

27 January 2016

*<QQE Supplementary Measures: Follow-up Report>**Risks from Extending the QQE Policy**—Bank of Japan's JGB Purchases to reach Limits in June 2017**JCER Financial Research Team**Kazumasa Iwata (President of JCER)**Ikuko Samikawa (Principal Economist)**Eriko Takahashi (Economist)**Takuya Kimotsuki (Trainee Economist)¹***How long can the BOJ keep buying JGBs?**

Since the introduction of its qualitative and quantitative easing (QQE) program in April 2013, the Bank of Japan (BOJ) has mopped up a massive amount of Japanese Government Bonds (JGBs) from the market, at a pace exceeding 7 trillion yen a month, and 9 trillion yen a month after the program's expansion at the end of October 2014. Players in the secondary JGB market, where the supply/demand balance is becoming tighter, are beginning to whisper about limits to the BOJ's QQE program.

On December 18, 2015, the BOJ introduced new measures to supplement existing QQE. These include adding foreign currency-denominated loans and housing loans to the range of assets accepted from banks as eligible collateral, which mainly consists of JGBs, and extending the average remaining maturity of its JGB purchases. Private financial institutions need to hold a certain amount of JGBs as collateral in financial transactions, and the extension of large-scale JGB purchases by the BOJ will, therefore, make it difficult for them to keep buying JGBs. This report examines the extent to which the latest supplementary measures (expansion of the range of eligible collateral) will encourage private financial institutions to sell JGBs, and for how long the BOJ can keep buying JGBs. The analysis is approached from two angles: long-term JGB issuance and redemption (JGB supply factors) and the JGB holdings of financial institutions and investors (demand factors)².

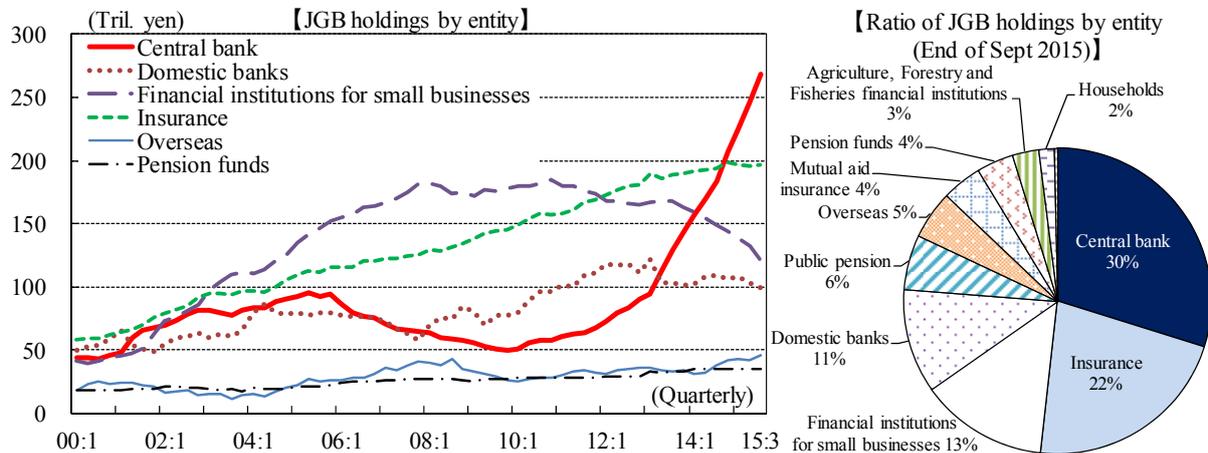
According to the BOJ's *Flow of Funds Accounts*, central government securities and FILP (Fiscal Investment and Loan Program) bonds, etc. held by the central bank as of 30 September 2015 totaled 898.5 trillion yen, increasing for the ninth consecutive quarter to reach a record level. A breakdown of holdings by entity as of the same date shows that the BOJ, which has been making large-scale JGB purchases under its QQE program, accounts for the largest share (30%), and its holdings hit a new all-time high both in terms of scale and share (Figure 1). The entities with the highest proportion of holdings after the BOJ are insurance companies (22%), financial institutions for small businesses

¹ Japan Finance Corporation Small and Medium Enterprise Unit

² Previous studies estimating limits to the BOJ's JGB purchases include Arslanalp and Botman (2015), and Kawano and Sugisaki (2015). The latter conclude with respect to the limits to the BOJ's JGB purchases that "the incentive for investors to reduce their holdings any further is likely to dwindle away within the next 18-24 months."

including the Japan Post Bank (15%), domestic banks (11%) and pension funds (6%). Sectors with JGB holdings of 5% or less, such as the foreign sector and mutual aid insurance companies, are not taken into consideration in this analysis because even on a quarterly basis, their holdings remain at a low level and do not change significantly.

Figure 1 BOJ is the Largest Holder of JGBs



Note: “Financial institutions for small businesses” includes the Japan Post Bank.

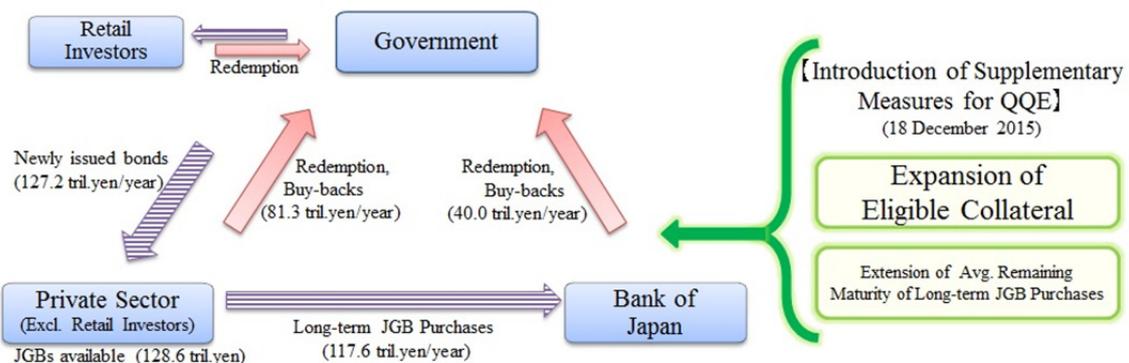
Source: Bank of Japan, *Flow of Funds Account*

