines for market operations were put forth for both the short-term interest rate and the long-term interest rate. The BOJ targeted a negative deposit rate of -0.1 percent and a 10-year JGB yield around 0 percent. To achieve the target yields, the BOJ conducted JGB purchases across all maturities with an annual pace of 80 trillion yen outstanding JGB holdings. It abolished the

²⁵ Bank of Japan. “[New Framework for Strengthening Monetary Easing: Quantitative and Qualitative Monetary Easing with Yield Curve Control](#).” September 21 2016.

guideline for average remaining maturity of 7-12 years. The guidelines for other asset purchases such as ETFs and J-REITs remained unchanged.

New tools of market operations included the Fixed-Rate Purchase Operations and the Fixed-Rate Funds-Supplying Operations. The Fixed-Rate Purchase Operations were Outright JGB purchases with yield designated by the BOJ in case of spikes in interest rates. The Fixed-rate Funds-Supplying Operations extended the longest maturity of the existing operation from 1 year to up to 10 years.

(b) Inflation-Overshooting Commitment

The BOJ promised to continue expanding the monetary base until the yearly increase in the core CPI (all items excluding fresh food) exceeded 2 percent and stayed above the level in a stable manner. According to the Bank’s new guidelines, the QQE with YCC framework would be continued until the inflation-overshooting commitment had been achieved. Meanwhile, the BOJ would adjust the pace of increase in monetary base under market operations to control the yield curve and achieve the price stability target.

Figure 32: Framework of QQE with YCC

Framework	
(a) Yield Curve Control	(b) Inflation-Overshooting Commitment
<ul style="list-style-type: none"> • Guidelines for market operations: <ul style="list-style-type: none"> ○ Short-term interest rate -0.1 percent ○ Long-term interest rate 0 percent ○ JGB purchases of 80 trillion yen annual increase ○ Unchanged guideline for other assets purchases such as ETFs and J-REITs • New tools of market operations: <ul style="list-style-type: none"> ○ Fixed-rate Purchase Operations ○ Fixed-rate Funds-Supplying Operations 	<ul style="list-style-type: none"> • Continue to expand monetary base until the yearly increase in the observed CPI exceeds 2 percent and stays above the level in a stable manner. • QQE with YCC will continue as long as necessary to achieve the 2 percent target in a stable manner.

Source: Bank of Japan. “[Statement on Monetary Policy.](#)” December 21 2017.

3.1.2 Interpretation of the New Framework

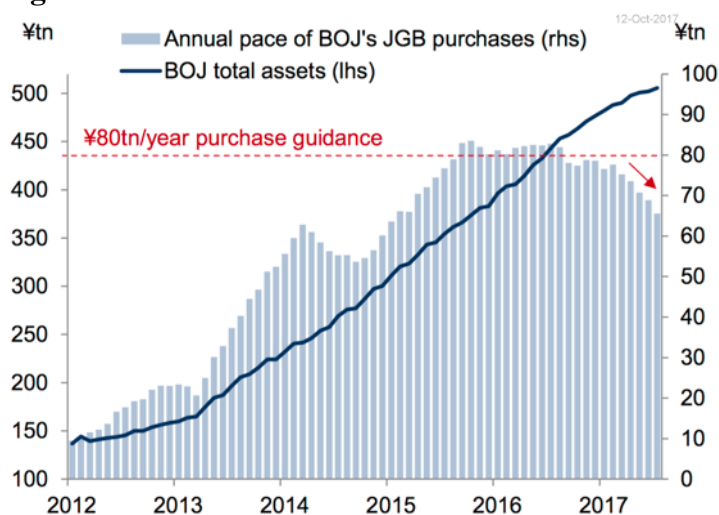
The new YCC framework represented a clear departure from the previous framework under QQE and NIRP. Whereas NIRP used monetary base control as an operating target for money market operations, YCC dropped the quantity target in favor of an interest-rate target. Although the BOJ stated that the amount of JGB purchases would be around 80 trillion yen annually, the actual amount to be purchased was endogenous; in other words, the amount to be purchased would be

adjusted accordingly in order to achieve the 10-year yield target. Given that the BOJ abandoned monetary base control, the new framework implied that the JGB purchases were not a binding target, but a projection to achieve the desired yield curve.

3.1.2.1 Reduced JGB purchases amount

The shift from the quantitative dimension reflected the BOJ’s realization that it was becoming more and more challenging to conduct JGB purchases operations due to the scarcity of JGBs. In February 2018, the BOJ bought 8 trillion yen of JGBs, higher than 7.3 trillion yen in January.²⁶ At this level of monthly purchases, the BOJ is increasing the JGB holdings in its balance sheet by around 60 trillion yen annually. The figure below illustrates the tapering of the annual pace of JGB purchases by the BOJ from the stated 80 trillion yen target to around 60 trillion yen (**Figure 33**).

Figure 33: Annual Pace of BOJ’s JGB Purchases

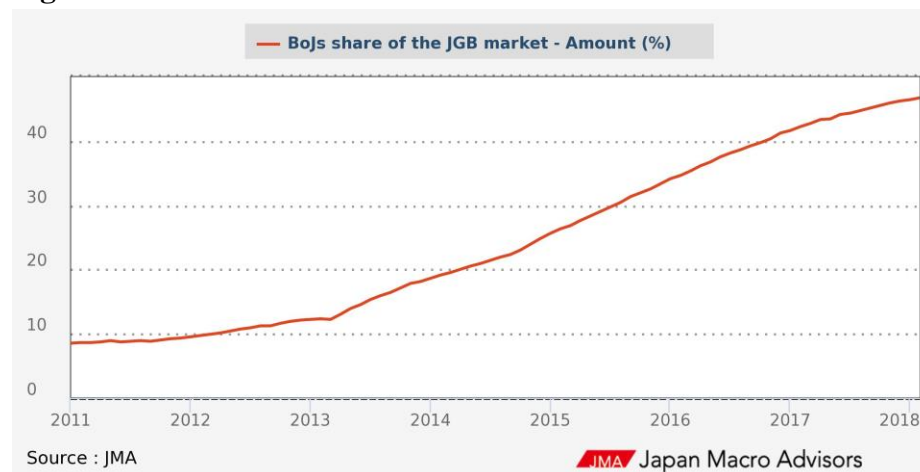


Source: Goldman Sachs. “[Outlook](#).” 2017.

Meanwhile, the BOJ's market share in the JGB market increased to 46.7 percent in February from 46.4 percent in January. Between 2013 to mid-2017, the BOJ's market share in JGB had been rising from 12 percent to 45 percent (**Figure 34**). After the implementation of YCC, the rise in the BOJ's market share started to slow down in mid-2017, as the Bank gradually reduced its monthly JGB purchases. In the last few months, the pace of increase dropped to 0.2-0.3 percent per month, compared to about 0.6 percent one year ago.²⁶

²⁶ Japan Macro Advisors. “[Japan JGBs held by BoJ](#).” March 21 2018.

Figure 34: BOJ share of JGB



Source: Japan Macro Advisors. “[Japan JGBs held by BoJ.](#)” March 21 2018.

3.1.2.2 Shorter average remaining maturities of JGBs purchases

The BOJ officially abolished the guideline for the average remaining maturity of the JGB purchases, which had been a key component of QQE. The abolishment of the maturity target indicated that the BOJ wanted a shortening of the average maturity of JGB holdings by purchasing more short-term JGBs and fewer long-term JGBs. This shift prevented the long-term yields from falling markedly. As a result, in 2018, the average duration of JGBs held by the BOJ was around 7 years, while average remaining maturity was around 7.5 years.²⁶

3.1.2.3 Pegging the 10-year yield

In its Policy Statement, the BOJ chose to target the 10-year JGB yield at around 0 percent, without stating a specific range or imposing a clear ceiling. By choosing to peg the yield, the BOJ aimed to prevent the long-term yields from falling too low and, therefore, mitigate the side effects of negative interest rates on financial institutions. At the same time, the BOJ’s rate-targeting prevented any increase in long-term yields caused by potential policy changes. Although the BOJ did not clarify what it meant by “around 0 percent,” the actual 10-year JGB yield has since remained largely within +/- 10 basis points of the 0 percent target, due to the peg as well as large-scale JGB purchases (**Figure 35**).

Figure 35: Japan 10Y Government Bond Yield in the Past Year



Source: Trading Economics. "[Japan Government Bond 10Y.](#)"

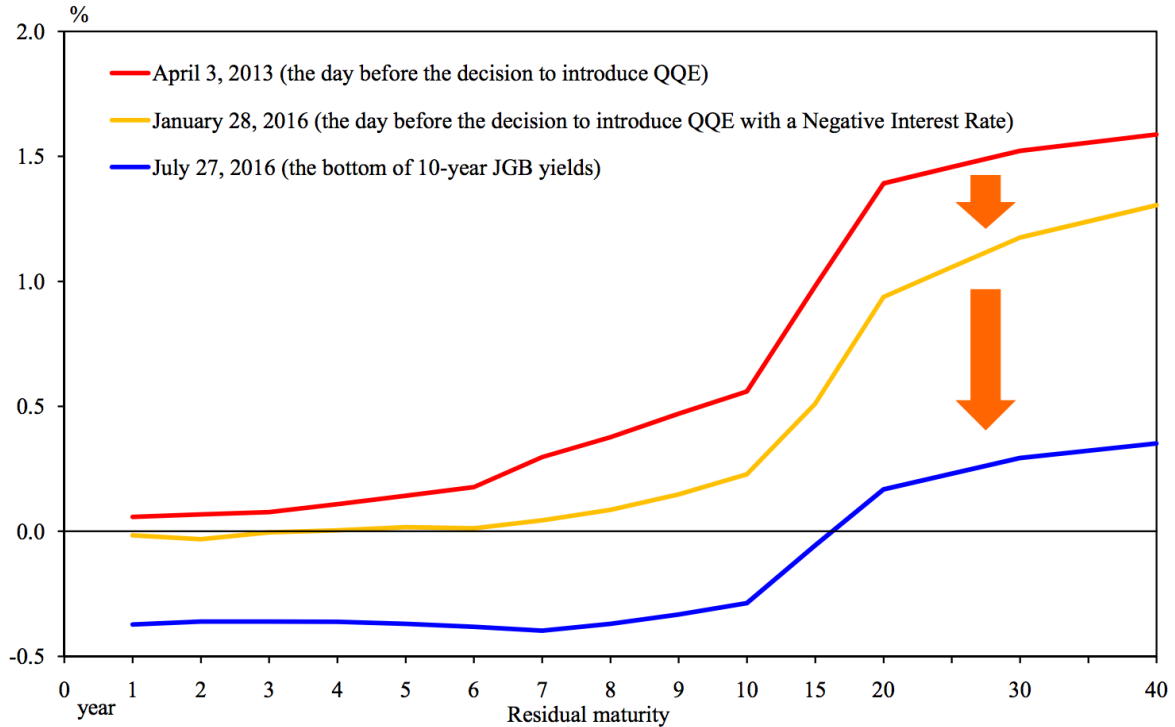
3.1.2.4 Inflation overshooting target to pull inflation expectation

The inflation overshooting commitment was added to the 2 percent price stability target, showing that the BOJ was still firmly determined to achieve the 2 percent target despite the change in the monetary easing framework. In the latest iteration of its policy goal, the BOJ maintained that it needed not only to touch 2 percent inflation, but also exceed the 2 percent price target in a stable manner. In other words, the BOJ felt it was necessary for Japanese inflation to exceed 2 percent for a while in order to anchor long-term inflation expectations at around 2 percent. Indeed, the reason behind the inflation overshooting commitment was that Japanese inflation expectations had been heavily influenced by past inflation, rather than forward-looking targets. Its inflation had remained consistently low in the past and it had never experienced 2 percent. Therefore, in order to gain credibility amongst the public, the BOJ planned to exceed 2 percent and, as a result, drive up inflation expectations towards 2 percent, as well.

3.1.3 Effectiveness of the Design

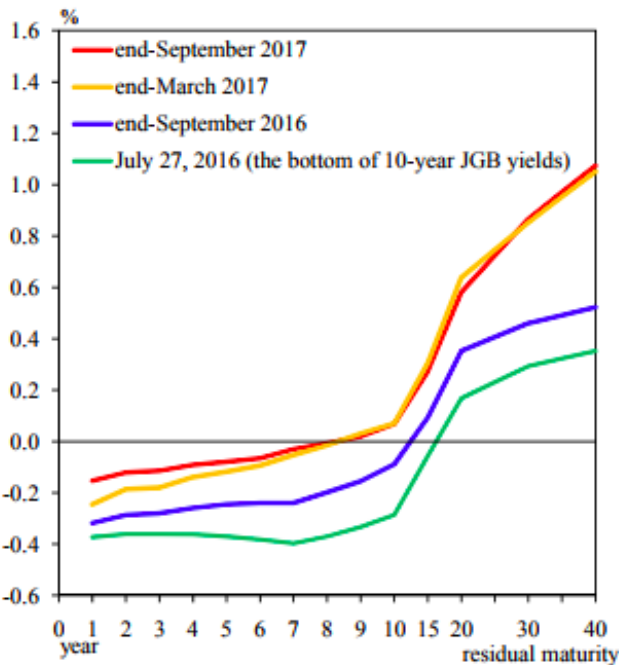
The JGB yield curve had been flattening since April 2013 (**Figure 36**). By the end of July 2016, the 10-year JGB yield had dropped 75 basis points from 50 to -25. This decline in long-term yield was a signal that the Japanese economy was extremely weak and the public expected the low inflationary environment to persist. By targeting the 10-year JGB yield at 0 percent, the BOJ managed to effectively uplift the long end of the yield curve. After the announcement of YCC, the JGB yield curve steepened considerably within one year (**Figure 37**). This transformation indicated an increase in inflation expectations, as well as the anticipation on the part of the public of faster economic growth.

