

April 07, 2017

*<The Effects of BOJ's Quantitative and Qualitative Monetary Easing with YCC: Follow-up Report>**Narrowing Monetary Policy Options**— Can FTPL be an effective means of escaping deflation?**JCER Financial Research Team¹**Kazumasa IWATA (President of JCER)**Ikuko FUEDA-SAMIKAWA (Principal Economist)**Eriko TAKAHASHI (Senior Economist)***1. BOJ's Negative Interest Rate Policy: A year on —Effects and risks of the new monetary policy framework**

In September 2016, the Bank of Japan (BOJ) switched from a policy of “quantitative and qualitative monetary easing (QQE) with a negative interest rate,” only just introduced in January 2016, to “QQE with yield curve control (YCC).” The central bank removed the term “a negative interest rate” from the policy title, hoping to soften people’s negative response to its connotations and lessen the blow to institutional investors of an excessive decline in interest rates in the super-long end of the Japanese Government Bond (JGB) market. However, since the adoption of YCC, there has been no significant change in the amount of JGBs purchased by the BOJ compared to before. Can the BOJ control the long-term yield curve? Is there not a sense of deadlock in monetary policy? This report assesses the effects and risks of the most recent monetary policy framework.

Since the end of the 1990s, Japan has been in a period of secular stagnation with a decline in the natural rate of interest, which brings savings and investment into balance. A decline in the natural rate of interest has also been observed recently in other advanced industrialized countries such as those of Europe and the United States. Former U.S. Treasury Secretary and Harvard University professor Lawrence Summers stated in the March/April 2016 issue of the journal of diplomacy Foreign Affairs that “the kind of Japan-style stagnation that has plagued the industrial world in recent years may be with us for quite some time.” When the natural rate of interest turns negative, it is difficult for monetary policy alone to influence it. At the August 2016 Jackson Hole Economic Symposium hosted by the Federal Reserve Bank of Kansas City, Nobel Prize winning economist and Princeton University professor Christopher Sims referred to the present situation of extremely low interest rates in developed countries and elaborated on recent arguments focused on the Fiscal Theory of the Price Level (FTPL). With respect to Japan, Sims attracted interest by arguing that the implementation of the

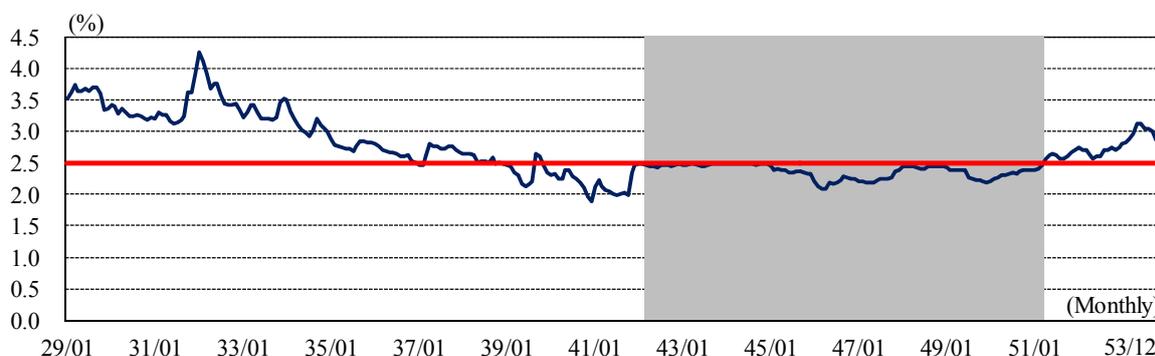
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consumption tax hike before the price stabilization target had been achieved was now making it difficult for Japan to break out of deflation.

2. The Yield Curve Control (YCC) policy—Is it possible to peg long-term interest rates?

Figure 2-1 shows the changes in yields on long-term U.S. treasury bonds over almost a quarter of a century, from 1929, when the Great Depression hit, until 1953, when the Korean War ended in an armistice. The long-term interest rate in the US recorded a high of 4.26% in 1932, and followed a downward trend until the outbreak of World War II in 1939. In 1935, the U.S. Federal Reserve started purchases of long-term treasury bonds as proposed by the U.S. Department of the Treasury to contain any rise in long-term interest rates.

Fig.2-1 Changes in U.S. long-term interest rate (1929-53)



Note: 1. The shadowed area indicates the period FRB capped long-term interest rates at 2.5%.

2. The bold line is upper bound of the long-term interest rates at 2.5%.

Source: Federal Reserve Bank of St. Louis (1943, 1976)

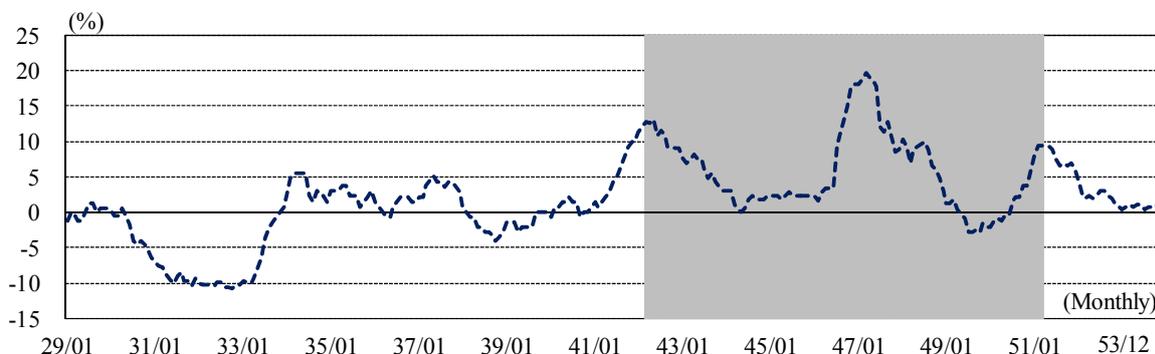
During the period between June 1939 and November 1941, the amount of outstanding debt of the U.S. federal government increased by 33%. The Federal Reserve only purchased treasury bonds from the market in September 1939, when World War II broke out, and in the spring of 1940, when Norway and Denmark were invaded.

In 1942, the Federal Reserve and Department of the Treasury set a ceiling of 2.5% on long-term interest rates and agreed that the Federal Reserve would purchase three-month treasury bills at fixed prices (limited prices) to guide the distribution rate of three-month treasury bills to 0.375%. Thereafter, the policy to cap long-term interest rates and call purchases of treasury bills continued until 1951 and 1947, respectively. This accord is generally considered to have been made based on a strong request to the Federal Reserve from the Treasury Department, with the intention to procure funds for the war from low-cost government bonds.

Figure 2-2 indicates the changes in U.S. inflation rates from 1929 until 1953. The Figure shows that inflation rates surged in 1939 with the outbreak of World War II, in 1946, when the control over wages

and prices conducted after the war was mitigated and around 1950 when the Korean War started.

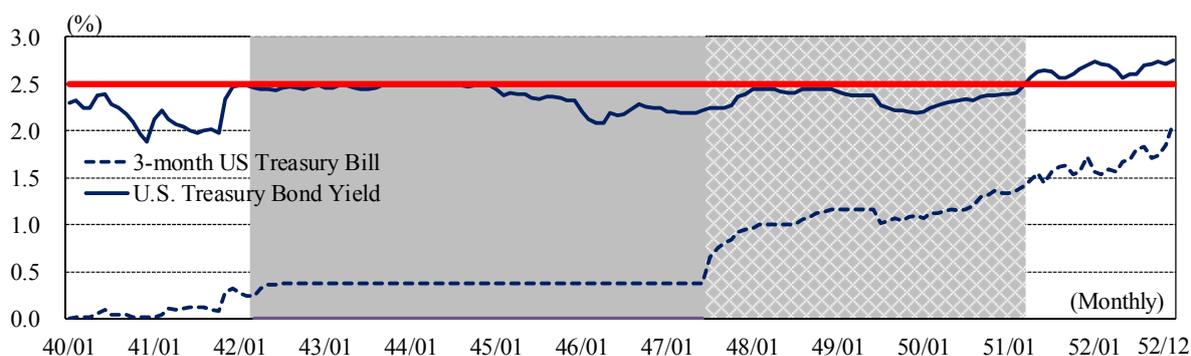
Fig.2-2 Changes in U.S. inflation rate (1929-53)



Note: 1. The inflation rate is the year-on-year rate of change in the consumer price index.
2. The shadowed area indicates the period FRB capped long-term interest rates at 2.5%.
Source: BLS

Figure 2-3 indicates the changes in short- and long-term interest rates in the U.S. from January 1940 until December 1952. Looking at the respective changes in during the period between March 1942 and March 1951, when the Federal Reserve capped long-term interest rates at 2.5%, and the period between March 1942 and July 1947, when the rate on treasury bills was stabilized at 0.375%, it can be seen that the Federal Reserve successfully controlled these interest rates.