To estimate the potential for extension of the JGB buying program, it is necessary to review various long-term JGB transaction flows since the expansion of quantitative easing. This analysis considers flows with respect to three sectors: the Japanese Government, the private sector and the BOJ (Figure 2). The period during which the BOJ will be able to keep buying long-term JGBs (N years) can be expressed by the following equation.

$$\boxed{\text{BOJ's annual purchases} \times N \text{ years} = \text{Net annual long-term JGB issuance} \times N \text{ years}} \\ \boxed{+ \text{Amount available for sale by the private sector}^3}$$

In the following pages, we estimate (i) annual purchases, (ii) issuance and (iii) amount available for sale in the above equation.

Figure 2 Flow of Long-Term JGBs



³ Since the BOJ focuses on purchasing longer-term bonds, treasury bills and long-term JGBs with less than a year remaining to maturity (which due to the nature of data are difficult to distinguish from treasury bills), are not included in this analysis. JGBs targeted at retail investors, which are not the target of BOJ purchases, are also excluded.

Categorization of JGB Flows

(i) Annual JGB Purchases

Let us begin by estimating the scale of purchases necessary for the BOJ to maintain the framework of its QQE program. For the BOJ to increase the monetary base at an annual pace of 80 trillion yen, when buying JGBs, it must take into consideration the JGBs that reach maturity and fall off its balance sheet. According to the latest information available, “under the current guideline for asset purchases, the gross amount of the Bank's JGB purchases in 2016 is expected to increase to about 120 trillion yen from about 110 trillion yen in 2015, due to an increase in the redemption of government bonds held by the Bank at maturity.”⁴ Figure 3 shows the amount of purchases necessary based on the policy for long-term JGB purchases announced by the BOJ.

Figure 3 Amount of JGB Purchases needed for the BOJ

Remaining Maturity of JGBs	Monthly JGB purchases as announced by BOJ (100 mil. yen)	% of total	Purchases needed so that the BOJ monetary base will increase by 80 tril. yen annually (100 mil. yen)
Up to 1 year	1,000~3,000	2.0	23,928
1 - 5 years	36,000~60,000	47.9	574,277
5 - 10 years	18,000~36,000	26.9	323,031
Over 10 years	15,000~30,000	22.4	269,192
15-year floating rate bond	1,200	0.6	7,178
10-year inflation indexed bond	400	0.2	2,393
Total		100.0	1,200,000

Note : The estimation is based on the assumption that the BOJ's annual purchase of long-term JGBs is 120 trillion yen. The amount is divided proportionally according to the median value of monthly JGB purchases classified by remaining maturity. The purchase sizes for floating-rate bonds and inflation-indexed bonds are bimonthly.

Source: Bank of Japan, *Outline of Outright Purchases of Japanese Government Bonds from January 2016*

(ii) JGB Issuance

The Government's long-term JGB issuance to the private sector will be JGB issuance for FY2016 (ending March 2017) less short-term JGBs, etc., which amounts to 127.2 trillion yen. However, JGBs that will reach maturity and fall from the private sector's balance sheets through redemption/buy-backs by the Government can be calculated as 81.3 trillion yen⁵. Assuming that the pace of issuance and redemption from FY2017 is the same as for FY2016, net annual JGB issuance will be 127.2 trillion yen less 81.3 trillion yen, which makes 45.9 trillion yen⁶.

⁴ Bank of Japan “Statement on Monetary Policy” (December 18, 2015) (http://www.boj.or.jp/en/announcements/release_2015/k151218a.pdf)

⁵ Please see Appendix for further details of JGB issuance and redemption. With respect to the redemption of FILP bonds, we could not confirm the amount due to be redeemed and, therefore, simply used the amount of FILP bonds having less than a year remaining to maturity as of the end of FY2014.

⁶ All figures are correct to one decimal place.

(iii) JGBs Available for Sale

Next, we estimate the amount of JGBs that could be sold by the private sector. Various financial institutions have different motives for holding JGBs. For example, banks need JGBs as collateral in foreign-currency-denominated transactions.

【BOX JGB Issuances and Assumptions regarding Redemptions】		
JGB Trade between Government and Private Sector (45.9 tril. yen)		
=JGB Issuance (127.2 tril. yen) - JGB Redemption/buy-backs (81.3 tril. yen)		
JGB Issuance (127.2 tril. yen)		
=①Total JGB Issuance - ②T-bills issuance - ③BOJ rollovers - ④JGBs targeted at retail investors		
	Amount (Tril. yen)	Assumptions
①Total JGB issuance	162.2	Total of Construction Bonds, Special Deficit-Financing Bonds, Reconstruction Bonds, FILP Bonds and Refunding Bonds
②T-Bills issuance	25.0	Excluded as T-bills are not targets of QQE purchases
③BOJ rollovers	8.0	Excluded as BOJ repurchases T-Bills for rollovers, which are not targets of QQE purchases
④Issuance for retail investors	2.0	Excluded as issuance for retail investors are not targets of QQE purchases
JGB Redemption/buy-backs (81.3tril. yen)		
=①JGB redemption - ②Short-term JGB redemption - ③Redemption of BOJ holdings + ④Buy-backs of private sector holdings		
	Amount (Tril. yen)	Assumptions
①Total redemption	146.1	Redemption of Regular Bonds (126.6 tril. yen, based on FY2015 budget plan), FILP Bonds (19.5 tril. yen, FILP Bonds with 1 - 2 years remaining until redemption at the end of FY2014)
②Redemption of T-Bills	25.8	Based on issuance for FY2014, excluded as T-bills are not targets of QQE purchases
③Redemption of BOJ's JGB holdings	40.0	BOJ announced that its JGB purchases will reach 120 trillion yen in 2016, of which 80 tril. yen accounts for its monetary base target. Excluded the remaining 40 tril. yen which we assume are redeemed
④Buy-backs of Private sector's JGB holdings	1.0	Based on estimation of FY2016 buy-back amount from financial institutions
Note: All figures are correct to one decimal place.		
Source: Based on Ministry of Finance, Bank of Japan documents		