Figure 36: JGB Yield Curve from April 2013 to July 2016



Source: Nakaso, Hiroshi. “[Evolving Monetary Policy: The Bank of Japan's Experience.](#)” Bank of Japan. October 19 2017.

Figure 37: JGB Yield Curve from July 2016 to Sep 2017



Source: Nakaso, Hiroshi. “[Evolving Monetary Policy: The Bank of Japan's Experience.](#)” Bank of Japan. October 19 2017.

3.2 The Communication of QQE with YCC

Since the publication of the Policy Statement in September 2016, the BOJ has been engaged in active communications with the public about its new policy framework. From mid-2016 to today, the Bank's monthly Statements on Monetary Policy have shown high level of consistency relative to the initial Policy Statement. Governor Kuroda has delivered speeches on the new monetary policy on a monthly basis in Japan and around the world, while his team has contributed to the same efforts through economic outlook reports, research papers, speeches and meetings. The combination of these communication tools shows the BOJ's firm commitment to the new YCC framework. Nonetheless, the BOJ's communication strategy has remained somewhat ambiguous in many aspects. This intentional opacity has likely been beneficial, as it has allowed the BOJ to gain additional flexibility in its implementation of YCC; however, the ambiguity has also created multiple interpretations of YCC, leading to confusion amongst market participants. If left unaddressed, these uncertainties could result in unintended expectations from investors.

3.2.1 Contradictions in JGB Purchases Amount

In its past Statements on Monetary Policy—including the latest Statement in March 2018—the BOJ has continuously stated that it will continue to purchase the JGB at more or less the current pace, or about 80 trillion yen annually. However, the monthly “Outline of Outright Purchases of Japanese Government Securities” have shown that the size of monthly purchases of JGBs across all maturities has been quietly shrinking since October 2016.²⁷ It is obvious that, on an operational level, the BOJ has been tapering JGB purchases; however, the Bank has refrained from mentioning tapering in its official statements. As a result, this ambiguity has created confusion among the public, as investors remain uncertain whether the BOJ would simply hold the 10-year yield level at 0 percent or, instead, would continue the JGB purchases of 80 trillion yen. This communication strategy has undoubtedly given the BOJ much leeway in implementing YCC without officially abandoning its previous efforts in expanding monetary base. However, the lack of transparency has raised concerns over the direction of the BOJ's future operations.

3.2.2 Redundant Forward Guidance

The introduction of the new Inflation-Overshooting Commitment was redundant. In fact, the concept of overshooting had already been embedded in the 2 percent price stability target introduced in April 2013. The new forward guidance from September 2016 stated that “The Bank will continue with ‘Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control,’ 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 continue expanding the monetary base until the

²⁷ Bank of Japan. “[Outline of Outright Purchases of Japanese Government Securities.](#)” December 28 2017.

year-on-year rate of increase in the observed CPI (all items less fresh food) exceeds 2 percent and stays above the target in a stable manner.”²⁵ The BOJ had previously used the same rhetoric when it introduced QQE and QQE with NIRP. The 2 percent price stability target already incorporated an inflation overshooting commitment because the actual rate of inflation had to exceed 2 percent in order to reach the 2 percent price stability target. Therefore, the newly introduced Inflation-Overshooting Commitment was merely a reiteration of the same policy goal, rather than a shift away from it.

3.2.3 Naming of the Policy

The BOJ named the new program “QQE with YCC”, as an attempt to stress the continuity of the three phrases of unconventional monetary policy starting from April 2013, i.e., QQE, QQE with NIRP, and QQE with YCC. Though the BOJ wanted to emphasize that the “QQE with YCC” was simply an evolution of previous QQE policies, market participants perceived YCC as essentially a departure from QQE. Indeed, while monetary easing in the quantitative dimension had been repeatedly emphasized since the adoption of NIRP, the new YCC framework dropped the quantitative dimension. Therefore, the new framework should be viewed as fundamentally different from “QQE” and “QQE with NIRP.” The BOJ likely kept “QQE” in the title of the new policy because it did not want to reject its previous efforts; however, the dubious reference to “QQE” in the new YCC framework increased uncertainty amongst market participants as to whether or not the BOJ would continue to expand the monetary base.

3.3 Implementation of the YCC

The implementation of YCC was conducted through both regular and irregular operations. The regular operations consisted of purchasing JGBs across all maturities, abolishing previous guidelines of maintaining average remaining JGB maturities at 7 to 12 years.²⁵ This change offered the BOJ a greater amount of JGB supplies when executing its operations. On the other hand, the irregular operations consisted of Fixed-Rate Purchase Operations and Fixed-Rate Funds-Supplying Operations. These operations could be executed to rapidly bring the 10-year JGB yield to +/-10 basis points around 0 percent. The Fixed-Rate Purchase Operations, in particular, were the major tools to be used to combat interest rate spikes.

3.3.1 The Four Trials of the Fixed-Rate Purchase Operations

The Fixed-Rate Purchase Operations were purchases of JGBs at a fixed rate calculated by adding the yield spread for each issue to the benchmark yields. Compared to Fixed-Rate Purchase Operations, the outright purchases of JGBs were priced competitively through bids from counterparties to achieve the desired yield spread over benchmark yields.

Since September 2016, the BOJ has conducted four Fixed-Rate Purchase Operations to bring down the 10-year yield from undesirably high levels (**Figure 38**). The time intervals between each of these operations ranged from three to seven months. The BOJ targeted short-term JGBs in the first two operations, and then 10-year JGBs in the latter two. During the four operations, three of the fixed rates designated by the BOJ were higher than market rates, and only during the second trial did the BOJ actually purchase JGBs. All four trials effectively brought down the yield curve, and quickly drove the 10-year JGB yield down to within 10bps above 0 percent.

Figure 38: Four Trials of fixed-rate purchase operations

Trials	Time	10-yr Yield Before Operation	BOJ Action	Immediate Effects
1	24 November, 2016	3bps	Offered to buy unlimited amount of 2-yr JGBs at 2bps and 5-yr JGBs at 1.9bps	10-yr yield fell to 1bp on the same day. Operation did not receive any bids.
2	2 February, 2017	15bps	Offered to buy unlimited amount of 2 to 5-yr JGBs at 11bps	BOJ purchased 723.9 billion yen, 10-year yield dropped below 10bps
3	6 July, 2017	10.5bps	Offered to buy unlimited amount of 10-yr JGBs at 11bps	10-year yield fell to 8.5bps. Operation did not receive any bids.
4	1 February, 2018	12bps	Offered to buy unlimited amount of 10-yr JGBs at 11bps	10-year yield fell to 9bps. Operation did not receive any bids.

Source: Bloomberg

3.3.2 Effect of the Fixed-Rate Purchase Operations Targeting Short-Term JGBs

The BOJ's first two purchase operations were more arbitrary, and there was little consistency in the timing and the fixed yields with which they were conducted. The first trial (November 2016) took place when 10-year JGB yield was at 3bps, which was quite close to 0 percent. The BOJ only purchased short-term JGBs, rather than 10-year or 20-year JGBs, although the Bank had previously stated that it would purchase long-term JGBs in case of interest rate hikes. The BOJ likely decided to target short-term yields because it did not want to put pressure on longer-term yields, which would have negatively affected pension funds and insurance companies. The trial was effective but ephemeral: the effect of the yield decline only lasted for four days.

From December 2016 to January 2017, the BOJ did not utilize the Fixed-Rate Purchase Operation, although 10-year yields increased to above 5bps and even to 9bps. While the market expected a purchase from the BOJ, the Bank continued to tolerate the rising yield, which led to concerns that it might start tapering. To dispel those concerns, the BOJ temporarily increased the purchase amount of JGBs in January, but without using the Fixed-Rate Purchase Operations.

In February 2017, the 10-year yield continued to rise above 10bps. When the BOJ sought to use regular purchase operations, the market was not satisfied and yields continued to rise towards 15bps. In response, the BOJ quickly announced the second Fixed-Rate Purchase Operations, targeting short term JGBs at 11bps. At this time, the 11bps was lower than market levels, so the BOJ ended up purchasing 723.9 billion yen JGBs. Though the 10-year yield first dropped below 10bps, it soon climbed above 10bps on the following Monday. As a result, the BOJ had to increase the regular JGB purchase operations across short-term and long-term maturities in order to bring down the 10-year yield once again. These two trials showed the market that, although the Fixed-Rate Purchase Operations were effective in rapidly bringing down the 10-year yield, they could not maintain control of the yield for an extended period of time.

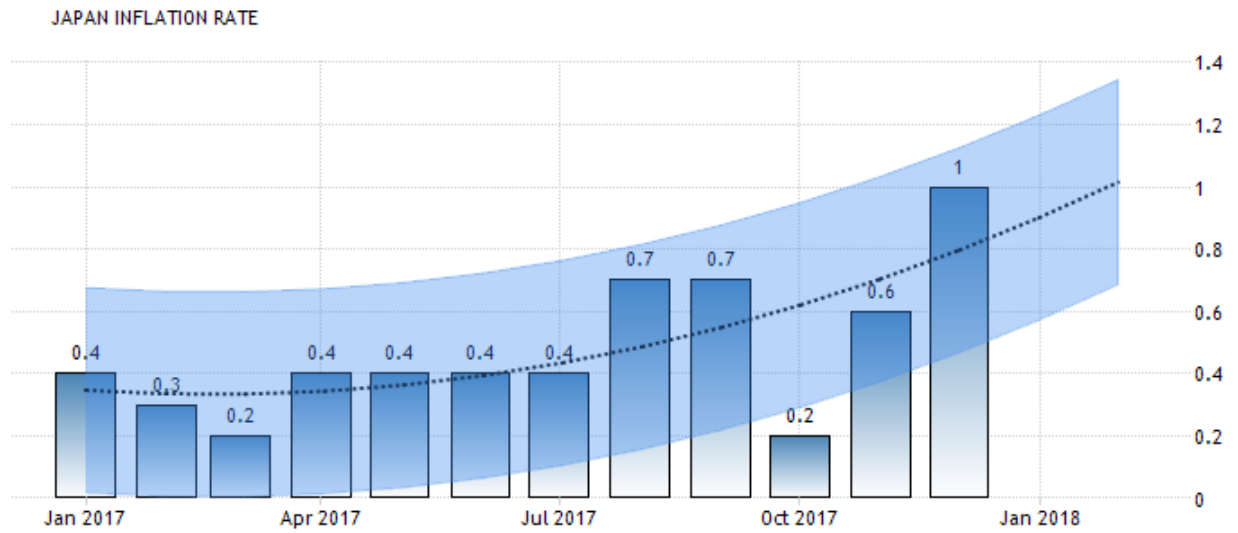
3.3.3 Effect of the Fixed-Rate Purchase Operations Targeting Long-Term JGBs

The last two trials were more consistent and effective in controlling the yield curve, as the BOJ shifted from purchasing short-term JGBs to purchasing long-term JGBs. Both trials were announced when the 10-year yield hiked sharply above 10bps. In response, the BOJ offered unlimited purchases of the 10-year JGB at 11bps. In both instances, the 10-year yield fell to below 9bps and remained at low levels long after the trial. The two trials were also accompanied by an increase in regular JGB purchases in order to push the yield back to around 0 percent.

3.4 Conclusion

From an inflation rate of 0.4 percent to 1 percent (**Figure 39**), the BOJ's QQE with YCC policy brought about significant improvements to the Japanese economy over the past year and a half. Although critics pointed out ambiguities in the BOJ's communication strategy, the overall design and implementation of YCC were effective in achieving the Bank's policy goal. The success of YCC is further demonstrated by the BOJ's exit plans. Indeed, the BOJ is considering exiting YCC in 2019, which indicates that the Bank expects to meet and exceed the 2 percent inflation target by the end of 2018. Undoubtedly, there are still numerous unpredictable variables that could hinder the BOJ's goal of stable inflation; but so far, the design, communication and implementation of YCC has proved successful.

Figure 39: Japan Inflation Rate



SOURCE: TRADINGECONOMICS.COM | MINISTRY OF INTERNAL AFFAIRS & COMMUNICATIONS

Source: Trading Economics. "[Japan Inflation Rate](#)."