Fig.2-3 Changes in U.S. short- and long-term interest rates under the capped- rate policy

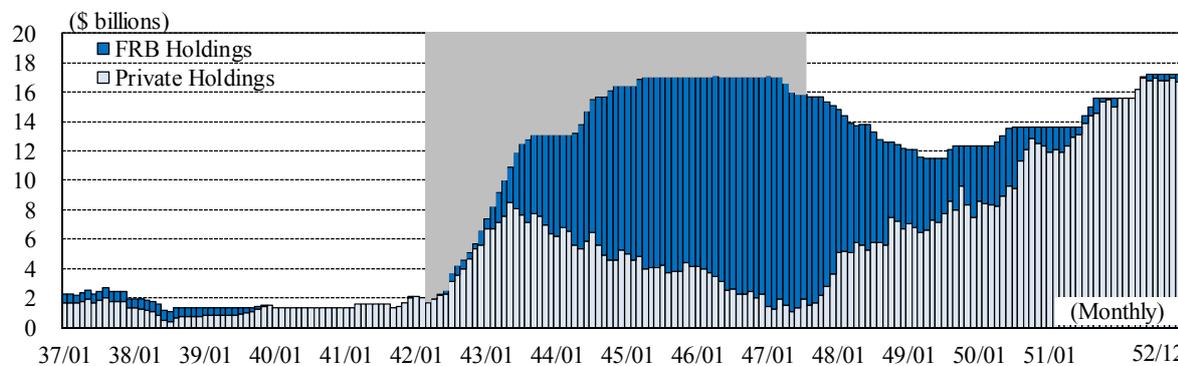


Note: 1. The short-term interest rates is the 3-month US Treasury Bill.
2. The shadowed areas indicate FRB capped short- and long-term interest rates (grey: the period FRB capped 3-month TB rates, grey +checkered: the period FRB capped long-term rates)
3. The bold line is upper bound of the long-term interest rates at 2.5%.
Source: Federal Reserve Bank of St. Louis (1943, 1976)

Figures 2-4 and 2-5 show that, with respect to short-term interest rates, the Federal Reserve pegged the rate on three-month treasury bills at 0.375% through massive purchases of treasury bills and that, with respect to long-term interest rates, the Federal Reserve was able to keep it at or below 2.5% until around 1948 without actively purchasing long-term treasury bonds. As the Federal Reserve also fixed

the Treasury bill rate of between 1942 and 1947, the view that short-term interest rates would likely be maintained at low levels for some time to come prevailed in the market.

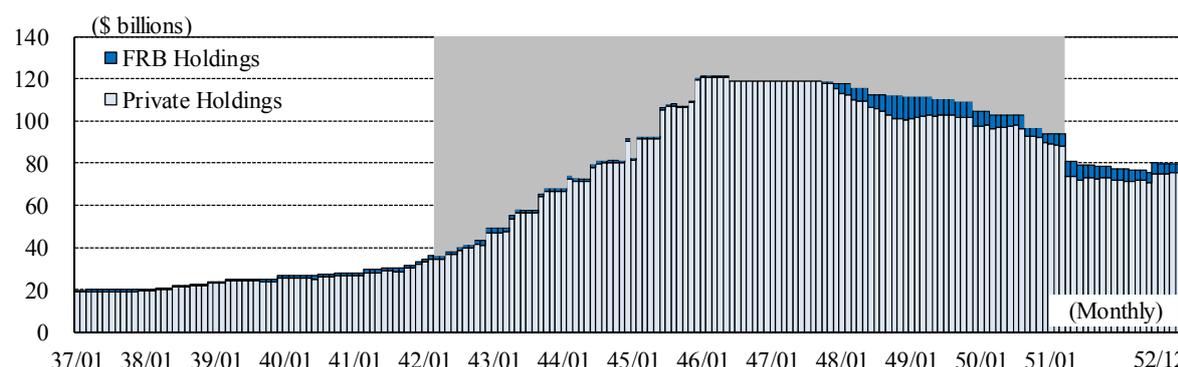
Fig.2-4 Changes in short-term bond holdings by FRB and private banks



Note: The shadowed area indicates the period from March 1942 to July 1947, when FRB capped the short-term interest rates at 0.375%.

Source: Federal Reserve Bank of St. Louis (1943, 1976)

Fig.2-5 Changes in long-term bond holdings by FRB and private banks



Note: The shadowed area indicates the period from March 1942 to March 1951, when FRB capped the long-term interest rates at 2.5%.

Source: Federal Reserve Bank of St. Louis (1943, 1976)

Figure 2-6 summarizes the main events between 1942 and 1951. In March 1951, the U.S. policy of capping long-term interest rates, which had continued since 1942, was terminated with the announcement of the accord between the federal government and the Federal Reserve.

Fig.2-6 Overview of the U.S. policy to cap interest rates (1942-51)

Year	Event
1942	<ul style="list-style-type: none"> ▪ 2.5% cap on the Treasury bond yield ▪ 0.375% peg to the Treasury Bills yield
1945	<ul style="list-style-type: none"> ▪ End of the World War 2
1946	<ul style="list-style-type: none"> ▪ Significant rise in the inflation ratio ▪ Significant rise in the rate on bankers acceptances and commercial paper rates
1947	<ul style="list-style-type: none"> ▪ Abandonment of the TB pegging ▪ Accumulate a large volume of the Treasury bonds (~48)
1950	<ul style="list-style-type: none"> ▪ Start of the Korean war ▪ Significant rise in the inflation ratio ▪ Accumulate a large volume of the Treasury bonds (~51)
1951	<ul style="list-style-type: none"> ▪ Abandonment of the cap on the Treasury bond yield ▪ Released the statement of the Accord ▪ Carry out the bond conversion

Source: FRB (2003) “Targeting Yield Curve: The Experience of the Federal Reserve, 1942-51”

When long-term interest rates started to rise with the termination of the policy to cap the rates, Treasury bond holders suffered from losses (due to decreases in Treasury bond prices). In 1951, almost all Treasury bond holders were, as shown in Figure 2-5, private banks, insurance companies and other financial institutions. Rises in long-term interest rates substantially eroded the Treasury bond holdings of private sector financial institutions, and the U.S. Department of the Treasury underwent a bond conversion to exchange marketable treasury bonds with non-marketable treasury bonds in order to prevent uncertainty toward the financial system. Specifically, the Department of the Treasury sought to avoid the risk of write-offs by converting about 19 billion dollars’ worth of treasury bonds issued in 1945 with a nominal interest rate of 2.5% into non-marketable treasury bonds with a nominal interest rate of 2.75%. The private sector financial institutions that held the non-marketable treasury bonds offered through the bond conversion until maturity and obtained high yields.

Under the unusual circumstances of World War II and the Korean War, the U.S. needed to engage in cheaper debt financing for the war effort. Capping long-term interest rate at 2.5% suggests the possibility that the Federal Reserve, the monetary authority, received a certain request from the Department of the Treasury, the fiscal authority.

In its steps toward overcoming deflation, the BOJ introduced the YCC policy in September 2016. The Bank manages monetary policy independently from the government. However, there is no guarantee that the Bank will not receive a request from the government in perpetuity. The Japanese public debt is well over twice the annual gross domestic product (GDP), at about 233%, significantly higher than the levels of debt to the GDP ratios of other major advanced countries. At the G-20

Summit held in Toronto, Canada, in June 2010, Japan declared its international commitment that it would achieve a surplus in the primary balance, which indicates fiscal soundness, by FY2020. However, the prospect as of March 2017 is that this target is unlikely to be achieved. The low interest rate environment, which leads to the containment of interest costs for government bonds, is preferable for the government. As discussed below in Section 3, if the BOJ suffers from losses when it exits from the so-called new dimension of monetary easing in the future, the government may request the Bank to extend such monetary easing policy by offering financial support to the Bank as security. It would be necessary for the government and the BOJ to make some arrangements concerning losses that would be generated in the exit phase and methods to deal with such losses and provide detailed explanations to the market.

The second point is that the U.S. Federal Reserve was able to keep long-term interest rates from rising without large purchases of long-term treasury bonds during the period between 1942 and 1947, when both long-term interest rates and the rate on treasury bills were fixed. The explanation for this given by the Federal Reserve (in 2003) was that the risk of depreciation of Treasury bond prices assumed by the market became limited as a result of fixing the rate on treasury bills at 0.375%. Under the Yield Curve Control introduced by the BOJ in September 2016, long-term interest rates are set to be maintained at about zero percent and short-term interest rates at negative 0.1%. There is concern that the BOJ will eventually meet its limit in purchasing JGBs. If maintaining short-term unchanged interest for some time would lead to limiting increases in long-term interest rates, it might become a strategy to cope with the limits in purchasing JGBs.

Prior to the introduction of the quantitative easing policy, which was later called QE2, the U.S. Federal Reserve examined the introduction of the policy of targeting market interest rates in the Federal Open Market Committee (FOMC) in October 2010. In this meeting, the modification of the monetary policy framework was discussed under the circumstances where the interest rate reached its zero lower bound (ZLB). Specifically, the agenda included the appropriate policy of targeting interest rates and the contents of additional large-scale asset purchases (LSAP). During the meeting, one of the staff pointed out that if a central bank sets explicit targets for interest rates, it would increase the market's confidence in the future interest rate path and lower the risk premiums. The staff explained that lower risk premiums would spur demand for government bonds and targeted interest rates would be achieved through purchases of government bonds on a smaller scale than LSAP.

In the meeting, the staff submitted three approaches to targeting interest rates. The advantages of the first approach would be that the clarity of targeted rates on government bonds would allow for the accurate management of market expectations and that keeping the economy on track as assumed by the policy makers would lead to a smoother exit. On the other hand, a disadvantage would be a possibility that the policy makers might suffer from losses if the economy recovers earlier than

expected. The advantages of the second approach would be that the central bank would be able to manage its monetary policy appropriately while assessing the impact of the YCC on the economy, which would facilitate a smoother exit. The advantages of the third approach would be that it would make it possible for the central bank to directly stimulate the interest rate that is considered to have a stronger impact on the economy than other interest rates. Furthermore, targeted interest rates could be achieved with fewer purchases of government bonds than LSAP, if this approach is maintained longer than market expectations. On the other hand, the disadvantages would be that the bloated balance sheet would not be reduced for a long time and that a rapid change in market sentiment would force the central bank to make massive purchases of government bonds over short periods.