In the baseline scenario (Scenario 1; before the announcement of BOJ's supplementary measures for QQE), we estimate that the amount of JGBs that can be sold by the private sector as 148.1 trillion yen as of the end of March 2015. In our alternative scenario (Scenario 2; after the QQE supplementary measures), we estimate JGBs that can be sold at 128.6 trillion yen, as of September 2015. Though the reference dates differ, for both scenarios, we calculate that the limits to JGB purchases will be reached in June 2017 (Figure 4). On the other hand, Arslanalp and Botman (2015) estimate, as of December 2014, that the amount the private sector could sell is 220 trillion yen, and that the limits to purchases will be reached by the end of 2018 at the latest, allowing for more leeway than JCER's analysis. The difference in reference dates is the main cause for the differing estimation results between JCER and Arslanalp and Botman (2015).

Figure 4 BOJ will likely face JGB Purchasing Limits in June 2017

	JCER scenarios for potential portfolio rebalancing				IMF scenario	
	Assumptions for Scenario 1 (BASELINE SCENARIO: Before QQE supplementary measures)	JGBs available for sale (Tril. yen)	Assumptions for Scenario 2 (ALTERNATIVE SCENARIO: After QQE supplementary measures)	JGBs available for sale (Tril. yen)	Assumptions	JGBs available for sale (Tril. yen)
Banks	Continue to reduce JGB holdings to 5% of total assets	74.4	Scenario 1 + foreign currency-denominated loans on deeds (7 tril. yen) + housing loans via a trust scheme (6.9 tril. yen)	62.6	Continue to reduce JGB holdings to 5% of total assets	76.0
Japan Post Bank	40 tril. yens-worth available (JGB holdings at the end of FY2014 excl. held-to-maturity bonds)	40.0	Same as Scenario 1	33.6	Same as above	100.0
Insurance companies	Shift out of JGBs to foreign bonds, raising foreign holdings to 25% of total assets	1.8	Same as Scenario 1	1.8	Shift out of JGBs to foreign bonds, raising foreign holdings to 25% of total assets	33.0
Japan Post Insurance	Same as above	19.2	Same as Scenario 1	17.9	Same as above	
Public pension funds	Shift to new asset allocation ratio for domestic bonds set at 35% ± 10%	12.7	Same as Scenario 1	12.7	Shift to new asset allocation ratio for domestic bonds set at 35% ± 10%	11.0
Total		148.1		128.6		220.0
Limit on JGB purchases	June 2017		June 2017		2017~18	

JGB Purchases to reach Limits in June 2017, same as before Supplementary Measures

Even taking the supplementary measures fully into account, the extra room for JGB purchases is, at most, only 13.9 trillion yen, reflecting expansion in the range of eligible collateral (Figure 5). We conclude, therefore, that JGB purchases will continue until June 2017, unchanged from our previous estimate results before the supplementary measures (Scenario 1). This also reflects the fact that, under the FY2016 JGB Issuance Plan (included in Scenario 2), gross long-term JGB purchases required to achieve the yearly target expansion in the monetary base of 80 trillion yen increased because of decreased JGB issuance and increased redemptions of JGB holdings by the BOJ.

Figure 5 After QQE Supplementary Measures

	JGB holdings (End of Sept 2015)			Scenario 2 (After QQE supplementary measures)				Previous analysis (Scenario 1)
	① Total assets (Tril. yen)	② Total JGB holdings (Tril. yen)	②/① Ratio (%)	Shift in ratio (%)	③ Total JGB holdings after shift (Tril. yen)	④ Supplementary measures	②-③+④ JGBs available for sale (Tril. yen)	JGBs available for sale (Tril. yen)
Banks	1,004.6	98.9	10	5	50.2	13.9	62.6	74.4
Japan Post Bank	207.2	92.8	45	—	59.2	0.0	33.6	40.0
Life insurance companies	281.1	101.9	36	36	101.9	0.0	0.0	0.0
Japan Post Insurance	84.9	46.7	55	34	28.9	0.0	17.9	19.2
Property insurance companies	30.8	5.8	19	13	4.0	0.0	1.8	1.8
Public pension funds	177.0	74.7	42	35	62.0	0.0	12.7	12.7
Total	1,785.6	420.8	24		306.2	13.9	128.6	148.1

Source: Summary Reports released by banks and other financial institutions and their websites

JGB Sales by Life Insurance Companies are unlikely

Before the Announcement of the supplementary measures, the BOJ had made the average remaining maturity of its long-term JGB purchases 7-10 years, but the supplementary measures made it easier for the BOJ to purchase long-term JGB by extending this to around 7-12 years from January 2016. If we look at JGB holdings by remaining maturity as of the end of March 2015, most long-term and super long-term bonds with remaining maturities exceeding 10 years are held by life insurance companies (including Japan Post Insurance), and the supplementary measures may be aimed at encouraging life insurance companies to sell JGBs (Figure 6).