CHAPTER IV: IMPLEMENTATION AND MARKET IMPACT OF QQE WITH YIELD CURVE CONTROL

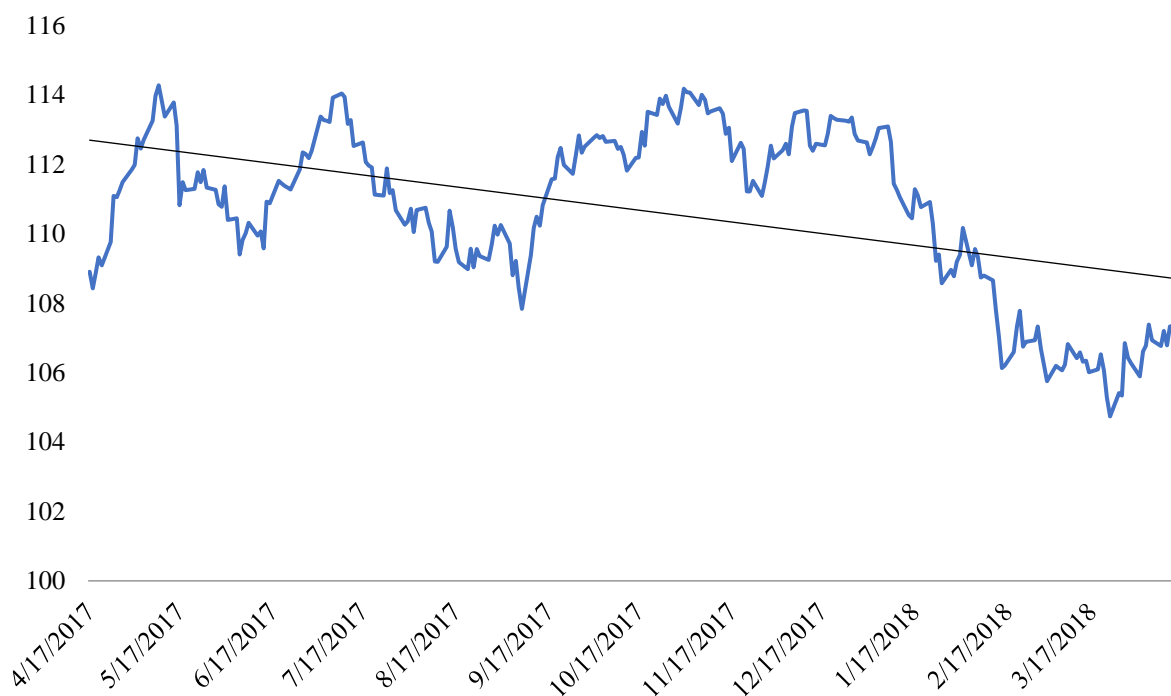
4.1 Market Reaction

After the BOJ unveiled its latest monetary stimulus, market reaction was quick. As usual, currency markets were the first to react, followed by equity and bond markets. Reactions worldwide were also felt, albeit to a lesser extreme. Although it is difficult to individually attribute broad market movements to a specific policy action, it is possible to understand the effects of the BOJ's monetary stimulus when we analyze the variables over a broader time horizon.

4.1.1 Currency, Equity, and Bond Markets

The initial reaction in currency markets was a depreciation of the yen. This reaction is counterintuitive, as yields rose from being negative to being at 0 percent as the BOJ had promised; under these conditions, an appreciation of the yen was to be expected. However, the currency likely depreciated because the cap on JGBs, while interest rates were on the rise in the U.S., caused investors to seek yield elsewhere, abandoning yen assets in favor of higher yielding ones. This depreciation was a welcome reaction by the BOJ, since a weaker currency helps to lift inflation. Again, while it is difficult to fully understand the effects of and the market reactions to one particular policy change, it is worth analyzing whether or not the policy effect is working as originally intended. For example, a clear example of a policy not working—at least initially—was the BOJ's NIRP, which had a consequential financial effect on markets. After the initial reaction by the yen, the currency appreciated and traded within a fairly stable range of between 109 and 114 JPY/USD. Currently, the currency has appreciated even further, reaching a level of 107 JPY/USD. This latest appreciation is likely the result of market participants viewing the yen as a safe haven currency, especially given the recent international developments in trade policy and other factors that have increased volatility in the markets (**Figure 40**).

Figure 40: JPY/USD Since the Adoption of YCC



Source: Bloomberg

Equity markets in Japan move hand in hand with the currency. Since most of the companies listed in Japan have important businesses overseas and export a considerable amount of goods, they benefit, or suffer, from currency movements. As the yen depreciated initially, the market rallied.

Bond markets had a more muted response to YCC, although the policy was primarily aimed at this market. In particular, 10-year yields—which had been negative pre-YCC—rose in response to the cap imposed by the BOJ, but the rest of the curve was generally unaffected. Nonetheless, since NIRP had previously flattened the yield curve, the new peg on 10-year yields at 0 percent helped steepen the yield curve.

4.1.2 Fixed Rate Market Operations

With the introduction of YCC, the BOJ capped the interest rate at its desired rate—in this case 0 percent—with an un-communicated flexibility of +/- 10 basis points. In order to accomplish this, the BOJ introduced fixed market operations. In these types of operations, the BOJ essentially committed to purchasing all the necessary JGBs at the target price in order to control the curve. The Bank has expressed that it is ready to conduct these types of operations whenever it is necessary. So far, the bank has only conducted unlimited fixed rate operations once (on February 3, 2017). On this date, yields in the JGB market were on an upward trend, reaching 0.15 percent, the highest yield since the adoption of NIRP. As a result, the BOJ quickly acted by carrying out

an unlimited fixed rate operation to lower the yield. It first asked financial intermediaries and primary dealers to bid at a rate of 0.11 percent and consequently bought the bonds. The aim of this operation was likely to stabilize the JGB at a lower rate and then allow it to return to its “equilibrium” yield of 0.10 percent or lower. By using this tool, the BOJ was accepting to purchase as many JGBs as the market wanted to sell to them. The total amount the BOJ ended up buying was about 724 billion yen, or about 7.2 percent of the monthly outright purchases by the Bank.

So far, the BOJ has been able to conduct YCC without having to aggressively intervene in markets. That is in part due to the credibility enjoyed by the Bank and the success of the previous fixed market operations. Indeed, a recent paper by the Japanese Ministry of Finance²⁸ points out that the central bank has been successful in stabilizing the yield curve by using fixed rate market operations.

4.1.3 Curve Flattening

As explained in Chapter II, one of the main problems faced by the Japanese monetary authorities was an increasingly flat yield curve, which was a result of NIRP. As explained above, the NIRP program had a considerable effect on banks’ ability to carry out maturity transformation and put significant pressure on their profits and stock prices. In addition, these challenges spread across the broader financial markets, tightening financial conditions rather than loosening them. As a result, part of the goal of YCC was to steepen the shape of Japan’s yield curve in order to allow for economic stimulus to be more effective. While a flat yield curve does provide the economy with stimulus (especially by lowering long-term interest rates), the Japanese curve was deemed “too flat” to the extent that it actually constrained the economy. Another example of this phenomenon took place in Switzerland, when the Swiss National Bank lowered interest rates to negative territory, causing banks’ profits to suffer. In response, banks started charging higher interest rates on their depositors, thereby reversing the actions of the Swiss National Bank.

4.1.4 Flexibility

Beside the reasons explained above, the BOJ also gave itself additional flexibility with its program by adopting YCC.

Firstly, the BOJ essentially de-committed itself to a fixed amount of bonds purchases it has to buy in order to achieve its price stability target. By providing a cap on the interest rate, it does not have to buy bonds except in situations where the yield rises to undesirable levels. However, the Bank decided to keep a reference to the amount of bonds it has to buy lest market participants misinterpret the new policy as a fundamental shift from QQE. In reality, though, the BOJ has begun tapering since the introduction of YCC, reducing the amount of bonds it buys without it

²⁸ Hattori, Takahiro. “[Do Fixed-Rate Purchase Operations by the Bank of Japan Control the Yield Curve? Evidence from High-Frequency Data.](#)” August 30 2017.

having a negative effect on the economy or shifting the course of its stimulus. Secondly, by not committing itself to buying a fixed amount of bonds, the monetary authority allows for extra flexibility should it decide to increase its monetary stimulus in the future. By buying fewer bonds, it leaves the market with more supply in case it will have to further expand its balance sheet in the future. Likewise, the new YCC framework allows the BOJ to directly target yields at maturities that it considers appropriate to provide either more or less stimulus to the economy. In summary, by adopting YCC, the BOJ was able to free itself of the rigidity of QQE framework and was able to save some supply for future use.

4.1.5 Market Liquidity and Volumes

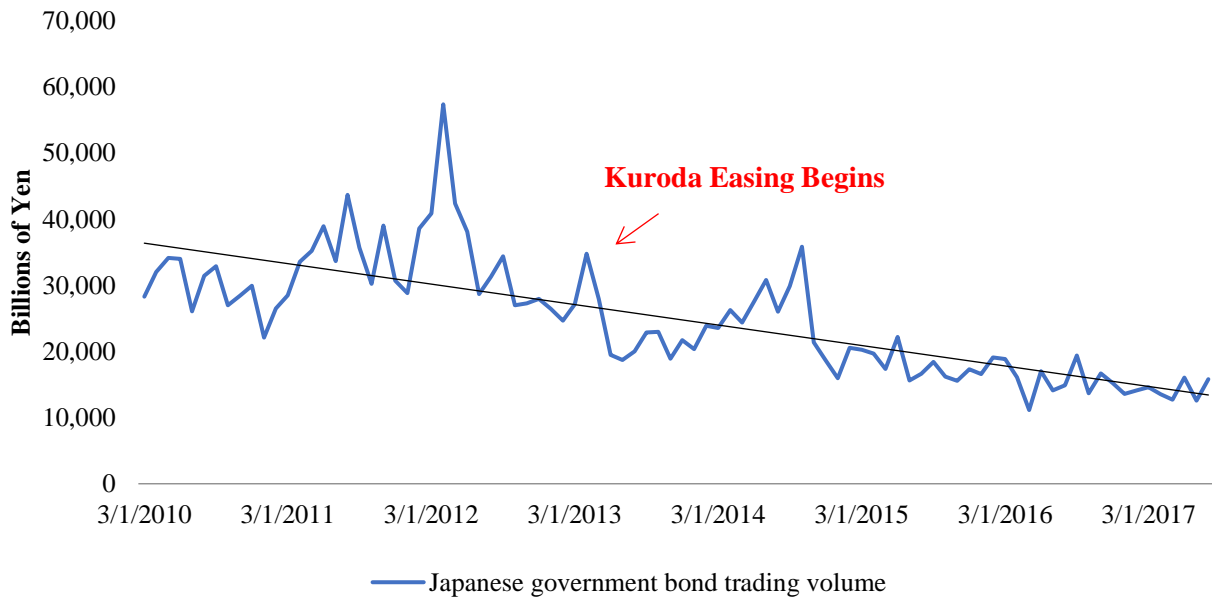
As the BOJ has pursued an aggressive monetary stimulus, the effect on the proper functioning and stability of markets has been a subject of debate. Although there have been no episodes of severe market volatility or so called “flash crashes” in the Japanese market, the possibility of there being an episode such as the ones experienced in the Bund market or the Treasuries is big, especially given the low volumes in the JGB market.

A recent paper by the BOJ Financial Markets Department analyzed the market and liquidity conditions for JGBs.²⁹ The paper concluded that financial conditions, especially liquidity, deteriorated considerably at the beginning of 2016 and has continued to improve since fall 2016. The authors of the paper measured liquidity in the cash market as well as in the futures market. It is important to note, however, that while the liquidity is reasonably sound and it has improved, the transaction volumes remain relatively subdued (**Figure 41, Figure 42, Figure 43**). This is an important distinction to make and presents a challenge to the operational framework of the BOJ³⁰. While there has been no problem so far for transactions in the market, this may change if the market experiences large orders or a sudden increase in volume. As a result, market liquidity may be unable to withstand such changes, leading to volatile and destabilizing conditions.

²⁹ Sakiyama, Toshiyuki, and Shun Kobayashi. “[Liquidity in the JGB Cash Market: An Evaluation from Detailed Transaction Data](#).” Bank of Japan. March 2018.

³⁰ Also important to note that while volumes have decreased, a distinction has to be made between Inter Dealer transactions and Dealer Client transactions. See Figure 3 and Figure 4.