In the past, the BOJ website showed a statement to the effect that “(Long-term interest rates) depend on forecasts for changes in short-term rates in the future, price fluctuations, revenues from plant and equipment investment using long-term funds, etc.” Accordingly, whether the BOJ can directly set long-term interest rates is controversial.

The BOJ has the risk of being pressured to purchase large amounts of JGBs in short periods of time, depending on interest rate trends. Under the YCC, when yields on 10-year JGB deviate from the target level, the BOJ will conduct unlimited purchases of JGBs with yields designated by the Bank (fixed-rate purchase operations.) If interest rates greatly deviate from the targets, the Bank would be forced to purchase larger amounts of JGBs, which will further increase the size of the balance sheet. There is also a limit to the amount of JGBs that the BOJ can purchase from the market. Regarding this point, Mr. Takahide Kiuchi, Policy Board member of the BOJ, recently reiterated, “When movements of interest rates are dramatic, the purchased amounts of JGBs will need to be increased contrary to the Bank’s expectations and I think this comes at a cost. Considering the fact that there is a limit to purchases of JGBs by the BOJ, or when the market liquidity of JGBs declines with increased purchases by the Bank, there is a possibility that this will result in volatile conditions for the JGB market sometime in the future. Accordingly, I think that increasing the Bank’s JGB purchases has costs.” To avoid the risk of market destabilization and limits of JGB purchases, the BOJ would need to adjust target interest rates ahead of changing economic conditions.

On the other hand, the YCC has the advantage of enabling a central bank to control long-term interest rates directly. In addition, there is a possibility that the explicit targets for interest rates set by the central bank would lower the risk premium, which would enable the central bank to achieve the targeted interest rates through purchases of government bonds in an amount smaller than the amount that the central bank is normally required to purchase. However, whether the BOJ can enjoy these advantages remains a question. This is because the Bank has provided a range, not a specific level, to target yields on 10-year JGBs by indicating about zero percent. It has been pointed out that there is still uncertainty regarding such an approach to indicating targets. In fact, with the rises in long-term

interest rates in the U.S. after Donald Trump won the U.S. presidential elections in November 2016, the widespread perspective was that this would bring about movements in the JGB market in Japan to test the upper limit on long-term interest rates. If the BOJ accepts rises in interest rates, market participants may turn into sellers of JGBs (long term interest rates would rise), based on the view that the BOJ's monetary easing has weakened.

The Monetary Affairs Department and other departments of the BOJ performed an empirical analysis of how long term interest rates have declined due to the massive purchases of JGBs as conducted by the Bank as part of the QQE introduced in April 2013. Factors that are considered to have impacted the changes in long-term interest rates in Japan are (1) the long-term interest rates in the U.S. (long-term interest rates in Japan will rise in conjunction with those in the U.S.), (2) the future outlook of the economic growth rate (when it is expected to rise in the future, long-term interest rates will also rise), (3) the ratio of JGBs held by the BOJ (if the ratio of the Bank's JGB holdings rises due to massive purchases of JGBs, long-term interest rates will fall) and (4) the inflation expectations (if the expected inflation rate rises, nominal long-term interest rates will also rise for a given real interest rate).

The BOJ Monetary Affairs Department reported that during the period between the end of March 2013 and the end of 2014, the outstanding amount of the Bank's long-term JGB holdings increased to 110 trillion yen. This is equivalent to a rise of 19.3 percentage points in the ratio of JGBs held by the Bank, and this reduced the long-term interest rate by 0.8 percentage points. In addition, the BOJ provided an analysis that an increase in the ratio of JGBs held by the Bank by one percentage point will have reduce the long-term interest rate by 0.022 percentage points.

In this analysis, the impact of the BOJ's change in monetary policy from QQE to negative interest rates was also examined. Specifically, dummy variables were added to the estimation to represent the change in the time before and after the adoption of the NIRP, because market sentiment changed significantly with the introduction of the policy.

The estimation results show that the parameter of the yields on U.S. government bonds variable was positive as expected and that statistical significance was achieved. In this analysis, a simulation was performed based on the results of Figure 2-7, excluding expectations for inflation. With respect to the expected real GDP growth variable, the parameter was positive for the entire period and statistical significant, though it was negative for the period after the adoption of QQE. Part of the reason for this could be that people's expectations rose at the beginning of the second Abe administration, while long-term interest rates in Japan were kept low by the BOJ's so-called new dimension of monetary easing.

Fig. 2-7 Estimation results

Explained Variable	JGB yields(10-year,%)					
	total		before QQE		after QQE	
	2009Y10M~2016Y8M		2009Y10M~2013Y3M		2013Y4M~2016Y8M	
The kind of Date	Monthly		Monthly		Monthly	
Explanatory Variable	Coefficient	0	Coefficient	0	Coefficient	0
c	0.356	***	2.808	***	0.955	***
U.S. treasury yields(10-year,%)	0.169	***	0.208	***	0.264	***
expected real GDP growth rates	0.321	**	0.174	-	-0.574	***
BOJ's share of JGB	-0.030	***	-0.388	***	-0.024	***
Dummy Variable(NIRP)	-0.004	-			-0.243	***
Adjusted R-squared	0.932		0.893		0.965	

Note: 1. The result of the statistical significance test for the coefficient of each explanatory variable indicates that asterisks denote statistical significance; namely, *** at 1 percent, ** at 5 percent, and * at 10 percent.
2. We decide to use the results after QQE in below substantiation.

Further, compared to the results of the analysis conducted by the BOJ Monetary Affairs Department shown in Figure 2-8, the coefficient for the ratio of the BOJ's JGB holdings is smaller in the results of this analysis (after the adoption of the QQE) than that in the analysis by the Monetary Affairs Department in terms of absolute value. The coefficient for long-term interest rates in the U.S. is larger in the results of this analysis than in the analysis by the Monetary Affairs Department. This implies, among other things, that in the extraordinarily low interest rate environment, the effect of the BOJ's JGB purchases to reduce long-term interest rates has weakened and that the market is more susceptible to the impact of long-term interest rates in the U.S. In addition, looking at the changes in the coefficient for the ratio of the BOJ's JGB holdings before and after the adoption of the QQE in Figure 2-7, the negative balance in the coefficient shrank from -0.388 to -0.024 after the introduction of the QQE. This shows that the impact of the ratio of the BOJ's JGB holdings on long-term interest rates was reduced after the introduction of the QQE. The remaining area the reduction of long-term interest rates is considered to have become smaller due to the introduction of the QQE, compressed by the JGB's risk premium. In addition, the lower limit of nominal interest rates had been believed to be zero percent prior to the introduction of the negative interest rate policy.

Fig.2-8 Factors affecting the 10-Year Treasury Bond Yield (Japan) - BOJ estimates

Explained Variable				
10 Year Treasury Bond Yield(Japan)				
Preceding Study	BOJ Monetary Affairs Department (2015)		BOJ (2016)	
Estimate period	Oct,2005~Dec,2014		Jan,2005~Jun,2016	
The kind of Date	Quarterly		Monthly	
Explanatory Variable	Coefficient		Coefficient	
c	0.197		0.189	
10 Year Treasury Bond Yield(US)	0.197	***	0.216	***
expected real GDP growth rates(over the next 10 years)	0.422	**	0.387	**
ratio of the Bank's JGB holdings to the total amount outstanding of JGBs	-0.042	***	-0.022	***
Inflation expectations(over the next 10 years)	0.212	*		

Note: 1. Asterisks denote statistical significance; namely, *** at 1 percent, ** at 5 percent, and * at 10 percent.

2. Ratio of the Bank's JGB holdings to the total amount outstanding of JGBs. Figures are calculated taking into account changes in the average remaining maturity of the Bank's amount outstanding of JGBs (excluding floating-rate JGBs and inflation-indexed JGBs).

Source: BOJ Monetary Affairs Department (2015), BOJ (2016)

How should the BOJ raise the percentage of JGBs held by 4.17 percentage points? It should either change the balance of JGBs held [Case 1], prolong the average remaining maturity of JGBs held [Case 2], or a combination of the two. First, we will look at the situation before the YCC was introduced.

As of the end of August 2016, the amount of JGBs held by the BOJ was 330.8 trillion yen, the average remaining maturity of such JGBs was 7.3 years, the total amount of JGBs issued by the government was 822.6 trillion yen, and the average remaining maturity of all JGBs issued was 8.2 years. Based on the formula (1), the percentage of JGBs held by the BOJ is 36.2%. In order for the BOJ to lower the long-term interest rate by 0.1 percentage points, it is estimated that the BOJ needs to increase JGB purchases to boost the amount of JGBs held by 41.6 trillion yen on a net basis, or purchase JGBs so that the average remaining maturity of JGBs held by the Bank will be prolonged by 0.9 years. It is possible that the BOJ will in fact lower the long-term interest rate by increasing the amount of JGB purchases while prolonging the average remaining maturity of JGBs held by the Bank, a combination of Cases 1 and 2.

3. Central bank losses —Massive purchases of government bonds and balance sheet expansion

Immediately after the introduction of the negative interest rate policy, the BOJ increased JGB purchases at a negative yield (at a high price). Therefore, there was concern that the losses of the BOJ would increase. In addition, the BOJ turned its attention in its monetary policy operation from quantity to interest rates, but it continues to purchase a huge amount of JGBs. In addition to the risk of the future loss associated with the BOJ's expanding balance sheet, there is a different risk that the BOJ will reach the limit of JGB purchases. Below, we will discuss the impact that the JGB purchases will

have on the settlement of accounts of the BOJ in the future by looking at the situation of the BOJ's JGB purchases after the introduction of the negative interest rate policy.