Figure 6 Long-term Bonds held mostly by Life Insurance Companies

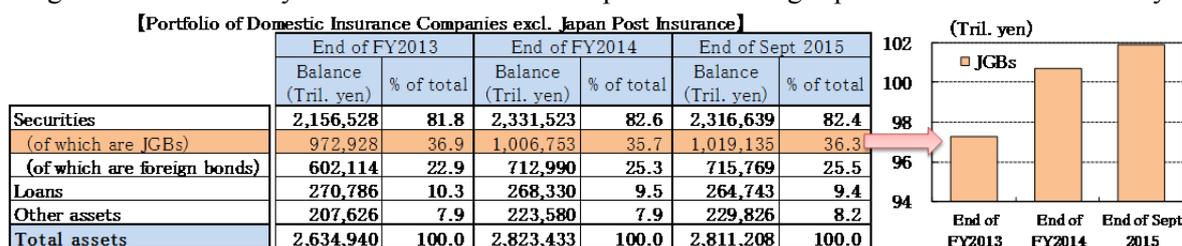
【JGB Holdings by Entity (End of March 2015, 100 mil. yen)】

	Up to 1 year	1 - 3 years	3 - 5 years	5 - 7 years	7 - 10 years	Over 10 years	Outstanding amount
Banks	253,471	323,395	291,018	127,070	99,776	53,345	1,148,074
Japan Post Bank	191,407	328,944	154,549	164,866	205,906	21,998	1,067,670
Life insurance companies	14,830	24,944	33,358	43,384	81,545	789,776	987,837
Japan Post Insurance	52,392	81,087	34,935	17,533	27,842	267,076	480,864
Property insurance companies	7,298	7,504	8,900	8,021	10,644	22,286	64,653
Public pension funds							746,578
Total amount							4,495,677

Source: Summary Reports released by banks and other financial institutions

However, if we look at the financial statements of life insurance companies as of the end of September 2015, Japanese life insurance companies, with the exception of Japan Post Insurance, are not actively selling JGBs (Figure 7). From the perspective of life insurance companies, insurance policies are long-term, yen-denominated liabilities. Therefore, life insurance companies hold long-term JGBs as stable assets to avoid a mismatch of maturities and a mismatch of currencies between their assets and liabilities. Yen bonds such as local government bonds and corporate bonds have less liquidity than JGBs, and foreign bonds also have limitations because they involve exchange risks. Life insurance companies do not have current deposit accounts with the BOJ, and are, therefore, not entitled to the 0.1% interest paid on the excess reserve held in that account. Since life insurance companies are unlikely to sell their JGB holdings until they take the risk of reinvestment, we presume that aggressive sales by insurance companies are unlikely.

Figure 7 JGB sales by Domestic Insurance Companies excluding Japan Post Insurance Unlikely



Source: Summary Reports released by banks and other financial institutions

Is the Extension of QQE through Reduction of Monetary Base Target an Option?

If QQE continues, leading to a situation where the BOJ faces undersubscription in its JGB purchasing operations, this could have various side effects. BOJ Board Member Takahide Kiuchi acknowledged that it would be difficult for the BOJ to keep buying JGBs at the current annual pace of 120 trillion yen. He went on to say that if the market glimpsed the limits to quantitative easing, “market interest rates could rise suddenly and deal a massive blow to the economy” and “it is important to shift to stable operations (by reducing the pace of purchases).”⁷ According to our calculations, if the BOJ were to reduce its monetary base expansion target from the current 80 trillion yen annual pace to 45 trillion yen, as proposed by Board Member Kiuchi, the BOJ would be able to continue JGB purchases for longer and QQE could be maintained until March 2019, past Governor Haruhiko Kuroda’s five-year-term ending April 2018.

While the supplementary measures will reduce short-term liquidity risk, they are not enough to dispel market concerns from a medium-to-long-term perspective in terms of the potential to extend the QQE. There are, of course, risks if the BOJ should start tapering its assets purchases before achieving its price stability target. However, the BOJ must surely consider a range of policy measures before its own credibility is damaged through undersubscription.

Furthermore, the amount of JGBs that the private sector could sell depends on how much the BOJ pays to purchase long-term JGBs. If JGB buying operations at prices far higher than actual market conditions were announced, bids might increase⁸. Also if measures to alleviate potential collateral constraints on banks were expanded further, this could push up the amount of JGBs the private sector could sell. Currently, efforts are being made to further expand the Securities Lending Facility through which the BOJ lends JGBs back to dealers, to prevent settlement failures in JGB transactions. Through more widespread use of this facility, the amount of outstanding JGBs held to meet the collateral needs of banks may also decrease.

References

- Arslanalp, S., & Botman, D.P.J. (2015). Portfolio Rebalancing in Japan : Constraints and Implications for Quantitative Easing. *IMF Working Paper No. 15/186*.
<https://www.imf.org/external/pubs/ft/wp/2015/wp15186.pdf>
- Kawano, K., & Sugisaki, K. (2015). Government Bond Supply and Absorption. Morgan Stanley MUFG Securities.

⁷ *Nikkei* morning edition (Dec. 4, 2015), p.5 “BOJ Board Member Kiuchi says 2% Inflation Target beyond Japan’s Economic Capacity”

⁸ However, when the BOJ, which uses the amortized cost method, buys long-term JGBs at prices far higher than their face value, it must amortize the difference between the purchase price and the face value in equal amounts over the remaining term. Therefore, if the BOJ were to purchase JGBs with a short time to maturity at prices far higher than their face value, the central bank’s annual interest expenses would increase and this could reduce its annual profits.

Appendix A. Sales of JGBs by Entity

(i) Domestic Banks and the Japan Post Bank

Banks need JGBs as collateral in funding transactions. According to Arslanalp and Botman (2015), domestic banks could reduce their JGB holdings to 5% of their total assets, bearing in mind their collateral needs, which center on short-term bonds. As shown in Figure A1, JGB holdings equivalent to just under 5% of total assets is the minimum level of JGBs held by domestic banks historically and, similarly, for this report’s baseline scenario, we regarded reduction to 5%, in line with the IMF Working Paper, possible. On this basis, the amount that private-sector banks, excluding Japan Post Bank, could sell is 48.7 trillion yen⁹.

Figure A1 The Ratio of JGB Holdings to Total Assets for All Banks was around 5% in the 1990s



Source: Bank of Japan, *Assets and Liabilities of Domestically Licensed Banks (Banking Accounts)*

Arslanalp and Botman (2015) take the view that, like other banks, Japan Post Bank can reduce its JGB holdings to 5% of total assets and assumes that it could sell JGBs worth 100 trillion yen. We regard this as a slight overestimation and the grounds for this are explained below.