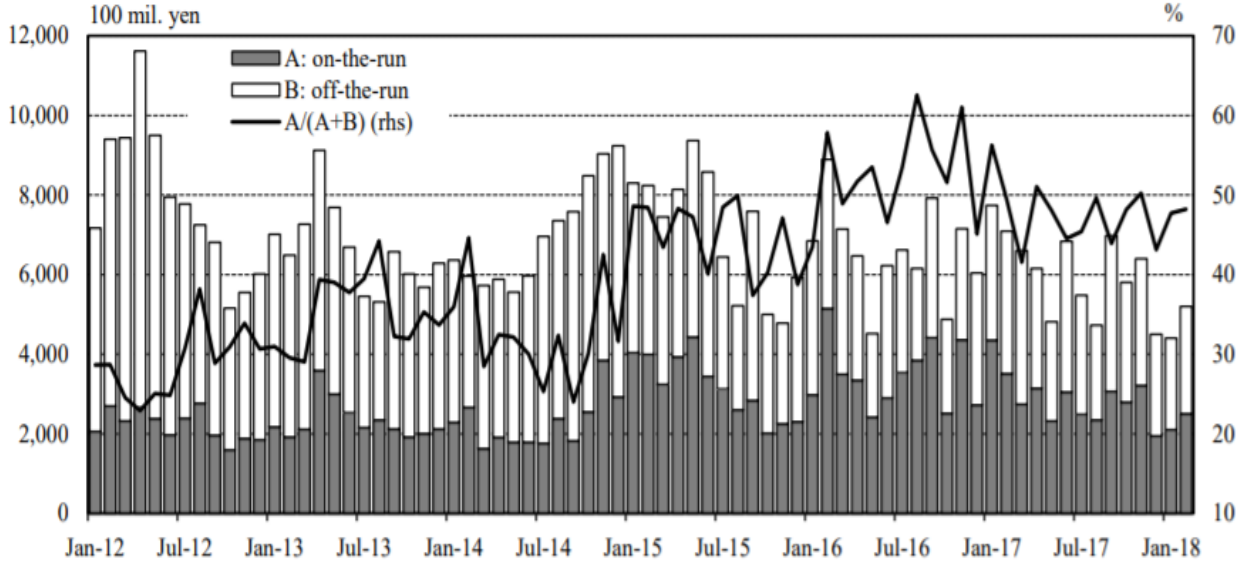
Figure 41: Daily Volumes in JGB Market



Source: Bloomberg

Figure 42: Inter-Dealer Transaction Volume

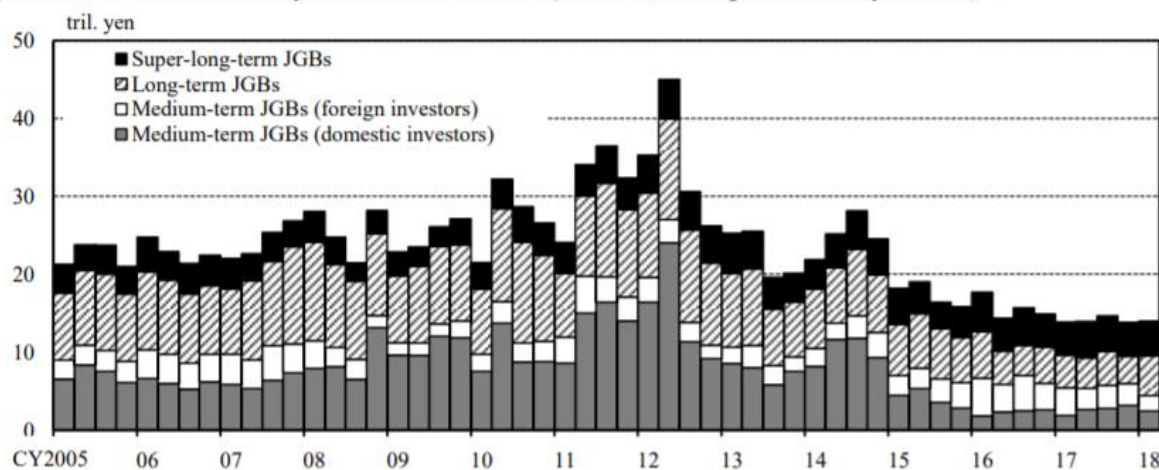
(1) Inter-dealer daily transaction volume



Source: Hattori, Takahiro. [“Do Fixed-Rate Purchase Operations by the Bank of Japan Control the Yield Curve? Evidence from High-Frequency Data.”](#) August 30 2017.

Figure 43: Dealer-to-Client Monthly Transaction Volume

(2) Dealer-to-client monthly transaction volume (Gross amount purchased by clients)



Source: Hattori, Takahiro. [“Do Fixed-Rate Purchase Operations by the Bank of Japan Control the Yield Curve? Evidence from High-Frequency Data.”](#) August 30 2017.

Communication by the authorities here is vital as it helps to reduce uncertainty and mitigate the possibility of a disorganized market reaction. Ambiguity or unclear comments by the BOJ may cause investors to misinterpret the policy direction and rapidly flood the market with transactions, causing liquidity to be compromised and bid/ask spreads to widen. As a result, this would cause an undesired effect on Japan’s financial conditions and stability. Proper and well-communicated forward guidance reduces these uncertainties by providing a clear roadmap to calm investors and allow them to move their portfolio accordingly with sufficient time, instead of having to aggressively change their holdings at once and induce panic.

Some of the problems that the BOJ has experienced are related to the Bank’s ability to continue buying JGBs, as explained above. This challenge has been in part because the central bank has already absorbed a considerable amount of bonds; in addition, many holders of these bonds are unable or unwilling to sell them to the BOJ. Banks have been willing sellers to the BOJ during most of the program as has the GPIF (Government Pension Investment Fund). However, most of the big JGB holders have been unwilling and, in some cases, unable to sell. Big insurance firms and pension funds, for instance, have not been sellers to the BOJ, mainly because of the obligations they have that require them to hold long-term bonds.

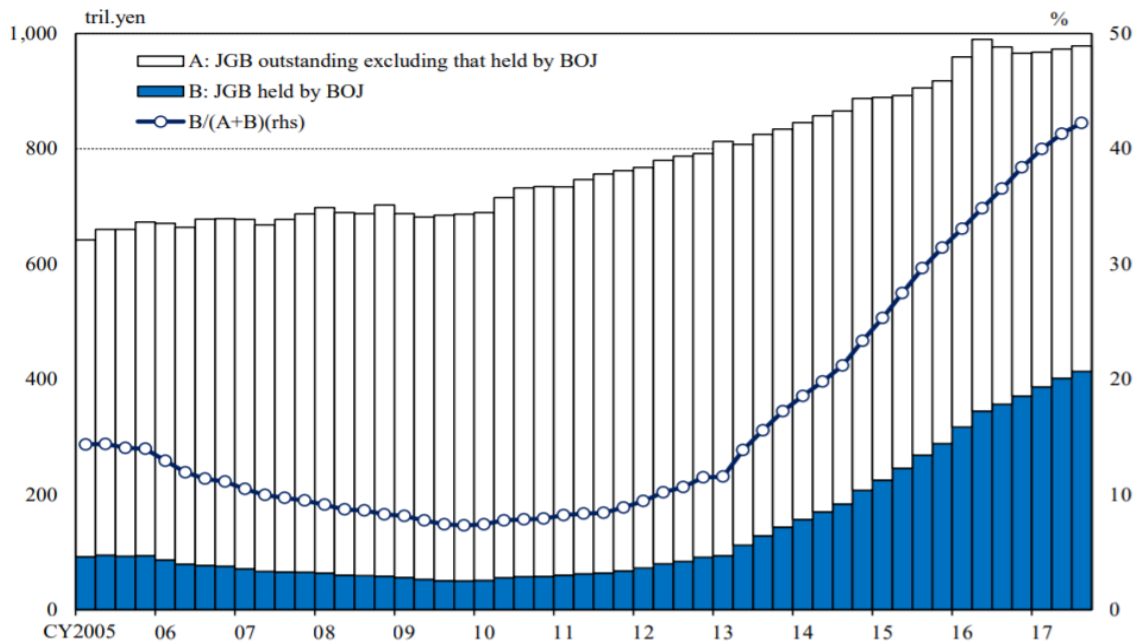
4.2 Market Interpretation

Undoubtedly, it is difficult to understand precisely what happens in committee meetings of central banks worldwide. Although authorities give us insight into their discussions, outsiders can never fully understand what central banks are thinking in their quest to achieve their mandate. The BOJ

has probably the most difficult task at hand and, compared to the Fed and the ECB, has implemented the most aggressive policies. The overwhelming amount of stimulus the BOJ has implemented—and the series of changes in recent years—has caused some confusion, and even turmoil, among market participants. In particular, the most recent addition to the toolkit—the YCC—came about with ambiguous and sometimes unclear dynamics.

Before the YCC program was rolled out, there was speculation that the BOJ would have to modify its QQE program, since the Bank was purchasing a substantial amount of JGBs to the point where it was not only running out of securities to purchase but it was also distorting the market, as decreasing volumes threatened to have negative spillovers into financial markets. So far, the BOJ holds around 40 percent of the JGB market, mostly concentrated on the short end of the curve (**Figure 44**). The BOJ was purchasing these bonds mainly from the GPIF (Government Pension Investment Fund),³¹ as well as banks, whereas insurance companies and pension funds were unwilling to sell as they had to keep the bonds on their balance sheet to honor their liabilities mismatch. Once the YCC was rolled out to markets in September 2016, the BOJ essentially was able to overcome this problem since it did not have to commit to buying a specific amount of bonds. As such, the BOJ continued to buy JGBs mostly from banks and GPIF, while also decreasing its reliance on other big institutional holders. Of course, the Bank maintained a target for purchasing JGBs, probably as a precaution not to spook the market and give the impression that it was pulling back the stimulus.

Figure 44: JGB Market



Source: Sakiyama, Toshiyuki, and Shun Kobayashi. “[Liquidity in the JGB Cash Market: An Evaluation from Detailed Transaction Data.](#)” Bank of Japan. March 2018.

³¹ The GPIF changed its portfolio allocation in domestic bonds from about 60 percent in 2015 to 35 percent currently.

As the program was implemented, the communication by the BOJ was generally thin and unclear. It was not very clear, for example, by how much 10-year yield was going to be allowed to fluctuate around the target. Thanks to the credibility enjoyed by the Bank and Governor Kuroda, the yield has so far not moved more than 10 basis points from the desired target of 0 percent. Furthermore, since the program was rolled out, there have been 10 tweaks to the operational aspects of YCC, which policymakers at the bank explained as simply “fine tuning” of the new policy. This somewhat nebulous communication strategy presents a challenge for Japan’s monetary authorities, since the yield merits a re-pricing as macroeconomic conditions continue to evolve. As a result, it is not simple to easily convey these changes to the public without causing turmoil and volatility in the financial markets. This phenomenon has increased recently as global economic growth has picked up and other major developed banks have begun to tighten (i.e. the Fed) or given indications that their massive programs will end soon should favorable conditions continue (i.e. ECB). As growth increases, so do yields in most other developed sovereign markets. However, so far, the JGB yields have been shielded from this trend thanks to YCC, but they will likely have some “catching up” to do once the cap is either increased or lifted. When that happens, banks could experience considerable financial losses and, if moves are volatile, the market could be thrown into financial instability. Another important factor to point out is the strengthening of the yen, most likely as a result of the safe haven status. This appreciation, however, points to an additional challenge for the BOJ, as a stronger currency could hamper growth in the Japanese economy’s export sector and weaken the potential rise in inflation. As expected, though, the BOJ has repeatedly mentioned that it does not target a specific level for the JPY/USD. However, if the currency continues to appreciate, there is speculation that the BOJ may target a yield for the shorter end of the curve (2-5 years) as this usually has a bigger effect on the currency.

Recently, the BOJ announced that it was going to trim its purchases of longer-dated JGBs. Specifically, the Bank would reduce purchases of JGBs with maturity of 10-25 years and 25-40 years by 10 billion yen to a total of 190 billion yen and 90 billion yen respectively. This announcement caused the yen to strengthen against the USD, leading to wide speculation amongst market participants about whether the BOJ was going to tighten its stimulus sooner than expected. As a result, yields climbed higher along the curve. Importantly, the 10-year yields rose but to a level within the market-accepted band of 10 basis points (0.090 percent). This rise in yields was an unwelcome development for the BOJ. Indeed, Japanese authorities viewed this rise as an overreaction by the market, and Governor Kuroda quickly clarified that the BOJ had no intention to scale back its stimulus program. Instead, Governor Kuroda raised concern about the “reversal

rate”³² in a speech at the Business Leaders in Osaka Meeting.³³ When interest rates remain very low for very long, a central bank’s monetary policy runs the risk of constraining economic activity rather than expanding it. This concern was likely the main reason behind the BOJ’s decision to modify its program. However, Kuroda’s comments, along with declining JGBs purchases after YCC, has fueled speculation that the BOJ has been conducting a sort of “stealth tapering.” This speculation, so far, has been dismissed by authorities.

Another problem that the BOJ faces is what happens when bond yields fall rather than rise. Intuitively, when bond yield prices rise, the central bank can intervene and buy bonds to effectively limit the rise in yields. However, when yields fall, the Bank faces an unexpected challenge: in theory, it would have to sell bonds to prevent yields from falling. This phenomenon has happened only once since the beginning of the program and it corrected without meaningful intervention by the monetary authority.³⁴ However, if the global economy faces shocks which call into question the economic recovery (for instance, as a result of geopolitical tension in Asia, due to North Korea), safe-haven assets, including Japanese assets, may be in high demand. As a result, the BOJ would essentially have to sell its bonds or reduce the amount it buys to counteract the drop in yields. This reduction in the Bank’s balance sheet, however, would have a negative effect on BOJ’s goals.

Part of the reason for the overreaction in the markets stems from the actions of other developed central banks around the world. For instance, the Fed has raised interest rates and begun shrinking its balance sheet; the ECB, while maintaining its monetary stimulus, has entertained discussions about a potential exit. Governor Draghi, however, has reassured markets, stating that the accommodation would remain in place until they reach their target. Actions by these central banks, along with the BOJ’s tweaks to its stimulus program, have unnerved investors, often causing a market overreaction.