The BOJ publishes the "Money Market Operations Conducted by the BOJ" three times a month and discloses the issues (numbers) and the amount outstanding of JGBs held by the BOJ. In our estimate, we assume that such issues whose outstanding amount increased from the latest published document were purchased by the BOJ during this period. For example, comparing the outstanding amount on January 10, 2017, with that on January 20, 2017, we will identify which issues the BOJ has purchased in its operation from January 11 to January 20. Then we will use the results of the operation published by the BOJ. Figure 3-1 shows the extracted and reprocessed data from some of the materials published by the BOJ.

Fig. 3-1 Money Market Operations Conducted by the BOJ

Money Market Operations Conducted by the Bank of Japan (December 2016)(2)

January 11, 2017
Bank of Japan
Financial Markets Department

**Outright Purchases of JGBs, Outright Purchases/Sales of Treasury Discount Bills,
Outright Purchases of Corporate Bonds, Outright Purchases of CP, Purchases of ETFs,
and Purchases of J-REITs**

(100 million yen, percent per annum, percent)

① Date of Offer	② Instrument	③ Date of Exercise	④			⑤		Allocation on a Pro-rata Basis Rate
			(a) Amounts Offered	Amounts of Competitive Bid	Amounts of Successful Bid	(b) Pro-rata or Non-pro-rata Yield Spread (Price Spread)	Average Successful Yield Spread (Price Spread)	
12/29	Outright Purchases of JGBs (1-3)	1/4	4,000	7,523	4,004	-0.007	-0.005	62.1
29	Outright Purchases of JGBs (3-5)	1/4	4,200	11,733	4,204	-0.010	-0.009	86.1
29	Outright Purchases of JGBs (5-10)	1/4	4,100	13,909	4,106	-0.010	-0.008	26.3

Money Market Operations Conducted by the Bank of Japan (January 2017)(2)

February 7, 2017
Bank of Japan
Financial Markets Department

**Outright Purchases of JGBs, Outright Purchases/Sales of Treasury Discount Bills,
Outright Purchases of Corporate Bonds, Outright Purchases of CP, Purchases of ETFs,
and Purchases of J-REITs**

(100 million yen, percent per annum, percent)

① Date of Offer	② Instrument	③ Date of Exercise	④			⑤		Allocation on a Pro-rata Basis Rate
			(a) Amounts Offered	Amounts of Competitive Bid	Amounts of Successful Bid	(b) Pro-rata or Non-pro-rata Yield Spread (Price Spread)	Average Successful Yield Spread (Price Spread)	
1/4	Outright Purchases of JGBs (1-3)	1/6	4,000	7,982	4,001	-0.010	-0.006	79.6
4	Outright Purchases of JGBs (3-5)	1/6	4,200	12,451	4,204	0.006	0.007	46.2
4	Outright Purchases of JGBs (10-25)	1/6	1,900	4,752	1,906	0.015	0.018	8.8
4	Outright Purchases of JGBs (25-)	1/6	1,100	3,990	1,105	0.015	0.016	67.8
6	Outright Purchases of JGBs (0-1)	1/11	700	1,903	701	-0.015	-0.003	5.9
6	Outright Purchases of JGBs (5-10)	1/11	4,100	12,288	4,109	-0.005	-0.004	67.6

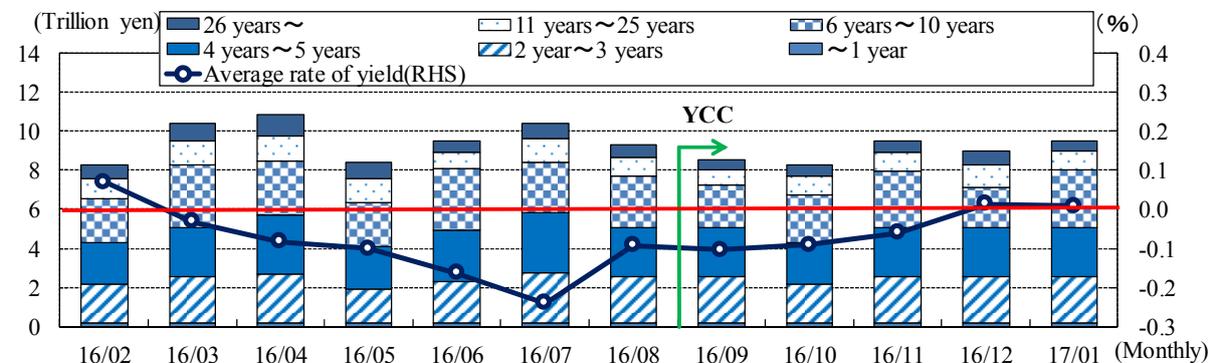
Source: BOJ

With respect to the purchase of long-term JGBs, the BOJ publishes information on the purchase of

eight kinds of JGBs, including floating rate JGBs and inflation-indexed JGBs, in addition to fixed rate JGBs, which are classified according to the remaining maturity. Our analysis in this report does not cover floating rate JGBs and inflation-indexed JGBs whose yields change during the holding period in order to take a closer look at interest income and the amount of adjusted interest in the future. The average auction-clearing yield (price) spread means the difference between the yield of JGBs purchased by the BOJ from financial institutions, etc. and the yield that the BOJ assumed in advance based on the prevailing market rates. If the yield spread is positive, it shows that the BOJ purchased JGBs at a higher yield (lower price) than it assumed. To the contrary, if it is negative, it shows that BOJ purchased JGBs at a lower yield (higher price) than it assumed. The yields (prices) that the BOJ determines with consideration for market price appear to mean the Reference Statistical Prices [Yields] for OTC Bond Transactions published by the Japan Securities Dealers Association. By referring to this, we use the Reference Statistical Prices [Yields] for OTC Bond Transactions published by the Japan Securities Dealers Association on the date of offer for yields assumed by the BOJ in our estimate.

Figure 3-2 shows the results of repeatedly applying the above procedure to all operations from February 2016, when the negative interest rate policy was introduced, to January 2017, when the most recent operation was conducted. Since February 2016, when the negative interest rate policy was introduced, the average auction-clearing yield has declined significantly and fell below -0.2% in July 2016. The average auction-clearing yield turned up in December 2016, because long-term interest rates rose in Japan following the introduction of YCC in September 2016, and interest rates rose in the United States before and after the presidential election. Meanwhile, the amount of JGB purchases has not changed significantly even after the introduction of YCC. The quantity (limit of JGB purchases) problem still exists.

Fig. 3-2 Amount of BOJ's JGB Purchases and Average rate of yield



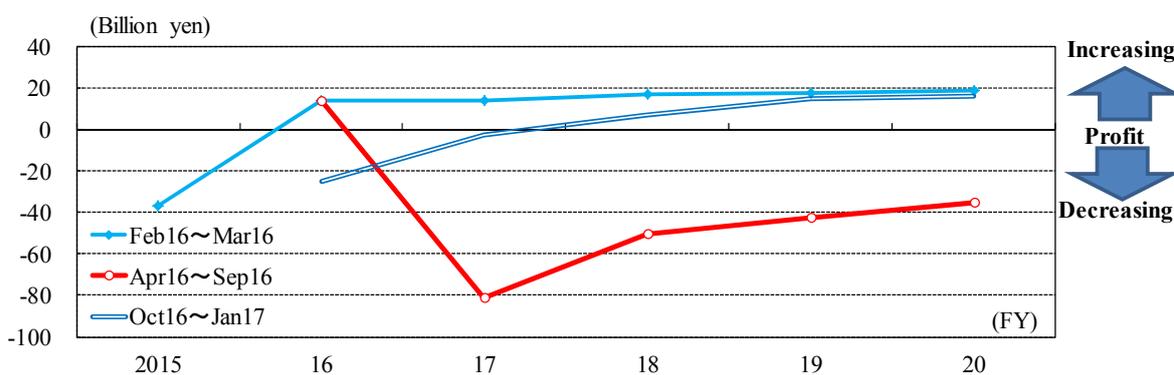
Note: Data excludes Floating-rate JGBs and Inflation indexed bonds.

Source: BOJ, Japan Securities Dealers Association

BOJ Board member Takahide Kiuchi said, “It is uncertain whether JGB purchases will decline at a fast enough pace to increase the sustainability of JGB purchases in the future, and I think, to the contrary, that there is a risk that the BOJ will be forced to further accelerate the pace of JGB purchases.” At the end of January, the JGB purchase operations declined to a lower level than the market expected and interest rates rose temporarily, reflecting the speculation that the balance of supply and demand would worsen. At the end of February, the BOJ published the dates of JGB purchases in March for the first time in order to ease market concerns about the declining number JGB purchase operations.

Figure 3-3 is the summary of the total of the amount of interest income and the amount of adjusted interest estimated for each issue in each fiscal year. To take a closer look at the impact of the negative interest rate policy on the settlement of accounts of the BOJ, the figure covers JGBs newly purchased from February 2016, when the negative interest rate policy was introduced, to January 2017, when the most recent operation was conducted. For JGBs with the particularly low average auction-clearing yield purchased in the first half of FY2016, a loss of some 80 billion yen and about 40 billion yen will be generated in FY2017 and FY2020, respectively. The BOJ purchased a large amount of JGBs at a positive interest rate in the past, and the interest on JGBs (calculated by subtracting the amount of adjusted interest from the amount of interest income) in FY2015 was approximately 1.3 trillion yen. High-yield JGBs will gradually mature in the years ahead. Long-term interest rates are currently at a positive level following the rising long-term interest rates in the United States. However, if the situation that the level of interest rates declines significantly, it could have a negative impact on the financial standing of the BOJ.

Fig. 3-3 Profits and Losses Generated by BOJ’s JGB Purchases during Feb16~Jan17



Note: Data excludes Floating-rate JGBs and Inflation indexed bonds.