If we compare the balance sheets of Japan Post Bank with those of other banks in Figure A2, the impact of lending business regulations is obvious. In this report, we judged that it would be difficult in terms of portfolio management for Japan Post Bank to reduce its JGB holdings to 5% of total assets in line with the IMF Working Paper given that it is not allowed to divert proceeds from the sale of JGBs to lending. However, as of September 2015, Japan Post Bank’s total JGB holdings amounted to 92.8 trillion yen, of which 59.2 trillion yen worth were in held-to-maturity-bonds. Therefore, we estimated

⁹ Jun Ishii, Chief fixed-income strategist at Mitsubishi UFJ Morgan Stanley Securities, estimates the collateral needs of city banks and regional banks combined at around 40–60 trillion yen (*Shukan Toyo Keizai* February 14, 2015 issue “Unconventional Negative interest rates stemming from BOJ’s bond buying program”) (<http://toyokeizai.net/articles/-/60244>). Outstanding holdings after sale of 40.4 trillion yen as estimated in this report are within the range estimated by Ishii.

conservatively that the Japan Post Bank could sell the remaining JGBs (33.6 trillion yen)¹⁰.

Figure A2 Portfolio Rebalancing from JGBs to Lending looks stuck for Japan Post Bank

	【Portfolio of Japan Post Bank】				⇒	【Portfolio of Domestic Banks excl. Japan Post Bank】			
	End of FY2014		End of Sept 2015			End of Sept 2015			
	Balance (Tril. Yen)	% of total	Balance (Tril. Yen)	% of total		Balance (Tril. Yen)	% of total	Balance (Tril. Yen)	% of total
Loans	3	1.3	3	1.3	Loans	530	52.7		
Securities	156	75.0	150	72.3	Securities	241	24.0		
(of which are JGBs)	107	51.3	93	44.8	(of which are JGBs)	107	10.6		
Other assets	49	23.6	55	26.5	Other assets	234	23.3		
Total assets	208	100.0	207	100.0	Total assets	1,005	100.0		

Source: Japan Post Bank, Japanese Bankers Association

(ii) Life Insurance and Property Insurance Companies

The entities with JGB holdings comparable to those of the banks are the life insurance and property insurance companies. Since the main products of insurance companies are long-term policies denominated in Japanese yen, insurance companies set aside policy reserves to cover future claims. JGBs make up the majority of policy reserves. However, with the fall in JGB yields caused by monetary easing, in recent years, insurance companies have also shifted out of JGBs into foreign bonds to supplement their earning power.

Arslanalp and Botman (2015) assume that insurance companies will raise their foreign holdings to 25% of assets, and will sell JGBs accordingly. However, the foreign holdings of Japanese life insurance companies, with the exception of Japan Post Insurance, had already reached 25% by the end of September 2015. Therefore, in this analysis, we project only sales by property insurance companies (1.8 trillion yen).

If we compare the asset structure of Japan Post Insurance with that of other life insurance companies, we see that Japan Post Insurance has a low percentage of foreign bonds (Figure A3). Japan Post Insurance President Ishii Masami declared, in November 2015, that Japan Post Insurance would raise its ratio of investment in equity and foreign bonds from 4% to 10%¹¹. In our baseline scenario, we assume that Japan Post Insurance, like other life insurance companies, will increase its foreign bond holdings to 25%, and estimated the amount of JGBs that Japan Post Insurance could sell at 17.9 trillion yen.

¹⁰ This estimate was deemed generally valid, given that Japan Post Bank has, in fact, reduced its JGB holdings by 45.3 trillion yen from the beginning of FY2013 when QQE began through to the second quarter of FY2015, and if it continues to sell JGBs at the current quarterly pace of 4.5 trillion yen over the coming two years, total sales will amount to 36 trillion yen.

¹¹ *Nikkei* morning edition (Nov. 5, 2015), p.5 “Two postal financial institutions, stocks towards additional sales”

Figure A3 Shifting to Foreign Securities looks yet to be Completed for Japan Post Insurance

【Portfolio of Japan Post Insurance】					【Portfolio of Domestic Insurance Companies excl. Japan Post Insurance】				
	End of FY2014		End of Sept 2015			End of Sept 2015			
	Balance (Tril. Yen)	% of total	Balance (Tril. Yen)	% of total		Balance (Tril. Yen)	% of total	Balance (Tril. Yen)	% of total
Securities	66	78.1	66	78.1	⇒ Securities	232	82.4		
(of which are JGBs)	48	56.6	47	55.2	(of which are JGBs)	102	36.3		
(of which are foreign bonds)	2	2.3	4	4.2	(of which are foreign bonds)	72	25.5		
Loans	10	11.8	9	11.1	Loans	26	9.4		
Other assets	9	10.2	9	10.7	Other assets	23	8.2		
Total assets	85	100.0	85	100.0	Total assets	281	100.0		

Source: Summary Reports released by Japan Post Insurance, Life Insurance Association of Japan

(iii) Pension Funds

The Government Pension Investment Fund (GPIF) and Japan's three mutual aid associations¹² have set forth portfolio benchmarks (investment policy) shown in Figure A4. Assuming that major pension funds have domestic bond holdings in line with the investment policy, the amount of JGBs they could sell is estimated at 12.7 trillion yen¹³. The GPIF has been rebalancing its portfolio in line with the investment policy since 2013, and the three mutual aid associations have also been steadily transitioning to the new model since October 2015.¹⁴

Figure A4 Portfolio Shift and the Amount of JGBs Available for Sale by Pension Funds