³² Reversal Rate refers to the rate at which monetary policy “reverses” its intended effect and becomes contractionary for lending. It occurs when recapitalization gains from the duration mismatch are offset by decreases in net interest rate margins, lowering banks net worth and constraining lending. Brunnermeyer, Markus and Yann, Koby, Working Paper “The Reversal Interest Rate”.

³³ Kuroda, Haruhiko. [““Comprehensive Assessment” of the Monetary Easing and “QQE with Yield Curve Control”.](#)” Bank of Japan. September 26 2016.

³⁴ September 2017, as a result of a missile test by North Korea that flew over Japan.

CHAPTER V: IMPLICATIONS FOR THE FEDERAL RESERVE

5.1 Introduction

The aim of this Chapter is to identify and assess policy options the Fed might consider were it in the future to explore a YCC program in the U.S. We will first review the pre- and post-crisis instruments in the Fed's monetary policy toolkit in order to identify potential gaps and/or weaknesses. Secondly, we will lay out a framework for introducing a YCC program sponsored by the Fed. The framework we propose will draw from the BOJ's YCC program as well as the Fed's own internal memos. Finally, we will assess the benefits and risks of a potential Fed-sponsored YCC, with a focus on design, communication, and implementation challenges.

5.2 Review of Monetary Policies in the Fed's Toolkit

In 2018, the Fed is on a slow and steady path to gradually hike interest rates, as the U.S. economy continues to recover from the Global Financial Crisis and its persisting ramifications. Nonetheless, a looming question remains of whether the Fed's existing tools are adequate enough to respond to future economic downturns. This is no small concern for the Fed, policymakers, and financial institutions alike. In the words of former Fed Chairwoman Janet Yellen, "one lesson from the crisis is that our pre-crisis toolkit was inadequate to address the range of economic circumstances that we faced."³⁵ Indeed, the Global Financial Crisis and Great Recession posed new challenges for central banks around the world, but also spurred innovations in the design, implementation and communication of monetary policy. As a result, the Fed—along with its counterparts around the world—pioneered new policy instruments that will continue to influence the conduct of monetary policy in the years ahead.

Prior to the financial crisis, the main instrument in the Fed's monetary policy toolkit consisted of open market operations to manage the amount of reserve balances available to the banking sector. Through these operations, the Fed was able to influence the interest rate in the federal funds market, where banks experiencing reserve shortfalls could borrow from banks with excess reserves. This simple toolkit, however, suffered from two main shortcomings: first, the Fed was not able to control the federal funds rate once the quantity of reserves was no longer relatively scarce; second, once the federal funds rate fell near zero, the room for significant monetary accommodation was substantially limited.

As a result, the Fed took action to extend its policy toolkit with a series of new instruments, including:

³⁵ Yellen, Janet. "[The Federal Reserve's Monetary Policy Toolkit: Past, Present, and Future](#)." Federal Reserve. August 26 2016.

- **Interest on banks' reserve balances:** Introduced in October 2008, paying interest on reserve balances enabled the Fed to control short-term interest rates even when banks' reserves were abundant.
- **Large-scale asset purchases (LSAPs):** The Fed's purchases of Treasury and mortgage-related securities in the open market pushed down longer-term borrowing rates for millions of American families and businesses.
- **Explicit forward guidance:** By announcing that they intended to keep short-term interest rates lower for longer than might have otherwise been expected, the Fed was able to put significant downward pressure on longer-term borrowing rates.

The introduction of non-conventional monetary policy instruments helped the Fed provide additional accommodation even with near-zero short-term interest rates. The combination of Quantitative Easing and extended forward guidance was replicated by other central banks, including the Bank of England (BOE), the ECB, and the BOJ. The widespread adoption of these non-conventional policies by major central banks across the globe is indeed a testament to the success and flexibility of instruments like LSAPs. Nonetheless, viewing Quantitative Easing as a monetary policy panacea would be incorrect. The experience of the ECB and the BOJ with negative interest rates clearly reveals that large-scale asset purchases alone do not necessarily provide sufficient economic stimulus in times of financial turmoil. As the Fed continues to monitor domestic and global markets for signs of the next slowdown, it is imperative that they continue evaluating and re-evaluating the policies and programs in their toolkit. And YCC could be a potential policy candidate.

5.3 What Would a Fed-Sponsored YCC Look Like?

In late 2016, the words YCC made headlines³⁶ in the financial press when the BOJ announced a policy overhaul aimed at combining quantitative easing with 10-year government bond yield control. Media reports presented mixed opinions regarding the perceived effectiveness of the program, but unanimously hailed the BOJ's policy as a new "era of financial engineering."³⁷

In reality, though, the BOJ's YCC is not the only episode in modern history of bond-price pegging or capping by a national central bank, nor is it the first one. Indeed, the Fed first pioneered the idea of directly targeting interest rates out the yield curve in the 1940s.³⁸ Prior to the Federal Reserve-Treasury Accord of 1951, the Fed maintained a ceiling of 2-1/2 percent on long-term Treasury bonds for nearly a decade. Moreover, it simultaneously established a ceiling on the twelve-month

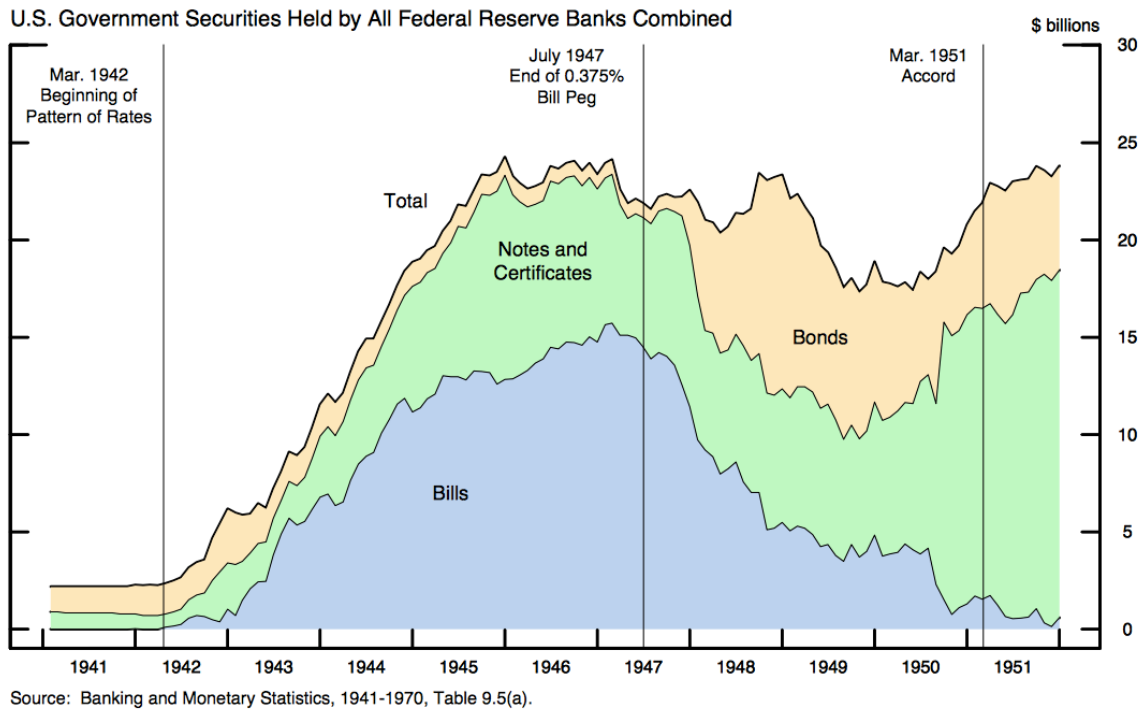
³⁶ Fujioka, Toru. "[BOJ Shifts Policy Framework to Targeting Japan's Yield Curve](#)." Bloomberg. September 21 2016.

³⁷ Cox, Jeff. "[CNBC explains: The Bank of Japan's 'yield curve control'](#)." CNBC. September 21 2016.

³⁸ Hetzel, Robert, and Ralph Leach. "[The Treasury-Fed Accord: A New Narrative Account](#)." Federal Reserve Bank of Richmond, *Economic Quarterly*, Volume 87/1. Winter 2001.

Treasury certificate of between 7/8 percent to 1-1/4 percent and, during the first half of that period, a rate of 3/8 percent on the 90-day Treasury bill. At times, in order to enforce these low rates, the Fed had to purchase the bulk of outstanding 90-day bills.³⁹ Interestingly, though, the Fed enforced the 2-1/2 percent ceiling on long-term bond yields for nearly a decade without ever holding a substantial share of long-maturity bonds outstanding. For example, the Fed held 7.0 percent of outstanding Treasury securities in 1945 and 9.2 percent in 1951 (the year of the Accord), almost entirely in the form of 90-day bills (**Figure 45, Figure 46, Figure 47**).

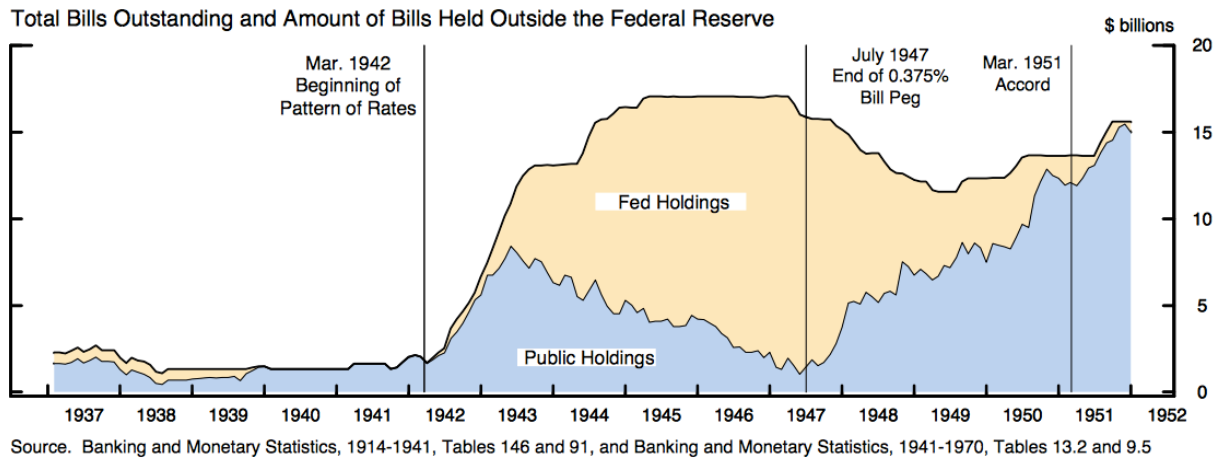
Figure 45: U.S. Government Securities held by Fed (1941-1952)



Source: Federal Open Market Committee. [“Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.”](#) June 18 2003.

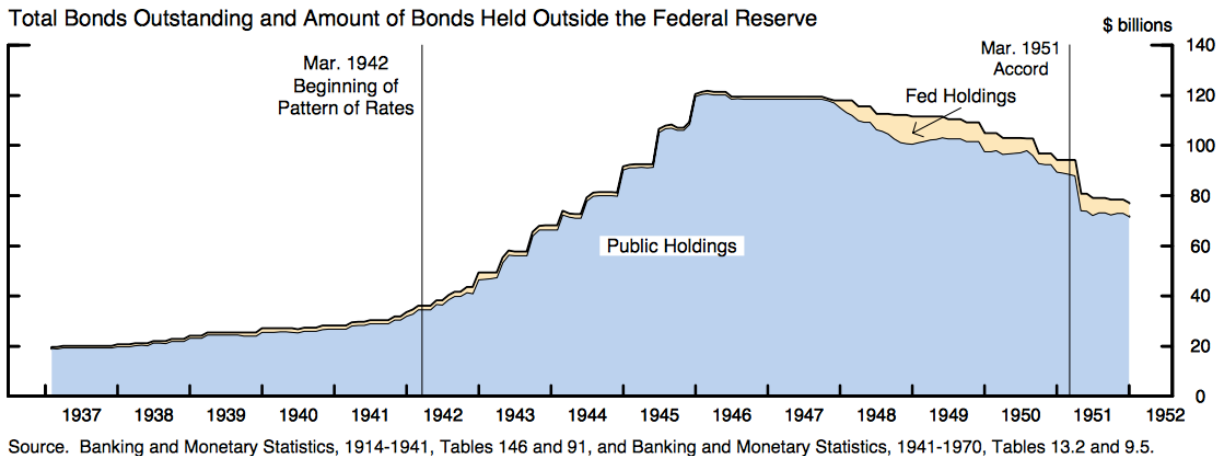
³⁹ Chaurushiya, Radha, and Ken Kuttner. [“Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.”](#) Federal Reserve. June 18 2003.

Figure 46: Fed and Public Holdings of Total Bills Outstanding (1937-1951)



Source: Federal Open Market Committee. [“Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.”](#) June 18 2003.

Figure 47: Fed and Public Holdings of Total Bonds Outstanding (1937-1951)



Source: Federal Open Market Committee. [“Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.”](#) June 18 2003.

Historical experience, therefore, tends to support the proposition that a sufficiently determined Fed can peg or cap Treasury bond prices and yields at longer-term maturities. It is no surprise, then, that a YCC program has been under active consideration by the Fed on multiple occasions. The first public reference to a policy targeting the yield curve in the 21st century comes from former Federal Reserve Chairman Ben Bernanke.