Source: BOJ, Japan Securities Dealers Association

In addition to falling interest rates, lower share prices and the appreciation of the yen will also cast a negative shadow on the financial standing of the BOJ. Figure 3-4 is an estimate of valuation losses

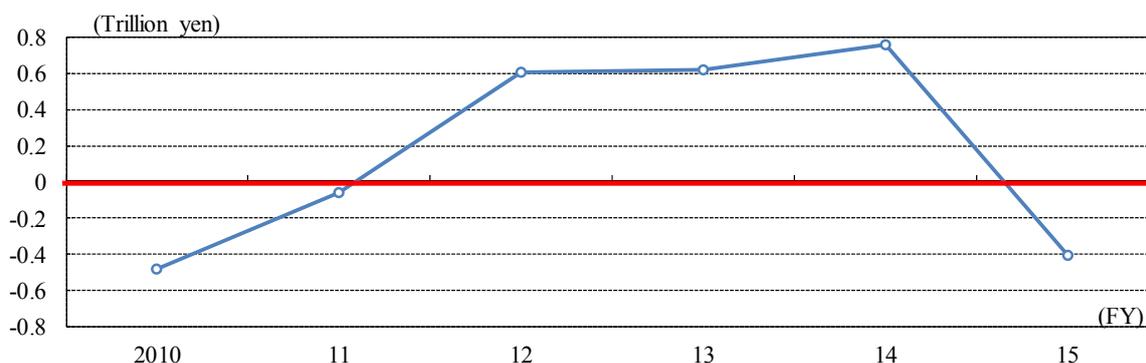
and gains that will arise when the share prices of ETFs held by the BOJ fall. The result shows that if the share prices falls 30% from the level at the end of January 2017, a valuation loss of about 1.7 trillion yen will be generated. In addition, the BOJ’s ETF purchases contain the risk that the liquidity of individual stocks will decline, as pointed out in the report above. If this occurs beyond a certain level, the possibility that the range of fluctuation of share prices will be larger cannot be denied. If the BOJ continues to purchase ETFs at a pace of six trillion yen a year going forward, the risk will increase. Figure 3-5 shows changes in foreign exchange losses and gains of the BOJ at the time of the settlement of accounts. In the past, a loss of more than 400 billion yen was generated in a phase where exchange rates move strongly toward the stronger yen. If the stronger yen and lower share prices take place at the same time, there is a risk that they will significantly damage the financial standing of the BOJ.

Fig. 3-4 Simulation Result in the Case of Market Prices Fall

	(Yen, Points)			(Billion yen)							
	Market Prices			Valuation at Market Prices				Valuation Gain or Loss			
	Nikkei 225	TOPIX	JPX-Nikkei 400	Nikkei 225	TOPIX	JPX-Nikkei 400	Total	Nikkei 225	TOPIX	JPX-Nikkei 400	Total
As of Jan 31, 2017	19,041	1,522	13,642	7,319	6,899	314	14,532	1,482	1,170	18	2,670
Case 1 20% Fall in Market Prices	15,233	1,217	10,914	5,855	5,519	251	11,626	18	-210	-45	-236
Case 2 30% Fall in Market Prices	13,329	1,065	9,550	5,124	4,830	220	10,173	-714	-900	-76	-1,689

Source: BOJ, NEEDS-FinancialQUEST

Fig. 3-5 Amount of BOJ’s Foreign exchange gains and losses



Source: BOJ

4. Limitations of Monetary Policy and the Fiscal Theory of the Price Level (FTPL)—Can FTPL be a means of escaping deflation?

Because the BOJ has practically pegged long-term interest rates under YCC since September 2016, the Bank is forced to increase JGB purchases by conducting fixed-rate operations if the yield of 10-year JGBs rose significantly above zero percent. However, as the Financial Research Team of the Japan Center for Economic Research has pointed out, the BOJ’s JGB purchases could reach the limit

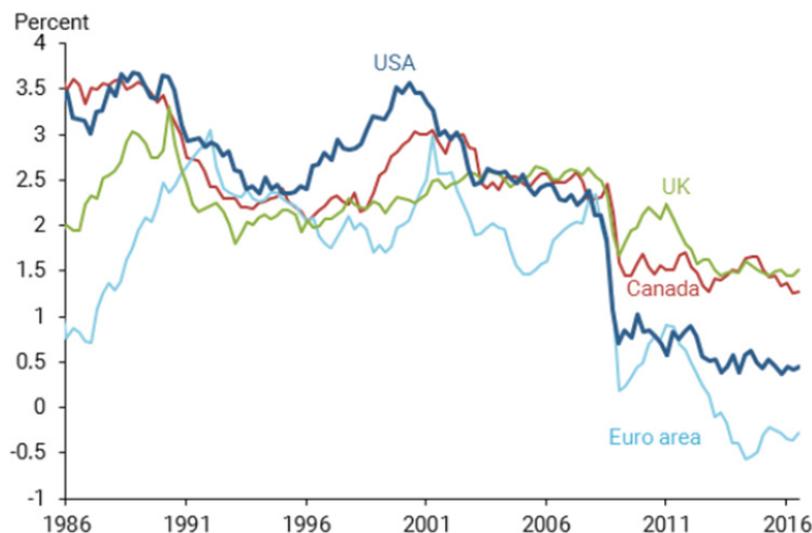
eventually. This is because financial institutions have a compelling reason of not wanting to give away any more JGBs for the management of collateral necessary for their fund transactions. In addition, even if the BOJ wants to lower negative short-term interest rates, it is believed that there is a limit on deepening them further into negative territory, because of the existence of cash with a zero interest rate. There is the possibility that a shift to cash will happen, depending on the degree of negative interest rates. Consumer prices, excluding fresh food (CPI core), turned positive, rising 0.1% year on year, in January 2017 for the first time in 13 months, but the achievement of the inflation target of two percent is still only half-way through. It is increasingly difficult to predict what policy measures the BOJ will take the next, given that the limit is being approached in expanding quantity and further deepening negative interest rates.

The precipitating factor in sparking interest in FTPL recently was a symposium held in April 2016 at the Becker Friedman Institute of the University of Chicago. Called “Next Steps for the Fiscal Theory of the Price Level,” the symposium was attended by FTPL specialists such as John H. Cochrane of Stanford University, Eric Leeper of Indiana University and Christopher Sims of Princeton University, as well as central bank officials such as San Francisco Federal Reserve Bank President John Williams and former Minneapolis Federal Reserve Bank President Narayana Kocherlakota. At the symposium, Professor Sims argued that, as the nominal interest rate approaches the zero lower bound, the phase of monetary policy changes, and FTPL considerations become important. When Sims presented his lecture during lunch at the Jackson Hole symposium about five months later at the end of August, he explained the FTPL mechanism without using a single equation. With respect to Japan, he observed that “a substantial increase in the consumption tax was introduced before the inflation target was reached,” and went on to say, “What is required is that fiscal policy be seen as aimed at increasing the inflation rate, with monetary and fiscal policy coordinated on this objective.” In this way, he stressed the importance of linking the scheduled October, 2019 consumption tax hike with the inflation rate targeting policy.

With reference to the analysis by San Francisco Fed President John Williams and others who showed that the natural rate of interest is declining in Europe, Marianne Nessén, Head of the Monetary Policy Department, Sveriges Riksbank of Sweden, expressed the view that “first-best policies do not lie with monetary policy, but with policies that will improve future growth prospects.” (Figure 4-1) The natural rate of interest, which brings savings and investment into balance, is the real rate of return compatible with the actual strength of the economy (and is conceptually close to the economy’s potential growth rate). When the nominal interest rate approaches the zero lower bound and the inflation rate turns negative, the real interest rate (i.e., the nominal interest rate minus the expected rate of inflation) remains in positive territory. Escaping from deflation would require using monetary policy to guide the real interest rate lower than the natural rate, thus producing a

liquidity-easing environment. But if there is little leeway to cut the nominal interest rate because rates are already so low or negative, it is difficult for monetary policy to guide the real interest rate below a negative natural rate of interest. The natural rate of interest in Japan has been negative since the end of the 1990s, with Japan falling into secular stagnation, but the natural rate of interest has recently been observed to fall in Europe and the United States as well. In the Eurozone in particular, the natural rate of interest has turned negative in the wake of the European sovereign debt crisis with no sign of a turnaround. Since the natural rate of interest can be negative for an extended time during a period of secular stagnation, it is thought that the effectiveness of monetary policy is limited. Shinichi Uchida, former General-Director of the BOJ's Monetary Affairs Department (now Branch Manager of the BOJ's Nagoya Branch), made a speech in Tokyo in February 2017 in which he stated that central banks are discussing the possibility of raising the present inflation target to 3%, but under present conditions, in which they are unable to achieve a target of 2%, raising the target would likely be very difficult. These circumstances are partly responsible for the focus of attention on FTPL, according to which it is possible to break out of deflation using fiscal policy.