【Portfolio Benchmarks of Pension Funds】												
Domestic bonds		Domestic stocks		Foreign bonds		Foreign stocks						
35%		25%		15%		25%						
±10%		±9%		±4%		±8%						
【Asset Structure of Pension Funds (end of FY2014) and After Shift in Portfolio Allocation Ratios】												
	Domestic bonds		Domestic stocks		Foreign bonds		Foreign stocks		Short-term assets etc		Total balance (tril. yen)	
	Balance (tril. yen)	% of total	Balance (tril. yen)	% of total	Balance (tril. yen)	% of total	Balance (tril. yen)	% of total	Balance (tril. yen)	% of total		
GPIF	56.7	39.4	31.7	22.0	18.2	12.6	30.1	20.9	7.3	5.1	143.9	
National public service personnel	5.2	66.4	1.0	12.8	0.2	2.6	1.0	12.2	0.5	6.0	7.8	
Prefectural government personnel	10.6	50.6	4.5	21.6	2.4	11.4	3.2	15.1	0.3	1.3	21.0	
Private school mutual aid	2.1	50.7	0.6	15.3	0.6	13.4	0.6	14.1	0.3	6.5	4.2	
Total ① (End of March 2015)	74.7	42.2	37.9	21.4	21.3	12.1	34.8	19.7	8.3	4.7	177.0	
After portfolio allocation shift	Balance ②	61.9	35.0	44.2	25.0	26.5	15.0	44.2	25.0	0.0	0.0	177.0
	Difference (②-①)	-12.7	-7.2	6.4	3.6	5.2	2.9	9.4	5.3	-8.3	-4.7	0.0

Note: The entire amount of domestic bonds is assumed to be long-term JGBs.

Source: The websites of the Government Pension Investment Fund (GPIF), the Federation of National Public Service Personnel Mutual Aid Associations, the Mutual Aid Association of Prefectural Government Personnel, and the Promotion and Mutual Aid Corporation for Private Schools of Japan

¹² Japan's three major mutual aid associations are Federation of National Public Service Personnel Mutual Aid Associations (KKR), The Mutual Aid Association of Prefectural Government Personnel, and The Promotion and Mutual Aid Corporation for Private Schools of Japan.

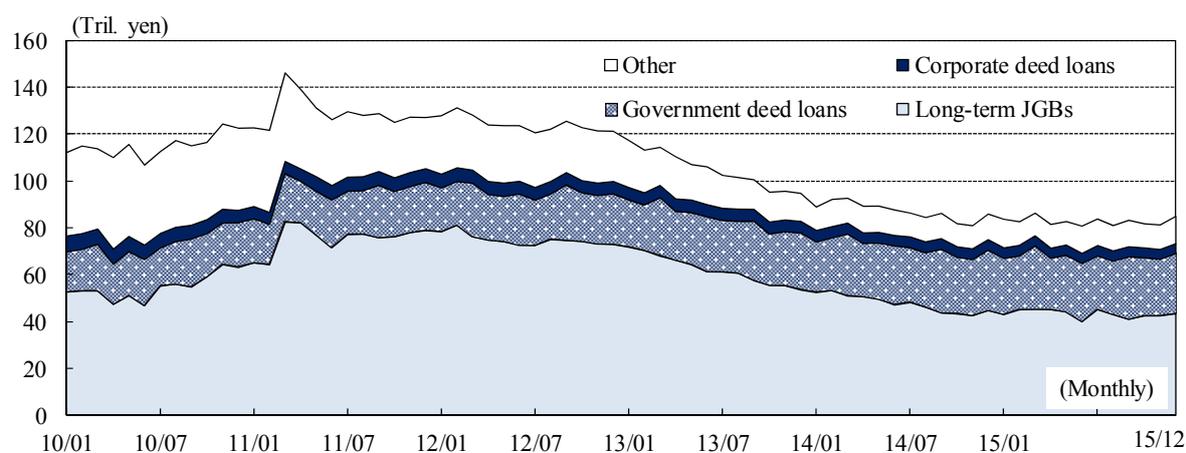
¹³ This report assumes that all domestic bonds held by public pension funds are JGBs.

¹⁴ Government Pension Investment Fund "Target Asset Allocations (Model Portfolio)" (March 20, 2015)
(http://www.gpif.go.jp/public/activity/pdf/model_portfolio.pdf)

Appendix B. Expansion of the Range of Eligible Collateral

Most of the 84.9 trillion yen in collateral accepted by the BOJ (face value as of the end of December 2015) consists of long-term JGBs (43.3 trillion yen) (Figure B1). The supplementary measures will expand the range of collateral that financial institutions are allowed to deposit with the BOJ (eligible collateral) and, as a result, the long-term JGBs previously held in the BOJ's custody may be substituted with other collateral, and the long-term JGBs returned to the financial institutions may be sold to the BOJ.

Figure B1 Almost Half of the Collateral Accepted by BOJ consists of Long-term JGBs



Note: Each asset type is shown in face value.

Source: Bank of Japan, *Collateral Accepted by the Bank of Japan*

As part of its supplementary measures, the BOJ has decided to accept (1) foreign currency-denominated loans on deeds and (2) financial institutions' housing loan portfolios using a trust scheme, etc. as eligible collateral, and we shall, therefore, look at each of these assets in turn. With respect to housing loans, Governor Haruhiko Kuroda explained at the press conference following the Monetary Policy Meeting on December 18, 2015 that housing loans are not such significant amounts individually, but trading housing loan portfolios in the form of trust beneficiary interests was actually a common market practice, and the BOJ would, therefore, also accept appropriate portfolios as collateral¹⁵, and we will, therefore conduct our analysis in line with this approach.