In a speech he gave before the National Economists Club on November 21, 2002, then-Governor Bernanke introduced what he called a “more direct method” to lower rates on government bonds of longer maturities:

So what then might the Fed do if its target interest rate, the overnight federal funds rate, fell to zero? One relatively straightforward extension of current procedures would be to try to stimulate spending by lowering rates further out along the Treasury term structure--that is, rates on government bonds of longer maturities.[...]A more direct method, which I personally prefer, would be for the Fed to begin announcing explicit ceilings for yields on longer-maturity Treasury debt (say, bonds maturing within the next two years). The Fed could enforce these interest-rate ceilings by committing to make unlimited purchases of securities up to two years from maturity at prices consistent with the targeted yields. If this program were successful, not only would yields on medium-term Treasury securities fall, but (because of links operating through expectations of future interest rates) yields on longer-term public and private debt (such as mortgages) would likely fall as well. Lower rates over the maturity spectrum of public and private securities should strengthen aggregate demand in the usual ways and thus help to end deflation. Of course, if operating in relatively short-dated Treasury debt proved insufficient, the Fed could also attempt to cap yields of Treasury securities at still longer maturities, say three to six years.⁴⁰

Since then, a YCC program has been under active consideration by the Fed, as suggested by a series of internal memos that have recently been released to the public. Most recently, a 2010 memo titled “Strategies for Targeting Interest Rates out the Yield Curve” outlined the key choices and mechanisms required to put a YCC approach into operation.⁴¹ Building on Bernanke’s comments from 2002, the Fed memo weighed the benefits and risks of different rate-targeting policies along two dimensions: 1) the targeting horizon—or whether YCC should target yields at short- and intermediate-term horizons or over longer horizons; and 2) the flexibility of the target—or whether the Fed should establish a “hard” target designed to keep yields continuously at a specified levels, or a “soft” target that could be adjusted on a periodic basis.

The memo then proceeds to propose three different approaches to interest-rate targeting, namely:

1. A policy signaling approach that targets interest rates over the short-to-intermediate portion of the yield curve;
2. An incremental approach that begins at the short end of the yield curve and moves out in steps as needed;
3. An approach that directly targets a long-term interest rate.

⁴⁰ Bernanke, Ben. “[Deflation: Making Sure "It" Doesn't Happen Here.](#)” Federal Reserve. November 21 2002.

⁴¹ Federal Reserve. “[Strategies for Targeting Interest Rates Out the Yield Curve.](#)” October 13 2010.

All three approaches aim to provide monetary stimulus by setting explicit interest-rate targets and committing to purchasing securities in whatever quantity is needed to achieve the desired target rate. The three methods, however, differ by the targeting horizon (short-term rate vs. long-term rate) and the timing of the targeting (incremental vs. non-incremental).

In order to better understand the three approaches, let's consider a hypothetical scenario. It's December 2020, and the U.S. has been engulfed by a new economic downturn: after a decade of recovery, GDP is stagnant, unemployment rises, while consumer spending and investments decline. The Fed lowers interest rates once again, but it soon reaches the zero bound constraint. The Fed is confident that the economy will pick up steam by December 2024. But in the meantime, additional stimulus is required. That's when YCC comes into play.

In the **policy signaling approach**, the Fed would cap the interest rates on all Treasury securities that mature during the period throughout which federal funds rate are expected to be near zero. In our example, if the Fed expects to begin hiking the federal funds rate in December 2024, it could announce a cap of 25 basis points on all Treasury securities that mature on or before December 2024. If it is credible, the Fed's announcement would provide additional clarity to market participants about the period in which the Fed expects to keep rates low. As a result, this policy would likely bind in securities with a maturity range of up to four years, flattening that part of the yield curve. In addition, should the yield on short-term securities slip above the target, the Fed could enforce the cap by buying securities in whatever quantity is needed. If monetary policy evolves as the Fed had expected, the range of targeted interest rates would shorten over time; by December 2024, it would ultimately revert back to the federal funds rate, just as the Committee begins to raise the target rate. Meanwhile, assets on the Fed's balance sheet will run off in line with the expected withdrawal of policy stimulus.

In the **incremental approach**, the Fed would cap rates at the short end of the yield curve and progressively move further out along the yield curve as needed. For instance, in our example, the Fed might set a cap of 25 basis points on Treasuries that mature on or before December 2022, approximately two years before the Fed expects to begin tightening. If it is credible, the two-year target should cause rates on Treasury securities further out the yield curve to also move lower. However, if this does not occur, or if the effects on the yield curve were insufficient, the Fed could decide to target the rate on the note maturing one year later (i.e. December 2023). By adopting this incremental approach, the Fed would be able to shape a Treasury yield curve that is consistent with the level of economic stimulus desired, without setting an explicit target on medium-term Treasury maturities from the start. In other words, it would be a more prudent and politically feasible approach. If monetary policy evolves as the Fed had expected, the range of targeted interest rates would shorten over time, and the program would naturally phase out by the time the Fed begins rising interest rates in December 2024.

In the **long-term approach**, the Fed would target the rate of long-term Treasury securities, such as the 10-year yield. In our hypothetical scenario, the Fed could announce a cap that is 100 basis points below the current yield on the ten-year Treasury security. For instance, if the 10-year Treasury note is trading at a yield of 3.05 percent, the Fed could set a cap of 2.05 percent. If the announcement is successful, the yield on the 10-year note should decline. Furthermore, the Fed could purchase all securities with yields in excess of the 2.05 percent target and maturities of around 10 years in order to enforce the cap throughout the life of the rate-targeting program. Unlike the two other methods discussed above, the long-term approach does not have a natural expiration date: if the Fed starts hiking rates in December 2024, a portion of the securities purchased to enforce the cap will still be outstanding (i.e. notes that mature between December 2024 and December 2030). This situation may lead to excessive liquidity in the market, or even capital losses if the Fed decided to sell these assets to drain liquidity. As a result, the Fed should periodically adjust its cap on the 10-year note based on the level of economic stimulus needed or the severity of balance sheet risks.

The long-term approach described in the memo most closely resembles the YCC program introduced by the BOJ in 2016. Nonetheless, the three strategies aforementioned show the flexibility of rate-targeting policies, and any of the three approaches could be successfully deployed depending on macroeconomic outlook, liquidity conditions, and market sentiment.

Figure 48: Yield Curve Control Throughout History

Comparison of Yield Curve Control programs			
	BOJ YCC	Fed YCC (1942-51)	Fed YCC (2010 memo)
Motivation	The BOJ's YCC was aimed at stimulating economic inflation and inflation, steepening the yield curve and safeguarding profitability of financial intermediaries after NIRP and QQE had eroded profit margin.	The YCC policy established by the Fed in 1942 resulted primarily from the requirements of wartime finance, rather than monetary policy considerations per se.	The Yield Curve Control described in the 2010 memo by the Fed was aimed at stimulating economic inflation and providing additional stimulus when the overnight federal funds rate reaches the zero or near-zero level.
Communication	The BOJ's communication of YCC was intentionally ambiguous. The Bank specified that it would commit to a target of around 0 percent for 10-year JGBs, but did not specify whether the target was intended to a	The policy of capping the yield curve at longer maturities was not publicly announced, at least at first, but it became apparent over the course of 1942 and 1943.	The Fed memo emphasizes that a clear and well-crafted communication strategy is essential to establishing the Bank's credibility and ensuring the success of the rate-targeting program.

	cap, a peg, or a band. Similarly, the Bank maintained its commitment to the purchase of 80 trillion JGB annually, though empirical data shows that purchases have since declined.		
Implementation	The BOJ targeted 10-year JGB yields around 0 percent. It introduced new tools such as Fixed-Rate Purchase Operations and Fixed-Rate Funds-Supplying Operations to achieve its target whenever yields rose above the desired levels.	In this period, the Fed capped yields on long-term Treasury bonds at 2-1/2 percent and, until 1947, pegged the yield on short-term Treasury bills at 3/8 percent. After 1947, the peg on short-term rates was allowed to change, but only with the approval of the Treasury. During a short period in 1947-48, the cap on long rates became binding and the Fed managed to maintain it through large purchases of these securities, even with the peg on short-term rates. This was achieved without decoupling long-term Treasury rates from long-term rates faced by private parties.	The Fed memo proposes three different approaches to interest-rate targeting: <ul style="list-style-type: none"> • A policy signaling approach that targets interest rates over the short-to-intermediate portion of the yield curve; • An incremental approach that begins at the short end of the yield curve and moves out in steps as needed; • An approach that directly targets a long-term interest rate.
Exit strategy	The BOJ is considering exiting YCC in 2019. The Bank has not yet laid out its exit strategy.	The Treasury-Federal Reserve Accord of 1951 discontinued the interest rate ceilings. The abandonment of the cap on long-term interest rates in April 1951 meant a decline in the value of bonds, raising concerns about the balance sheets of the institutions holding those bonds. To offset a portion of those losses, the Treasury offered to exchange the bonds for higher-yielding convertible securities.	Exit concerns are a key element in the Fed's 2010 memo. While the incremental approach and the policy signaling approach both have a natural expiration date, the long-term approach presents a series of challenges in terms of executing an exit.

Source: Shirai, Sayuri. [“Mission Incomplete: Reflating Japan's Economy.”](#) ADB. 2017, Federal Reserve. [“Strategies for Targeting Interest Rates Out the Yield Curve.”](#) October 13 2010, and Federal Open Market Committee. [“Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.”](#) June 18 2003.

5.4 How does YCC Fit into the Fed’s Toolkit?

In a 2016 speech to the Federal Reserve Bank of Kansas City, Janet Yellen reflected on the lessons from the Global Financial Crisis and laid out her vision for “resilient monetary policy frameworks for the future.”³⁵ Yellen’s speech emphasized the new responsibilities of the Fed and the vital role of monetary policy in promoting a stable and healthy economy in what many economists and policymakers saw as a new era of ultra-low interest rates. Indeed, if recent forecasts are correct, the federal funds rate should settle at about 2.9 percent in the long run, compared to the 7 percent average between 1965 and 2000.⁴²

This historically low level of short-term interest rates is likely to limit the scope for conventional rate cuts in the face of an economic downturn. Some potential new tools remain in the Fed’s monetary toolbox—including forward guidance about the future path of short term rates, additional rounds of quantitative easing, and even negative short-term interest rates. Collectively, these tools could provide significant stimulus to the U.S. economy—but what if more accommodation was needed? YCC could be a useful addition.

5.4.1 Benefits and Advantages

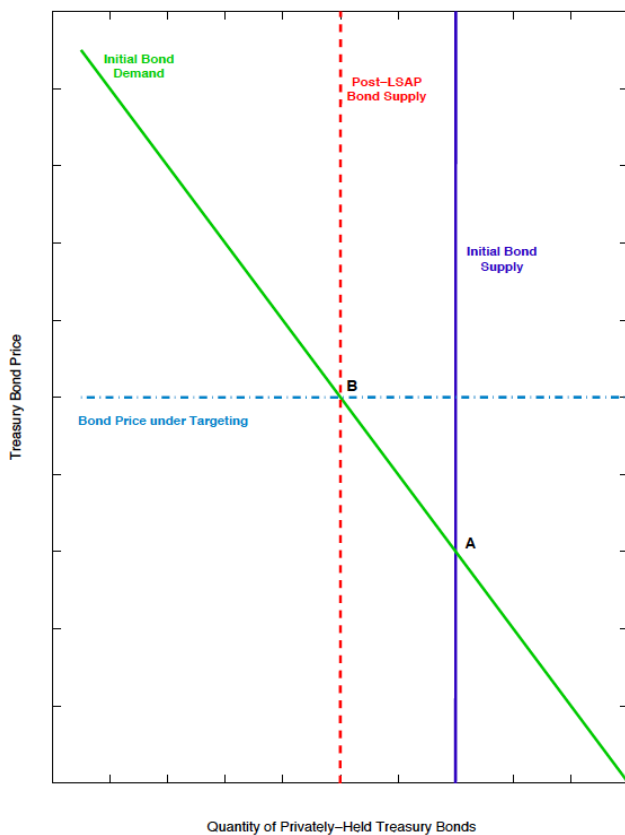
A rate-targeting program such as YCC could bring about meaningful benefits to a flagging economy. First, directly targeting interest rates on Treasury securities would bring the yield curve closer to what policymakers might consider desirable given the current economic conditions. In addition, in conjunction with clear communication of the interest-rate targets, yields could decline due to signaling effects, tending to lower the magnitude of purchases required to keep interest rates near target. Third, YCC would allow for greater flexibility in targeting different maturity horizons and providing “soft” or “hard” targets.

To fully understand the benefits of YCC, it is worth comparing explicit rate-targeting and QE.⁴¹ YCC could be implemented as a companion or an alternative to LSAP when prevailing economic conditions necessitate greater economic stimulus than near-zero overnight rates allow for. In many respects, interest-rate targeting and LSAPs are similar, since they both involve buying potentially large amounts of securities. However, the difference between the two approaches is that one sets the quantity, while the other sets the price: when using QE, the Fed buys a predetermined quantity of securities, but it lets the market decide on prices and yields; in contrast, a Fed-sponsored YCC program would specify the yield it wishes to achieve, but the quantity of securities it has to buy ultimately depends on the credibility of the peg.