Fig. 4-1 Natural interest rates are also declining in Europe



Source: John C. Williams “Three Questions on R-star” FRBSF Economic Letter, February 21, 2017

Since around autumn 2016, FTPL has enjoyed a wave of popularity in Japan as the “Sims theory.” The person who initiated this was Koichi Hamada, Special Advisor to the Cabinet. Hamada said that he was quite shocked upon reading Sims’ presentation entitled “Fiscal Policy, Monetary Policy and Central Bank Independence,” in which FTPL was presented as a new macroeconomic theory rather than orthodoxy. With regard to the outright purchase of Japanese Government Bonds (JGBs) by the BOJ (quantitative easing) when interest rates are extremely low, Hamada pointed out that quantitative

easing, which is effective from the standpoint of monetarism, is mostly ineffective in creating demand from the perspective of FTPL because the quantity of the assets held by the private sector does not change. Thus if quantitative easing and the negative interest rate policy fail to function adequately it is owing to insufficient support on the fiscal side. Hamada’s prescription for the Japanese economy, which faces such daunting problems, is to “leave the consumption tax rate for the following fiscal year unchanged if the price level target of 2% (or the BOJ’s targeted inflation trend of 1.5%) cannot be achieved. The consumption tax rate can then be raised in 1% increments in fiscal years immediately following years in which the inflation targets have been achieved. This would be continued even after the consumption tax rate exceeds 10%.” Hamada subsequently referred to Sims’ theory in an interview with the Nihon Keizai Shimbun and in a paper submitted to the magazine Bungei Shunshu, saying that “everything became clear. QQE failed to work and generate inflation because it wasn’t conducted in tandem with fiscal policy.”

In contrast with the monetarists’ quantity theory of money, which argues that it is the supply of money as set by monetary policy that determines the price level, FTPL argues that it is the size of the consolidated government debt as set by fiscal policy that determines the price level. Summarized below, is the thinking underlying FTPL with reference to sources such as Kimura (2002) and Watanabe and Iwamura (2004). The private sector, the government sector and the central bank each has their own budget constraint, which limits their actions, and each year they act in a way to ensure that these constraints are observed. This is unrelated to the price level but means that economic activity, such as consumption and investment, is conducted within budgetary bounds.

<Intertemporal budget constraint of private sector>

Formula (1) indicates intertemporal budget constraint of the private sector. The left-hand side of formula (1) is the total amount of money that the private sector can spend now and in the future. The right-hand side describes the use of money. Since rational consumers try to wipe out all their savings, the equality in formula (1) becomes true at any time. The condition is known as “transversality condition”.

$$\begin{aligned}
 & \frac{\text{private holdings of government debt and money}}{\text{price level}} + \text{the present value of real income} \\
 = & \text{the present value of real taxes and net social security contributions} \\
 & + \text{the present value of an opportunity cost of holding cash} \\
 & + \text{the present value of real consumption} \dots\dots\dots(1)
 \end{aligned}$$

<Transversality condition>

Transversality condition can be described as follows.

$$\lim_{n \rightarrow \infty} \frac{1}{(1+R)^n} \frac{B_n + MB_n}{P_n} = 0$$

R : real interest rate , B_n : outstanding of government bond at the end of the period n ,
 MB_n : monetary base at the end of the period n P_n : general price level
(2)

<Intertemporal budget constraint of the consolidated government>

Formula (3) shows intertemporal budget constraint of the consolidated government which connects the government with the central bank. The left-hand side of formula (3) shows the total amount of debt in real terms to be paid back by the consolidated government in the future, while the right-hand side is the present value of the resource for reimbursement payment. Government bonds are considered as asset for the private sector, whereas they are liabilities for the government. The government must pay off all the debt they owe to the private sector and in this sense formula (3) could be treated as the solvency condition for the government.

private holdings of government debt and monetary base

Price level

= the present value of real future primary surpluses + seigniorage
(3)

Based on the premise that the solvency condition must in any case be satisfied, an important point in FTPL is the question of who acts to ensure that the government’s solvency condition is met. If the fiscal authorities were to cause the discounted present value of the fiscal surplus to change, the FTPL says that the price level will change so that the solvency condition will remain satisfied. If the government were to cut taxes, for example, the discounted present value of the fiscal surplus would shrink, making the left side of formula (3) greater than the right side. However, since the real assets of the private sector would increase with a tax cut, the wealth effect (the Pigou effect) would operate, leading the private sector to increase consumption. Under these circumstances, if the supply of goods is steady, excess demand would arise, pushing up prices and, as a result, the price level would adjust such that both sides of formula (3) would be equal. Under this transmission mechanism, monetary policy does not contribute to the increase in prices. For this reason, FTPL argues that the price level is set through fiscal policy.

This does not mean that FTPL is always effective. By coordinating the policy stance of the government with that of the central bank, the impact on the economy and prices will be different. A few cases are considered below, with reference to sources such as Leeper(1991), Kimura (2002) and Watanabe and Iwamura (2004) (Figure 4-2). Firstly, the government’s policy stance may be Ricardian or non-Ricardian. A government adopting a Ricardian policy stance would act in a manner that satisfied its own solvency condition. In contrast, a government adopting a non-Ricardian policy stance

would conduct fiscal policy without regard to its solvency condition. A government that continued with an expansionary fiscal policy while knowing that it will have no funding source to repay the debt would be classified as non-Ricardian. Kimura (2002) also refers to a Ricardian government as a “Follower” and to a non-Ricardian government as a “Leader.” According to Woodford (1995), FTPL operates when the government is non-Ricardian.

Fig. 4-2 The regime of Government and Central bank – Leader or Follower?

		Central Bank	
		Leader (Active Model) Central bank decides the amount of money (rate) for not meeting the solvency condition but the stability of prices.	Follower (Passive Model) Central bank decides the amount of money to meet the solvency condition.
Government	Leader (Non Ricardian Model) Government decides government net debt without thinking about the amount of money (rate).	<Case1> Private sector decide their expenditure to meet the solvency condition. Price Determinate but Explode	<Case3> Central bank decides the amount of money to meet the solvency condition. Price Determinate <Fiscal Dominance>
	Follower (Ricardian Model) Government decides government net debt to meet the solvency condition in any economic situation.	<Case2> Government strives to meet the solvency condition by changing government's net debt. Price Determinate <Monetary Dominance>	<Case4> Both Government and Central bank work for meeting the solvency condition. Price Indeterminate

Note: Case 3 is considered the current situation in Japan.

Source: Kimura (2002), Watanabe and Iwamura (2004)

With regard to the policy stance of the central bank, meanwhile, a central bank which conducts policy in order to achieve a price target it has set itself is defined as a “Leader” (or active) while one which does not is a “Follower” (or passive). Particularly when the central bank is the Follower, FTPL argues that it should not act to achieve the price stability target but to adjust the money supply to satisfy the government’s solvency condition.

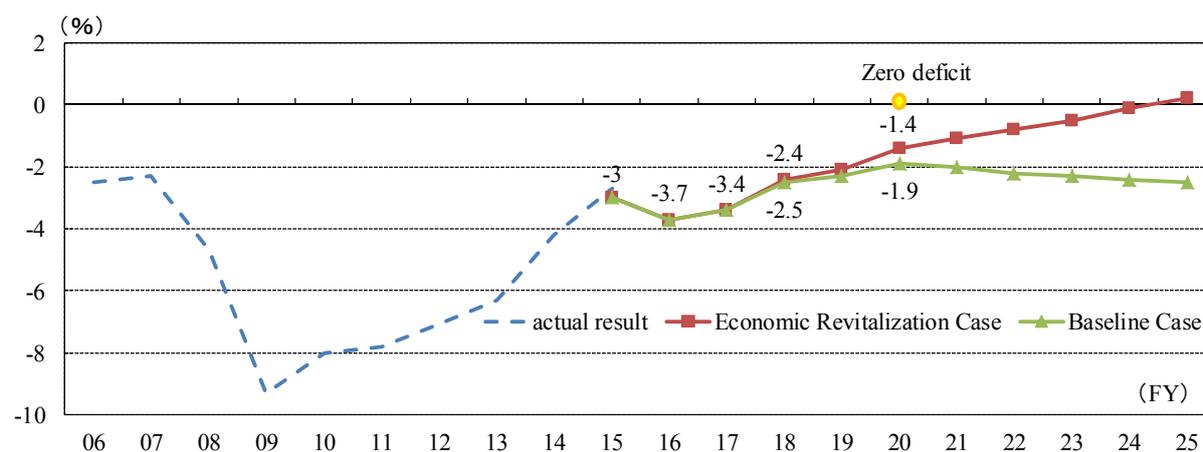
With reference to these classifications in FTPL, Watanabe (2017) states that, with reference to the policy mix for stabilizing the economy through an adroit combination of monetary and fiscal policy, the nature of the explanation differs considerably from before.

Watanabe argues that Japan’s situation from 2012 through 2017 is an example of case 2 (in which monetary policy is the Leader and fiscal policy the Follower). He cites two reasons for this. First, the consumption tax was raised under the second Abe Cabinet, so the government’s approach cannot be described as non-Ricardian. Second, quantitative easing in monetary policy boosted the nominal price of Japanese Government Securities. Saito (2017) states that although FTPL assumes that an increase in the government liabilities (or assets) leads to an increase in consumption and in turn causes the price level to rise, the wealth effect would likely fail to function because Japanese households hold

very little government debt. Moreover, he also points out that Japanese households are becoming increasingly Ricardian, pointing out that they are stressing the present more than the future. Thus the more the government rolls back fiscal rebalancing, he argues, the larger will be the negative influence caused by fiscal stringency.

One condition required for FTPL to function is that the government must be non-Ricardian, but are the Japanese fiscal authorities acting to satisfy the solvency condition? The Japanese government has set the goal of achieving a surplus in the primary balance by FY2020. According to the “Projections for Medium to Long Term Analysis” which the Cabinet Office submitted to the Council on Economic and Fiscal Policy in January 2017, Japan’s primary deficit will be a projected 8.3 trillion yen in FY2020, even if the consumption tax is raised in October 2019 as scheduled. This means that it would be nearly impossible for a surplus to be achieved (Figure 4-3). Despite having emphasized the target of achieving a surplus in the primary balance by FY2020, Prime Minister Abe did not mention it in his policy speech of last January, leading to speculation that he may have lowered the target.