(i) Foreign Currency-denominated Loans on Deeds

According to the comments made by Governor Kuroda at the Governor's Press Conference on December 18, 2015, U.S. dollar-denominated loans on deeds to Japanese corporations amount to

¹⁵ Bank of Japan "Governor Press Conference Summary" (December 21, 2015) (http://www.boj.or.jp/announcements/press/kaiken_2015/kk1512d.pdf)

around 10 trillion yen. When the BOJ accepts collateral from financial institutions, it calculates the value of the collateral by multiplying the market value of the pledged asset or the outstanding principal amount by an assessment rate (haircut rate) according to the remaining term or risk (Figure B2). Yen-denominated loans on deeds are already certified as the BOJ's eligible collateral, and the haircut rate is set at 70~96% depending on the remaining term. In the case of foreign currency-denominated loans on deeds, we apply a haircut rate of 80%, which is the average of those rates for yen-denominated loans for 3-5years(85%) and for 5-7years(75%). In addition, we multiply a haircut rate for foreign currency-denominated bonds of 88%, whereby the amount of foreign currency-denominated loans on deeds that financial institutions could deposit with the BOJ as collateral will become around 7 trillion yen (i.e. the outstanding amount of foreign currency-denominated loans on deeds in the market multiplied by a haircut rate of 80% and by 88%).

Figure B2 BOJ Eligible Collateral and their Values (Haircut rate)

Remaining maturity	Applicable rate of collateral to market price (%)			Applicable rate of collateral to outstanding principal balance (%)	
	JGBs	Foreign bonds (converted to yen)	Asset-backed bonds	Corporate deed loans	Government deed loans
Up to 1 year	99	88	97	96	97
1 - 3 years	99	88	97	91	95
3 - 5 years	99	88	97	85	90
5 - 7 years	98	88	96	75	85
7 - 10 years	98	88	96	70	80
10 - 20 years	97	88	95	—	—
20 - 30 years	96	88	94	—	—
Over 30 years	93	87	91	—	—

Source: Bank of Japan, *Eligible Collateral*

However, if we look at yen-denominated loans on deeds to corporations, as of the end of December 2015, the amount deposited with the BOJ as collateral by financial institutions stood at 4.2 trillion yen, accounting for only 1% of total loans on deeds of Japanese financial institutions, which amounted to around 400 trillion yen (end of November 2015, all currencies). It is, therefore, also possible that the amount of foreign currency-denominated loans on deeds used as BOJ collateral will also be less than the abovementioned 7 trillion yen. Moreover, as explained by Governor Kuroda in his speech to the Meeting of Councillors of Nippon Keidanren on December 24, 2015, when financial institutions deposit loans on deeds to corporations with the BOJ as collateral, consent by the debtor is required¹⁶, and this may also prevent their use as collateral.

(ii) Financial Institutions' Housing Loans as Collateral through a Trust Scheme

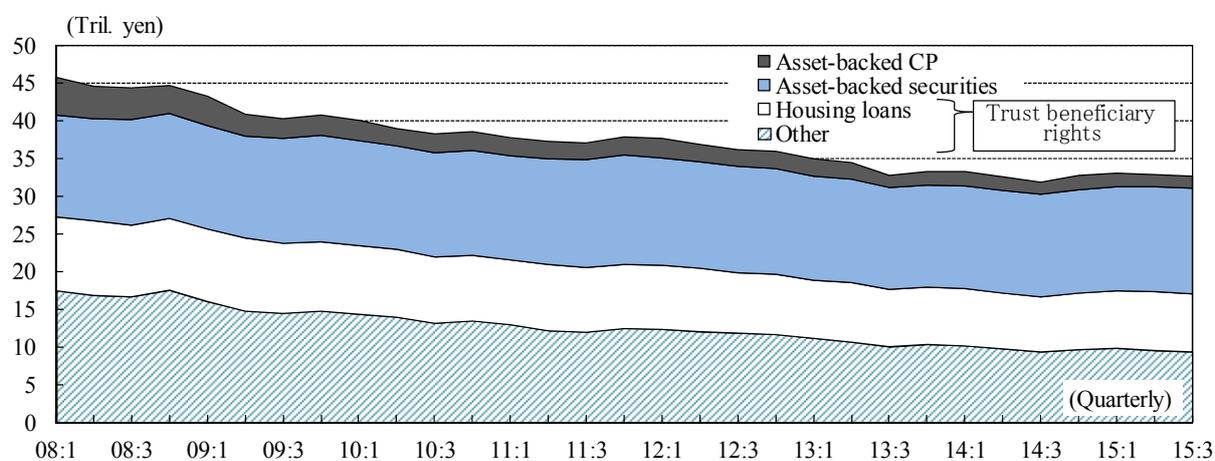
An individual housing loan amounts to tens of millions of yen, but it is also possible to turn housing

¹⁶ Bank of Japan "At the Turning Point - Speech at the Meeting of Councillors of Nippon Keidanren (Japan Business Federation) in Tokyo" (December 24, 2015) (http://www.boj.or.jp/en/announcements/press/koen_2015/ko151224a.htm/)

loans into trust beneficiary interests worth hundreds of millions or billions of yen by using a scheme for entrusting a portfolio of housing loans to a trust bank, etc.¹⁷ Under the latest supplementary measures, financial institutions can turn housing loans into trust beneficiary interests and deposit them with the BOJ as collateral.

Outstanding housing loans by sector as of the end of September 2015 were 116 trillion yen for domestic banks and 15.8 trillion for the Shinkin Bank. As of the end of September 2015, 7.7 trillion yen or 6% of these loans were held in the form of trust beneficiary interests. What is more, the amount of loans held in the form of trust beneficiary interests is trending downward (Figure B3). Details of the scheme for the BOJ's acceptance of housing loan portfolios as collateral will be determined at subsequent policy meetings. However, unless procedures are simplified considerably, there is little prospect of a turnaround in the amount of loans held in the form of trust beneficiary interests (Figure 5). As for the haircut rate, in the case of asset-backed securities, which are also eligible collateral as securitized products, the haircut rate is set at around 90% of market value (Figure B3). Assuming that the haircut rate is also 90% for trust beneficiary interests backed by housing loans, the maximum amount that financial institutions could deposit with the BOJ as eligible collateral is 6.9 trillion yen, i.e. the outstanding amount of 7.7 trillion yen multiplied by a haircut rate of 90%.