⁴² Federal Reserve Bank of St. Louis and U.S. Federal Open Market Committee. “[Longer Run FOMC Summary of Economic Projections for the Fed Funds Rate, Median.](#)” Federal Reserve Bank of St. Louis. April 7 2018.

In some scenarios, the two approaches—YCC and QE—are interchangeable and, in fact, equivalent. Suppose, for instance, that the demand schedule for a specific Treasury security is stable and known to the Central Bank. **Figure 49** below shows the initial equilibrium at point A, which lies at the intersection of the downward-sloping demand curve and the vertical Treasury supply curve. If the Central Bank wished to boost security prices to point B, the Fed could achieve its target equally well under either YCC or QE. Under QE, the Fed would use its knowledge about the demand schedule to determine the quantity of Treasury purchases required to boost prices to the target level. Under a rate-targeting approach, the Fed would announce its target (the horizontal dash-dotted line in the figure) and then purchase all securities that the private sector wished to sell at that price. Ultimately, either policy would reduce the quantity of securities held privately by the horizontal distance between point A and point B, and would boost their price by the vertical distance between the two points.

Figure 49: Yield Curve Control vs LSAPs



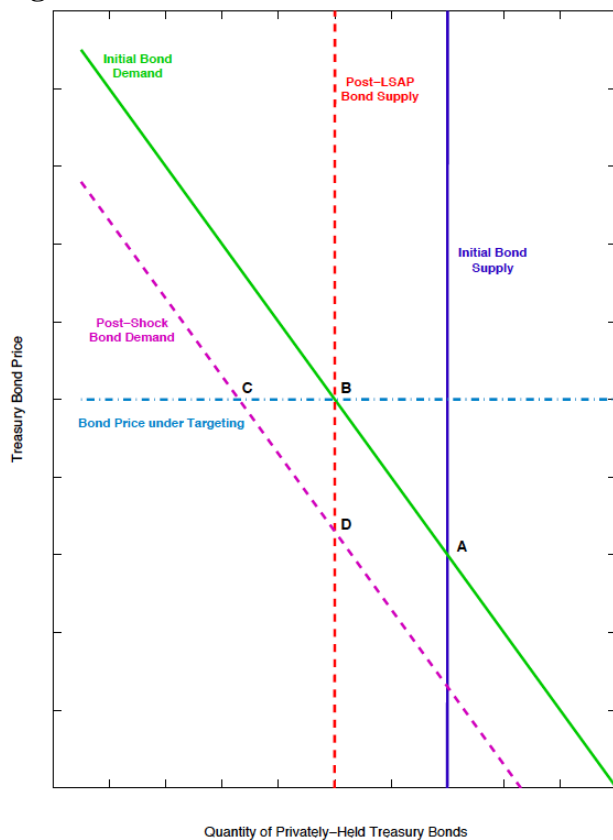
Source: Federal Reserve. “[Strategies for Targeting Interest Rates Out the Yield Curve.](#)” October 13 2010.

However, in other scenarios, QE and YCC are not at all interchangeable. For instance, let’s consider the market for a given-maturity Treasury note. **Figure 50** below shows the initial equilibrium at point A. Suppose that an exogenous shock shifts down the demand schedule for the Treasury note, putting downward pressure on the price of the security. Under QE, the Fed purchases a predetermined quantity of securities, causing the price of the security to drop to point

D. As a result, the yield would rise correspondingly. In addition, uncertainty about the slope of the demand schedule could exacerbate the price drop in unintended ways. By contrast, under YCC, the Fed could accommodate the shock by increasing the quantity of purchases, without changing the target rate. As long as the Central Bank has capacity to adjust its balance sheet, the Fed would reduce the quantity of securities held privately by the horizontal distance between point A and point C, and would boost the price of the securities by the vertical distance between the two points.

Therefore, YCC would help insulate the economy from shocks to the demand curve for Treasury securities that, for example, arise from fluctuations in risk aversion during an economic downturn. The result is that interest-rate targeting achieves greater certainty about the interest rate that will result from the policy, compared to LSAP operations. The rate target would allow the Fed to set rates more precisely and keep them more stable, which in turn would deliver a stronger boost to household and business spending if it allows consumers to make spending plans with more confidence.

Figure 50: Yield Curve Control vs LSAPS: Bond Demand Falls



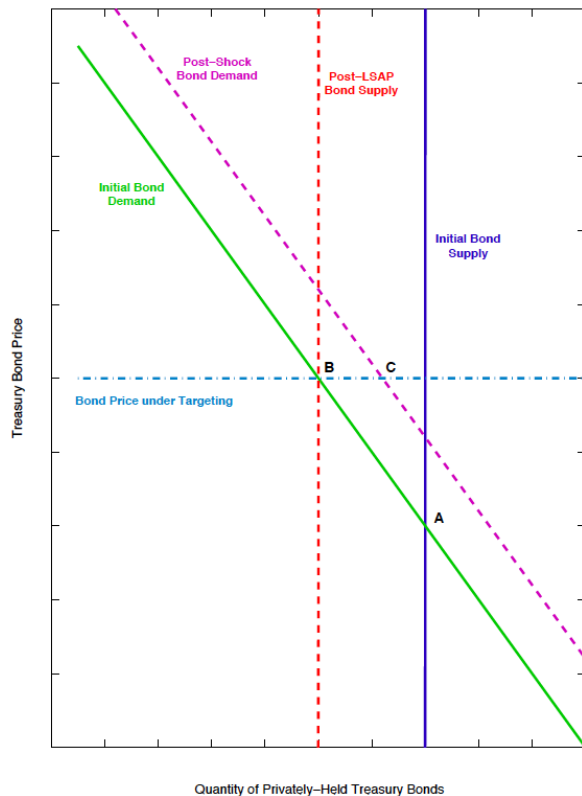
Source: Federal Reserve. “[Strategies for Targeting Interest Rates Out the Yield Curve.](#)” October 13 2010.

In addition, another benefit of YCC is it that it can be employed as a useful communication device: for instance, capping or pegging the two-year rate at a low level would strongly signal the Fed’s intention to keep short-term rates low for some time. Therefore, rate-capping not only boosts the

Central Bank’s credibility and clarifies expectations about the future path of the funds rate, but it also has the potential to lower premium risk and reduce the amount of purchases required to keep the interest rate near the desired target.

To illustrate this mechanism, let’s consider, once again, the market for a given-maturity Treasury note. **Figure 51** below shows the initial equilibrium at point A. In a QE approach, the Fed purchases a predetermined amount of Treasury securities to boost prices to the target level. The Fed would reduce the quantity of securities held privately by the horizontal distance between point A and point B, and would boost the price of the securities by the vertical distance between the two points. By contrast, a YCC approach could lead to the same price level, but with a smaller amount of purchases. Let’s suppose that the Fed’s announcement of an interest rate target prompts market participants to anticipate a rise in the price of Treasury bonds. If the Fed’s market is perceived to be credible, the demand schedule for securities will shift up and to the right. In this case, the Fed would only have to purchase securities in the amount of the horizontal distance between point A and point C, and would still achieve the same desired price level.

Figure 51: Yield Curve Control vs LSAPs: Bond Demand Rises



Source: Federal Reserve. “[Strategies for Targeting Interest Rates Out the Yield Curve.](#)” October 13 2010.

In other words, a YCC program that clearly and credibly communicates interest-rate targets could reduce yields through signaling effects, which would allow the Fed to lower the magnitude of its purchases. From this perspective, a YCC approach could be successfully employed not only as an

alternative to QE, but also as an instrument to gradually wind down a QE program, without causing undesired volatility in the market. That’s, for example, what has happened in Japan since the introduction of YCC in September 2016.

Finally, a third benefit of YCC—in addition to reduced volatility and lower purchases—is flexibility. As we discussed in the previous section, the Fed has considered different approaches to YCC, based on the targeting horizons and the flexibility of the target (“hard” vs “soft” targets). The three approaches to YCC—policy signaling, incremental and long-term—would empower the Fed to deploy a policy response targeted to the prevailing macroeconomic conditions, growth forecasts, liquidity factors, and size of the central bank’s balance sheet at the time of the target announcement.

Figure 52: Comparison of YCC approaches

Three Approaches to Yield Curve Control			
	Policy Signaling	Incremental	Long-Term
Pros	<ul style="list-style-type: none"> • This approach would be most effective in a situation where market sentiment might benefit from learning of a bold new proposal to stimulate economic growth. • This approach would complement the Fed’s forward guidance statements, providing additional clarity around the future path of short-term rates. • This approach has a natural expiration date, which would facilitate a potential exit. 	<ul style="list-style-type: none"> • This approach would allow policymakers to move gradually out the yield curve, based on evolving economic conditions. • The approach would be easily understood by market participants, since it is a natural extension of the practice of targeting the overnight rate. • This approach has a natural expiration date, and securities would be allowed to run off the Fed’s balance sheet relatively quickly, which would facilitate a potential exit. 	<ul style="list-style-type: none"> • This approach would directly lower the long-term rate and, therefore, deliver stimulus to the part of the yield curve that is most likely to influence economic activity. • This approach would help to lower term premiums and reduce the amount of purchases required to keep the long-term rate at the desired levels. • This approach would most directly spread to yields in other asset classes and the broader market.
Cons	<ul style="list-style-type: none"> • Although this approach could affect expectations for future short rates, its focus in on securities with short and intermediate maturities. As a result, its effect on longer-term interest rates 	<ul style="list-style-type: none"> • The effect on longer-term interest rates would be slower and weaker compared to the other approaches. 	<ul style="list-style-type: none"> • Since the approach targets long-term interest rates directly, it would likely add long-term securities to the Fed’s balance sheet. As a result, executing an exit plans might be problematic: if

	may be limited.		the Fed decided to move interest rates higher, it could suffer considerable capital losses.
--	-----------------	--	---

Source: Federal Reserve. “[Strategies for Targeting Interest Rates Out the Yield Curve.](#)” October 13 2010.

5.4.2 Risks and Challenges

Nonetheless, interest-rate targeting also entails some risks and challenges that ought to be carefully analyzed before being put into operation. First, the primary risk of YCC is that the Fed would expand its balance sheet excessively, or even lose control of its balance sheet. Second, rate-targeting could amplify macroeconomic shocks to a destabilizing degree. Third, executing an exit could create obstacles, including the possibility of significant capital losses. Finally, challenges around the Fed’s communication and credibility could jeopardize the benefits of rate-targeting.

The first risk factor to consider is the magnitude of Treasuries purchases under YCC. As we discussed, YCC achieves greater certainty about the interest rate that will result from the policy, relative to LSAP operations; however, price stability is achieved at the expense of greater uncertainty about the size of the central bank’s balance sheet. Indeed, a policy of interest-rate targeting adds great uncertainty about the quantity of securities that will be added to the Fed’s balance sheet, as the Fed would commit to purchasing and selling securities in whatever quantity is needed to achieve the desired target rate. Therefore, the Fed might end up buying very large amounts of securities, or even the entire stock of securities of a given maturity, without fully achieving its rate target. By contrast, in a QE program, the amount of securities to be purchased is typically specified in advance, thus giving the Fed more control over the size of its balance sheet. It was, indeed, concerns about “losing control of the balance sheet” that led the Fed to choose LSAPs over rate targets under Ben Bernanke.⁴³

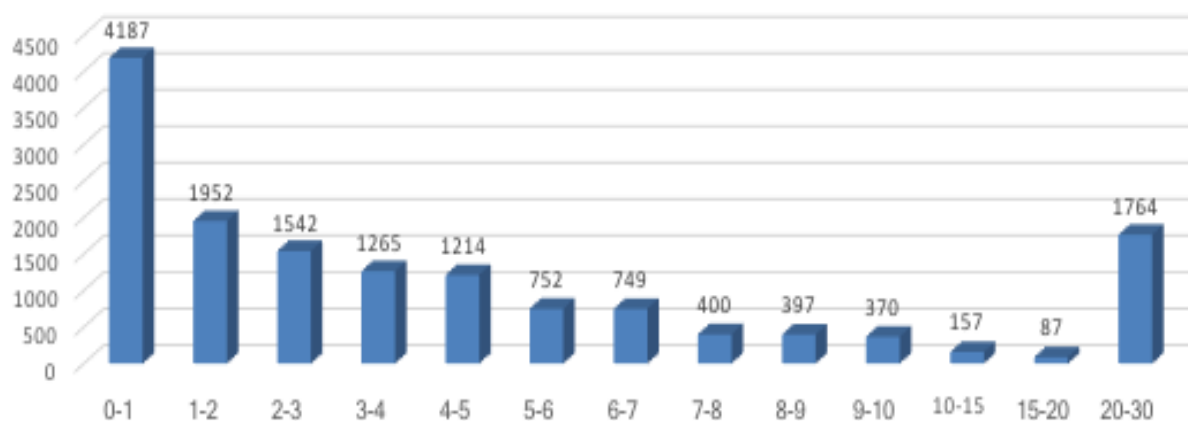
The required volume of securities purchases in a YCC program may depend on a number of factors, which may cause yields to be above the levels desired by the Fed. For example, if a security is trading at higher yield than the desired yield because of uncertainty about the future path of short-term rates, the announcement of a target rate would clarify these misperceptions and prompt the rate to move down without the need to make any significant purchases. However, if the announced target is not seen as fully credible (i.e. consistent with the expected path of short rates), then the Central Bank would have to make more substantial purchases to enforce its desired target. Similarly, if the Treasury yield is higher than desired because of the term premium, then the Central

⁴³ Bernanke, Ben. “[What tools does the Fed have left? Part 2: Targeting longer-term interest rates.](#)” Brookings. March 24 2016.