Fig. 4-3 Primary Deficit of Central and Local Governments (Ratio to GDP)



Note: We used the date Esri, Annual Report in National Accounts for 2015 (Benchmark Year Revision of 2011) Summary (Flow Accounts) for actual result.

Source: MOF, Economic and Fiscal Projections for Medium to Long Term Analysis

Experts such as Sims have now emerged saying that it might be preferable not to implement a consumption tax hike until the 2% price stability target is achieved. It is also possible to think that the government is not formulating any policy such as tax increases or fiscal stringency to cope with the reduction in the discounted present value of future financial surpluses. If people believe that the government is acting without regard to the solvency condition, then at least on the surface the conditions would be in place in Japan for the FTPL to function.

If we consider the BOJ’s monetary policy stance within the framework of FTPL, it is possible that a major regime change took place in September 2016 with the adoption of the Yield Curve Control.

Under the zero interest rate policy, it is hard to say that the BOJ conducted monetary policy in tandem with changes in the economic environment. Rather, it could be said that the conduct of monetary policy was passive. Under the unconventional monetary policies that followed the zero interest rate policy, including quantitative easing (QE), comprehensive easing, quantitative and qualitative monetary easing (QQE), and the negative interest rate policy, the BOJ acted as Leader with a policy that set targets for current deposit account balances or the “quantity” of the monetary base. In this sense, it is possible to classify the unconventional monetary policies from quantitative easing through the negative interest rate policy as active.

When the outstanding volume of JGBs rises, the monetary base rises only to an equivalent extent, so the central bank is no longer the active source supplying the monetary base. In other words, since the time of quantitative easing, the BOJ, which as Leader had itself been setting the target for the increase in the monetary base, became Follower by adopting the Yield Curve Control and instituting a fixed level for long-term yields. Since the government is viewed as non-Ricardian (Figure 4-2), Japan has moved to Case 3, meaning that in the FTPL framework the price level may have shifted to a rising phase.

In February 2016, Sims stated that Japan could break out of deflation if the government made it known that it would postpone increasing the consumption tax until the inflation target of 2% was achieved. He states that, given uneasiness over the future on the part of the national, private consumption is sluggish and the price level fails to rise, so until the inflation target is achieved, it is necessary for the government to halt any increases in the consumption tax and make it known that it would allow a portion of government liabilities to be repaid through inflation. By making this known, the price of JGBs would fall with the emergence of inflation, and in anticipation of that, people would reduce their holdings of JGBs, which would lead them to act to increase their consumption to the same extent. If the government acts on fiscal rebalancing only after achieving the inflation target, he believes, hyperinflation can be averted. What is important, Sims believes, is that Japanese politicians be bold in stating that inflation will occur and make it possible for business firms and consumers to prepare for it.

In Japan, which has been mired in a period of secular stagnation with a negative natural rate of interest over the long term, it is already nearly impossible for monetary policy to influence the natural rate of interest. Since around the time the BOJ instituted the negative interest rate policy, monetary policy began to lose its effectiveness, leading to increased interest in FTPL as the next possible option. Krugman (1998) has already stated that, in order to heighten people’s expectations, the central bank needed to become irresponsible. In contrast, advocates of FTPL believe that the fiscal authorities must at certain times become irresponsible. Both Krugman and Sims assume that the policy authorities make promises about the distant future and that the public has faith in those promises.

FTPL envisions the government as the Leader in the effort to influence the price level, and one method by which the central bank may act in order to achieve price stability targets is “helicopter money.” According to the Nobel Prize winning economist Milton Friedman, this amounts to financing temporary fiscal transfers with the permanent monetary base. Iwata et al (2016) summarize helicopter money dropped by the central bank, acting as Leader, as a policy under which the central bank, by reducing its own equity capital, increases bank reserves. They use the language of former Federal Reserve Board Chairman Ben Bernanke in describing it as fiscal policy financed by money from the central bank. The difference between FTPL and helicopter money is that FTPL reduces the discounted present value of the fiscal surplus while helicopter money reduces the discounted present value of seigniorage. Helicopter money is fiscal expansion affected by rolling forward seigniorage arising in the future.

In the recent book “Between Debt and the Devil”, Adair Turner, former chair of Britain’s Financial Services Authority, stated that the cause of secular stagnation is excess debt arising from a bloated financial sector. He goes on to argue that the stimulation of demand will require helicopter money, which replaces government bonds with the non-interest-bearing liabilities of the central bank. By replacing government bonds with the non-interest-bearing liabilities of the central bank in this way, the government’s repayment of interest and principal would be reduced, and as a result, the fiscal authorities to that extent would not need to reduce the future fiscal surplus. In essence, this may be seen as a policy of fiscal supplementation.

We will soon be entering the fifth year of the BOJ’s unconventional monetary easing policies. Already a growing number of observers are saying that monetary policy alone cannot change the public’s expectations. It is also possible that the BOJ has now switched to the position of Follower by adopting the Yield Curve Control. Under these circumstances, it seems necessary for the government to set the same targets and conduct fiscal policy in a more active way.

If we assume that an FTPL strategy for getting out of deflation can be worked out under the leadership of the government, either (1) the maturity structure of government liabilities would be shortened along the lines advocated by Cochrane (2001) or (2) a policy would be called for to reduce the future fiscal surplus. What is important, however, is changing the expectations of the public. Observers have pointed out that consumption has remained sluggish due to the public’s anxieties about the future, so one has to wonder whether people will actually believe the government even if it claims that it will postpone reduction of the fiscal deficit until the 2% price stability target is achieved and afterwards maintain fiscal discipline. In Japan, the intertemporal Pigou effect has always been small, so we need to consider whether deflation can be overcome solely through FTPL.

We also need to consider the problem of the Fiscal Multiplier, which involves the issue of what sort of fiscal policy would be desirable. Kato (2003) has touched on the fact that in Japan the fiscal

multiplier has remained below zero for some time, and it is generally known that the fiscal multiplier is higher when subject to the zero lower bound than when not subject to it, while Hills and Nakata (2014) show that, even if the lag in monetary policy is taken into consideration, the fiscal multiplier exceeds one under the zero lower bound.

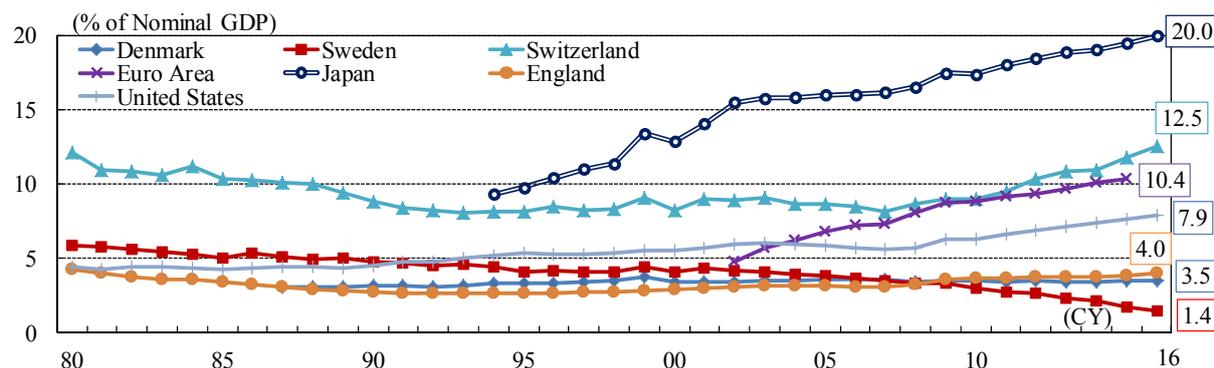
Even if Japan experiences a robust fiscal expansion based on FTPL, is it possible to safely dismiss expectations of a future tax increase? Moreover, if the government were to declare that it will not raise taxes, would the public remain unconcerned about the possibility of hyperinflation? As Konishi (2016) point out, doubts remain about whether inflation would be supported in Japan, which is increasingly becoming a “silver democracy.” The problem is how to change people’s expectations and how to make them believe.

5. Toward a cashless society — Considering central bank digital currencies

Virtual currency technologies including Bitcoin and new finance technologies are getting more attention than ever. In Japan, public transport IC cards and rechargeable smart cards are widely used at train stations and convenience stores. The use of Bitcoin, the online virtual currency, is also rising. As of the end of 2016, Bitcoin was accepted at 4200 stores in Japan, which is a 4.5 times increase in one year. During 2017, “ResuPress” (currently known as “Coincheck”), the company that manages the virtual currency exchange in Japan, aims to increase the number of stores where you can pay with virtual currency to twenty thousand. In 2016, Mitsubishi UFJ Financial Group announced that they would issue their own virtual currency for the public as of FY2017. The concept is to fix the value of one MUFG Coin, the new virtual currency, at one yen. As well as facilitating transfers 24 hours a day 365 days a year, the bank will also arrange a system for exchanging the currency for cash or convenience store points.

However, initiatives to implement the cashless society in Japan are lagging behind when compared to the Scandinavian countries or Britain. Looking at the ratio of outstanding cash in circulation to nominal GDP in the countries listed in Figure 5-1, the ratio for Japan is far higher than other countries, rising continually since the mid-1990s and reaching 20% of GDP in 2016. There is a tendency for people in Japan to favor cash and to use bank notes for important ceremonial occasions within the family relationships. In addition, the cost of retaining cash has declined because of the prolonged hyper-low interest rates in recent years. The cash ratio in Japan has also risen due to the sharp increase in the “cash under the mattress” phenomenon in the context of recent revisions to the tax system and the introduction of the My Number system.

Fig. 5-1 Cash in Circulation (% of Nominal GDP)



Note: 2016 GDP figures for Denmark, Sweden and Switzerland are IMF estimates.
Source: Central Bank websites, Bureau of Statistics, Eurostat, IMF, Cabinet Office

Set against the introduction of a policy of negative interest rates in Japan, it is possible that the shift to cash will continue, as there is a widespread view that interest rates on deposits will also go into the negative. If we consider the cost of transport, security, and storage for cash holdings, it is more advantageous to hold cash at the zero interest rate than deposits at negative interest rates. Incidentally, the ratio of cash usage is low in Sweden, Denmark, and other Scandinavian countries where a similar policy of negative interest rates has been implemented. In 2016, outstanding cash in circulation (as a ratio of GDP) was 1.4% in Sweden and 3.5% in Denmark. Sweden is rapidly moving toward the cashless society and banks have stopped handling cash at the counter. Sweden is moving away from cash so rapidly that Riksbank, the central bank, had to propose to the government that commercial banks must be obliged to handle cash to guarantee the convenience of depositors.

How are central banks dealing with the progress of the cashless society around the world? The main trends behind the move toward the cashless society are (1) outstanding cash in circulation is decreasing and settling payments using credit cards or bank deposits is increasing, (2) central banks are considering issuing digital currencies (CBDC) to replace cash and deposits. India is an example of the former. In November 2016, the Indian government decided to abolish high-value denominations and recommended a move to deposit settlements using biometric authentication technologies. The latter concerns the recent surge in interest among many central banks to issue CBDC. Figure 5-2 summarizes initiatives by country. In its annual report published in March 2016, the Dutch central bank, De Nederlandsche Bank (DNB), announced that it would experiment with in-house development of the DNB Coin, a CBDC based on blockchain technology (however, there is no intention to circulate the DNB Coin to the general public). The DNB is bringing together government agencies, financial institutions, and financial ventures to create a research hub.

Fig. 5-2 Central banks and digital currencies

Country	Month-Year	Event
Netherlands	Mar-16	Central bank said in annual report that they planed to develop a real DNBcoin prototype based on blockchain technology.
Canada	Jun-16	Bank of Canada and some of big banks announced that they had been experimeting with a digital currency called "CAD-Coin"
England	Jul-16	BOE staff published the working paper calculating the economic effect by introducing a digital currency.
China	Sep-16	Deputy governor of the People's Bank of China contributed an essay about issuing digital currency to China Finance.
Sweden	Nov-16	Deputy governor at the Riksbank announced the investigation of issuing digital currency "e-krona".
Deutschland	Nov-16	Bundesbank presented a functional prototype for the blockchain technology-based settlement of securities.
ECB	Jan-17	Member of the executive board of the ECB gave a speech about a central bank digital currency.

Source: Central banks, Bloomberg

In spring 2016, the Canadian government and the Central Bank in Canada joined with major banks and industry groups to launch an experiment to study the possibilities of issuing the CAD-Coin, a digital Canadian dollar based on blockchain and managed by the central bank, for use in interbank transactions. In a working paper published by staff at the Central Bank of Canada in November 2016, the authors point out that the widely adopted private digital currencies could weaken the transmission of monetary policy and restrict the ability of the central bank to act as the lender of last resort. A working paper dated February 2017 argues that private digital currencies will not succeed in the long term without government intervention, and proposes that private digital currencies and the CBDC issued by the Central Bank should be treated as a uniform currency.

Recently, it has become evident that China also has plans to issue a digital currency. Mr. Fan Yifei, Deputy Governor of the People's Bank of China, is said to favor an "indirect approach" where the People's Bank issues CBDC to commercial banks, which provide services to the general public.

In April 2016, the BOJ set up the FinTech Center within the Payment and Settlement Systems Department, which is expected "to play an active role as a catalyst for promoting interaction among financial practices and innovative technologies, research and study, and the needs of the economic society." Together with the Center for Advanced Financial Technology at the Financial System and Bank Examination Department, and the Center for Information Technology Studies at the Institute for Monetary and Economic Studies, the FinTech Center will research financial technologies. The BOJ raised the possibility of issuing a CBDC at Fintech and the Future of Money, a conference co-hosted with the Center for Advanced Research at the University of Tokyo in November 2016. In his remarks, Nakaso Hiroshi, Deputy Governor of the BOJ, mentions that the argument for a central bank digital currency seems to be based on increased awareness of the costs of processing and storing paper-based banknotes with certain quarters asking the central bank to adopt the newest information technology in order to satisfy the needs of the economy. He also denied any possibility of issuing a CBDC saying,

“The BOJ has no specific plan at present to issue digital currencies as a substitute for banknotes.”

Figure 5-3 adds information about the situation in Japan to supplement the report on digital currencies published in November 2015 by the Committee on Payments and Market Infrastructures at the Bank for International Settlements. In this section, we have focused on CBDC issued by central banks, but there are, of course, also private digital currencies such as Bitcoin and Ripple. Nakaso Hiroshi, Deputy Governor of the BOJ, says that if an entity with sufficient trust already exists, it is rational and efficient to make that entity issue the currency as a centralized liability. If, for argument’s sake, a virtual currency like Bitcoin is widely adopted, it would not only shake up the right to issue money, recognized as the monopoly of the state or central banks, but it would also become difficult to capture the movements of money, and it could have an impact on the validity of fiscal policy. At present, the BOE is renewing plans to construct its own version of blockchain. Below, we will look at several arguments involving digital currencies.

Fig. 5-3 Money classifications

Quoted from CPMI report	Physical			Electronic			
	Potential substitutes for physical money	Money in a traditional sense (denominated in a sovereign currency)				Potential substitutes for non-physical money	
		Central bank money		Commercial bank money	Legally recognised E-money(e-money in a narrow sense)	E-money(broad sense)	
	Cash	Central bank deposits	Digital currencies				
Examples	Gift certificates,Rice tickets etc.	Banknotes and Coins	BOJ's deposits	Deposits	Suica,Edy etc.	CBDC	Issued by non-central bank
						e-krona, CAD-Coin etc.	Bitcoin,Ripple and others.More than 600 digital currencies are in the world.The market capitalization of all digital currencies are around 22 billion dollars.

Note: Data up to and including Feb 24, 2017.
Source: BIS, coinmarketcap.com

One aspect of replacing current notes and coins with CBDC is that it would increase the effectiveness of a negative interest rate policy. Since cash disappears when the interest rate is zero, it makes sense that the limits on how far you can go into negative territory would disappear. If interest rates are negative, it is also possible to increase seigniorage. On the other hand, in case of the direct issue model, the degree of impact on the economy due to the decline in the ability of commercial banks to offer credit presents a problem. Fundraising by commercial banks will be limited the more the use of CBDC expands in case of direct issues by the central bank to individuals and companies with CBDC accounts. If the deposits of individuals and corporations are replaced with CBDC, the Central Bank will become a 100% reserve bank, and the deposit and clearing functions of commercial banks will no longer be needed. This approach, which would detach the deposit and clearing department and the financial services department including loans (the so-called narrow banking), has been discussed since the 1930s. The security of deposits would be guaranteed, but the banking

business would undergo great changes and it is possible that loans to individuals and corporations would shrink.

It is necessary to exercise prudence while ascertaining the impact not only on the financial systems, but also on the economy as a whole, because the impact on the actual economy would not be small were CBDC introduced.

Camera cites the following reasons why central banks must take the initiative on issuing digital currencies. (1) Currencies need credibility, and a currency issued by the central bank has more credibility than one issued by a commercial bank; (2) If there is a flood of digital currencies, clearing will be complex and expensive and it is possible that transactions will be rejected, which is something that can be avoided with a uniform currency, i.e. a CBDB; (3) It is possible to guarantee the security of the financial system. Central banks are confronted with the new phase of the cashless society and digital currencies. Will central banks still be the authority on monetary policy in a world of digital currency? The research on CBDC has only just begun.

6. Conclusion

In this report, we discussed about the effects and risks brought by the recent BOJ's monetary policies, including "Quantitative and Qualitative monetary Easing with negative interest rate" introduced in January 2016 and the "Quantitative and Qualitative monetary Easing with yield curve control" that came out with the new "Framework for strengthening monetary easing" in September 2016. With the adoption of the yield curve control (YCC), the BOJ seems to have begun to manipulate not only short-term interest rates but also long-term interest rates. As a result, the purchase amount of long-term Japanese Government Bonds (JGBs) is determined endogenously along with the level necessary to induce the yield on 10-year JGBs to 0%. This may be the implication that the axis of BOJ's monetary policy management shifted from "quantity" to "interest rate" as the Financial Research Team of Japan Center for Economic Research had been pointing out.

In a situation where long-term interest rates rise sharply, the BOJ intends to carry out unlimited purchase of government bonds (bid price operation) to bring the interest rate close to the target level. At that time, the BOJ will face the limit of purchasing JGBs and the problem of expanding their balance sheet. When the BOJ continues to buy JGBs at a higher price (under the negative interest rate), the Bank's financial conditions will be damaged. If the stock price falls and yen appreciate, the BOJ's financial performance will be further negative.

Amidst the feeling of stubbornness in monetary policy has been pointed out, FTPL (Fiscal Theory of the Price Level) is attracting new attention. With the introduction of the YCC, it is possible that the BOJ (and the monetary policy) has turned from a Leader to a Follower against the government (and the fiscal policy). An environment where FTPL is easy to establish, for example, postponement of

consumption tax increase and achievement of the primary balance surplus target by FY2020 are at stake. The question is whether people believe in the announcements of fiscal authority or monetary authority. But under what kind of mechanism people's expectations will change is still unknown. Enhancing the shift to a cashless society through the issuance of digital currencies will make it possible to deepen negative interest rates in monetary policy management and may be one of the growth strategies in terms of macroeconomic policy.

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