Bank would have to make significant purchases to remove duration from the market and adjust the term premium.

Figure 53 below shows outstanding amounts of marketable Treasuries by remaining maturity, as of March 31, 2018. These values effectively represent an upper bound on the securities the Fed might need to purchase to target interest rates at the maturities shown.

Figure 53: Outstanding Marketable Treasuries by Remaining Years to Maturity (Billion of Dollars, as of March 31, 2018)



Source: Treasury Direct. “[Monthly Statement of the Public Debt \(MSPD\) and Downloadable Files.](#)”

Secondly, an additional challenge is that YCC may amplify the effects of real macroeconomic shocks, compared to LSAPs. Indeed, interest-rate targeting constrains how interest rates respond to such shocks, as we have seen in **Figure 50** and **Figure 51**. In a low-interest rate environment, this lack of reactivity to macroeconomic conditions is not a significant concern, especially for negative shocks: yields would be allowed to decline in response to such negative shocks. Similarly, the stimulus to GDP from positive shocks would probably be larger under interest-rate targeting, especially if longer-term interest rates were targeted. However, in a different environment, the targets must be adjusted frequently enough to account for changing macroeconomic conditions. If adjustments are insufficient or slow, interest-rate targeting could induce substantial volatility in the central bank’s securities holdings and have a destabilizing macroeconomic effect.

Third, another potential risk revolves around executing an exit and its impact on the Fed’s balance sheet. The design of an exit should be a central component of any Fed-sponsored YCC policy and is likely to be a determining factor behind the Fed’s decision to adopt a policy signaling approach, incremental approach or long-term approach. As we discussed in the previous section, the three approaches have different “expiration dates” and, therefore, require different exit considerations:

- **The long-term approach** would likely add securities to the Fed’s balance sheet that will not have matured by the time the Fed starts raising the federal funds rate. As a result, it will

be necessary for the Fed to use reserve draining tools to improve control over the federal funds rate; in addition, should the Fed decide to sell these securities, this might result in significant capital losses, depending on the size of the purchases.

- Executing an exit would be relatively easier under the **policy signaling approach**, since this method terminates naturally with the passage of time. However, there are still potential risks. For instance, if incoming economic data were to show that recovery is occurring faster than anticipated, the Fed might raise the federal funds rate earlier than it had originally planned. In that case, some of the assets acquired by the Fed during previous targeting operations would still be on the balance sheet after policy rates started moving higher. As a result, the Fed might once again turn to reserve draining tools to guide interest rates higher, and could incur capital losses if it decided to sell those securities.
- The **incremental approach** also terminates naturally with the passage of time. In this case, though, exit and balance sheet concerns are limited. Since the targeting is gradual, it is unlikely that the Fed would target rates so far out the yield curve that they would involve securities maturing after the lift-off of the federal funds rate. As a result, should the Fed decide to begin withdrawing policy accommodation, these holdings could be allowed to run off the System's portfolio relatively quickly.

A fourth and final risk revolves around the Fed's communication and credibility. As Ben Bernanke wrote in a 2016 piece for *Brookings*, a carefully-planned communication strategy is essential to the success of any Fed policy, and especially when new exotic tools such as YCC are being considered.⁴³ "Public beliefs about these tools may influence expectations," Bernanke noted. "If the public and financial market participants are confident that government action will always be capable of returning inflation to the central bank's target, then long-term inflation expectations are more likely to be "anchored," which in turn makes attaining the inflation target easier." For a rate-targeting program to work, then, market participants must be confident that the Federal Open Market Committee (FOMC) will keep short-term interest rates on a path consistent with the target for the longer-term rate. As we discussed in previous chapters, the BOJ has faced a considerable amount of criticism for the ambiguity surrounding its YCC program. It would be unrealistic for the Fed to establish a YCC program with such ambiguity in design and implementation. In fact, much of the appeal of YCC over QE depends on the credibility of the Fed's announcement. Suppose, for instance, that the Fed adopted a signaling-approach to YCC. On May 1, 2020, the Fed announces that it will buy any Treasury securities that mature on May 1, 2022 or earlier at a fixed price corresponding to a 1 percent yield. If investors and market participants do not believe that the Fed will be successful at pushing down the two-year rate, or they expect that the Central Bank might abandon the program before 2022, they will immediately sell their securities of two years' maturity or less to the Fed. As a result, the Fed may end up owning most or all of the eligible securities, but the effect on longer-term interest rates will be uncertain. On the other hand, if the

Fed's announcement is perceived as fully credible, the prices of eligible securities will move immediately to the targeted levels, without any need for the Fed to make any purchases. A potential strategy to boost the credibility of YCC would be to combine the announcement of the target with consistent forward guidance about the expected path of short-term rates.

5.5 Conclusion

In summary, bond-yield targeting offers a series of benefits that are in line with the Fed's commitments and responsibilities. In particular, benefits of a Fed-sponsored YCC program would include: 1) the potential to reduce both the level and volatility of interest rates, and therefore provide economic stimulus even when the overnight federal funds rate reaches the zero or near-zero level; 2) the potential to lower the magnitude of purchases necessary to keep interest rates near target; 3) increased flexibility in targeting different rate horizons, given prevailing economic conditions. On the other hand, though, YCC entails some risks, such as: 1) large increase in the size of the Fed's balance sheet; 2) lower reactivity to macroeconomic shocks; 3) possibility of significant capital losses for the central bank upon exit; 4) challenges around communication and implementation.

The main appeal of a Fed-sponsored YCC lies in its ability to complement quantitative easing. While LSAPs work by reducing the risk and liquidity premiums on longer-term securities, a credible YCC program most effectively influences expectations about the path of short-term rates. Therefore, QE and rate-pegging could be used simultaneously to reduce longer-term rates when the scope for conventional monetary policy is limited.

To conclude, the Fed and other central banks are faced with unprecedented challenges, as they enter a new era of historically low interest rates. Challenges, however, breed opportunities: just like the Global Financial Crisis spurred innovation in monetary policy, the current macroeconomic environment demands that central banks around the world continue to assess their existing policy tools, while also developing new instruments tailored to the prevailing economic conditions. The BOJ's YCC is one of such policies. While seemingly exotic, the idea of interest-rate targeting finds its roots in the experience of the Fed's pegs during World War II and the immediate postwar years. Today, that seven-decades-old idea may offer new insight into the future of monetary policy. For the Fed, this means that they should closely monitor the evolution of the BOJ-sponsored YCC program, along with any new developments in implementation, market reaction, and possible exit strategies.

We sincerely hope that this Capstone report will serve as a building block for the Fed's investigation.

WORKS CITED

- Arslanalp, Serkan, and Dennis Botman. "Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing." No. 15-186. IMF. 2015.
- Bank of Japan. "Bank of Japan Accounts (December 31, 2017)." January 5 2018.
- Bank of Japan. "Outline of Outright Purchases of Japanese Government Securities." December 28 2017.
- Bank of Japan. "Statement on Monetary Policy." December 21 2017.
- Bank of Japan. "Financial System Report." October 2017.
- Bank of Japan. "Financial System Report." October 2016.
- Bank of Japan. "Comprehensive Assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE)." September 21 2016.
- Bank of Japan. "New Framework for Strengthening Monetary Easing: "Quantitative and Qualitative Monetary Easing with Yield Curve Control"." September 21 2016.
- Bank of Japan. "Financial System Report." April 2016.
- Bank of Japan. "Introduction of Quantitative and Qualitative Monetary Easing with a Negative Interest Rate." January 29 2016.
- Bank of Japan. "Key Points of Today's Policy Decisions (reference)." January 29 2016.
- Bank of Japan. "Monthly Report of Recent Economic and Financial Developments December 2015." December 22 2015.
- Bank of Japan. "Quantitative and Qualitative Monetary Easing: Assessment of Its Effects in the Two Years since Its Introduction." May 2015.
- Bank of Japan. "Minutes of the Monetary Policy Meeting on October 31, 2014." November 25 2014.
- Bank of Japan. "Introduction of the "Quantitative and Qualitative Monetary Easing"." April 4 2014.
- Bank of Japan. "Outline of Monetary Policy."
- Bernanke, Ben. "What tools does the Fed have left? Part 2: Targeting longer-term interest rates." Brookings. March 24 2016.
- Bernanke, Ben. "Deflation: Making Sure "It" Doesn't Happen Here." Federal Reserve. November 21 2002.
- BIS. "Effective exchange rate indices." March 15 2018.

Board of Governors of the Federal Reserve System. “Quarterly Report on Federal Reserve Balance Sheet Developments.” March 23 2018.

Chaurushiya, Radha, and Ken Kuttner. “Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.” Federal Reserve. June 18 2003.

Cox, Jeff. “CNBC explains: The Bank of Japan's 'yield curve control'.” CNBC. September 21 2016.

European Central Bank. “Consolidated balance sheet of the Eurosystem as at 31 December 2017.” 2018.

Federal Open Market Committee. “Targeting the Yield Curve: The Experience of the Federal Reserve, 1942-51.” June 18 2003.

Federal Reserve. “Strategies for Targeting Interest Rates Out the Yield Curve.” October 13 2010.

Federal Reserve Bank of St. Louis. “FRED Economic Data.”

Federal Reserve Bank of St. Louis and U.S. Federal Open Market Committee. “Longer Run FOMC Summary of Economic Projections for the Fed Funds Rate, Median.” Federal Reserve Bank of St. Louis. April 7 2018.

Fujioka, Toru. “BOJ Shifts Policy Framework to Targeting Japan’s Yield Curve.” Bloomberg. September 21 2016.

Goldman Sachs. “Outlook.” 2017.

Hattori, Takahiro. “Do Fixed-Rate Purchase Operations by the Bank of Japan Control the Yield Curve? Evidence from High-Frequency Data.” August 30 2017.

Hetzl, Robert, and Ralph Leach. “The Treasury-Fed Accord: A New Narrative Account.” Federal Reserve Bank of Richmond, Economic Quarterly, Volume 87/1. Winter 2001.

IMF. “Financial System Stability Assessment – Japan.” July 2017.

IMF. “Global Financial Stability Report.” April 2016.

Japan Macro Advisors. “Japan JGBs held by BoJ.” March 21 2018.

Kaneko, Kaori. “BOJ likely to push back timeframe for inflation target again: Reuters poll.” Reuters. July 18 2017.

Kawamoto, Takuji, and Moe Nakahama. “Why Did the BOJ Not Achieve the 2 Percent Inflation Target with a Time Horizon of About Two Years? — Examination by Time Series Analysis —.” Bank of Japan. July 2017.

Kihara, Leika, and Tetsushi Kajimoto. “BOJ pushes back inflation target for sixth time, keeps policy steady.” Reuters. July 19 2017.

- Kuroda, Haruhiko. “Quantitative and Qualitative Monetary Easing and Economic Theory.” Bank of Japan. November 13 2017.
- Kuroda, Haruhiko. ““Quantitative and Qualitative Monetary Easing with Yield Curve Control’: After Half a Year since Its Introduction.” Bank of Japan. March 24 2017.
- Kuroda, Haruhiko. ““Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control’: New Monetary Policy Framework for Overcoming Low Inflation.” Bank of Japan. October 8 2016.
- Kuroda, Haruhiko. ““Comprehensive Assessment” of the Monetary Easing and “QQE with Yield Curve Control”.” Bank of Japan. September 26 2016.
- Nakaso, Hiroshi. “Evolving Monetary Policy: The Bank of Japan's Experience.” Bank of Japan. October 19 2017.
- Nikkei Asian Review. “Japanese money market funds to close as returns prove elusive.” March 8 2016.
- Nishino, Kousuke, Hiroki Yamamoto, Jun Kitahara, and Takashi Nagahata. “Developments in Inflation Expectations over the Three Years since the Introduction of Quantitative and Qualitative Monetary Easing (QQE).” Bank of Japan. October 2016.
- Sakiyama, Toshiyuki, and Shun Kobayashi. “Liquidity in the JGB Cash Market: An Evaluation from Detailed Transaction Data.” Bank of Japan. March 2018.
- Shirai, Sayuri. “Mission Incomplete: Reflating Japan's Economy.” ADB. 2017.
- Trading Economics. “Japan Government Bond 10Y.”
- Trading Economics. “Japan Inflation Rate.”
- Treasury Direct. “Monthly Statement of the Public Debt (MSPD) and Downloadable Files.”
- World Bank. “Inflation, consumer prices (annual %).”
- Yellen, Janet. “The Federal Reserve’s Monetary Policy Toolkit: Past, Present, and Future.” Federal Reserve. August 26 2016.