Figure B3 Amount Outstanding of Securitized Products continues to fall in the Long-term



Since the above estimates assume that all existing trust beneficiary interests are held by financial institutions and are deposited in full with the BOJ, if trust beneficiary interests are held by investors other than financial institutions, there is less room for them to be deposited as collateral. In fact, the portion of the 14.0 trillion yen in outstanding asset-backed securities (as of the end of September 2015) deposited with the BOJ as collateral amounts to just 1.3 billion yen, which is less than 1% of the total market.

¹⁷ Since the Revision of the Trust Law in 2006, "Declaration of Trust (Self-trust)" has been made possible.

Appendix C. Is 10 trillion yen the Maximum Amount of Other Assets that could be Sold?

Given the limited room for long-term JGB purchases, could the BOJ not increase its purchases of other assets instead? The BOJ has already purchased Exchange Traded Funds (ETFs), Real Estate Investment Trusts (REITs), corporate bonds, and commercial paper (CP). Other assets the BOJ could purchase in the future include local government bonds and government agency bonds. Figure C1 shows the results of estimating the amount of each class of assets the BOJ could buy. The amount of assets other than long-term JGBs the BOJ could buy was no more than around 10 trillion yen in total. The following section examines this in more detail.

Figure C1 Estimation Result for the Amounts of Various Assets excluding JGBs Purchasable by BOJ

Types of assets	Amount purchasable by BOJ (JCER assumptions)	Amount already purchased by BOJ (tril. yen)	Further purchases (maximum amount, tril. yen)
ETFs	50% of yearly increase (estimated 3 tril. yen) of purchasable brands	6.2	1.5/year
REITs	Up to 5% of agg. market capitalization of AA credit ratings (8.6 tril. yen as of Nov 2015)	0.3	0.2
Corporate bonds	Up to 5% of amount outstanding (70.8 tril. yen as of June 2015)	3.2	0.3
CPs	No further purchases	2.2	0.0
Local government bonds	Up to 5% of amount outstanding (74.4 tril. yen as of June 2015)	0.0	3.7
Government-related bonds	Up to 5% of amount outstanding (76.8 tril. yen as of June 2015)	0.0	3.8
Total		11.9	9.5

Note: The maximum purchasable amount of ETFs is estimated as the amount held for at least one year.

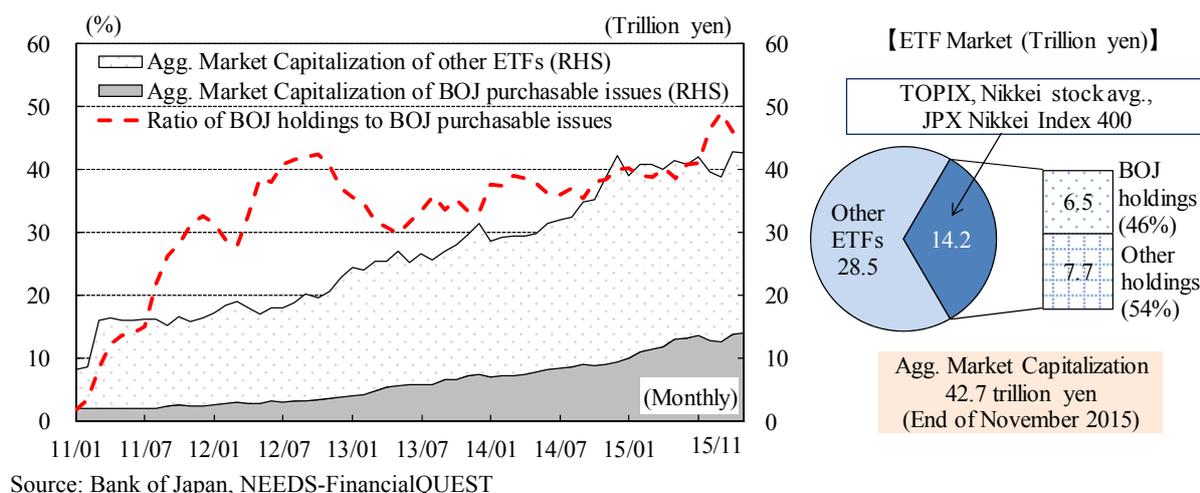
Source: Bank of Japan, *Flow of Funds Account*

(i) Index-linked Exchange Traded Funds (ETFs)

The BOJ began buying ETFs at the end of 2010. To minimize market intervention, the upper limit of purchases was set at 1 trillion yen per year under the QQE program introduced in April 2013, and 3 trillion yen per year from the additional easing commenced in October 2014, and the scope of purchases was also limited to 20 issues¹⁸. Purchases in 2015 amounted to 2.8111 trillion yen by the end of November, within eyeshot of the annual purchase upper limit of 3 trillion yen. On a stock basis, the outstanding amount of ETFs held by the BOJ as of the end of September 2015 was 6.2 trillion yen, which is equal to 16.0% of the entire ETF market, and looking solely at the 20 issues targeted for purchase by the BOJ, the BOJ's share is abnormally high at 49.3% (Figure C2).

¹⁸ More specifically, only products that are linked to the Tokyo Stock Price Index (TOPIX), Nikkei Stock Average (Nikkei 225) or JPX Nikkei index 400 (JPX Nikkei 400) (as of the end of November 2015, 20 issues out of 195).

Figure C2 BOJ now holds the Large Part of ETFs in the Market



In this report, we strictly set the upper limit on the BOJ's holdings of these 20 issues at 50%, from the viewpoint of avoiding excessive market intervention. Since its current share is close to 50%, any additional purchases would be made through growth in total value of the ETF market. The total market value of the issues eligible for purchase by the BOJ was 6.6 trillion yen at the end of September 2013, 9.1 trillion yen at the end of September 2014 (137.5% of the same period of the previous year), and 12.7 trillion yen at the end of September 2015 (139.9%). If we simplify this and assume that the total market value increases at an annual pace of 3 trillion yen, then the amount that the BOJ can purchase will increase at an annual pace of 1.5 trillion yen. If the amount of purchases is increased, the upper limit on the ratio held will have to be raised.

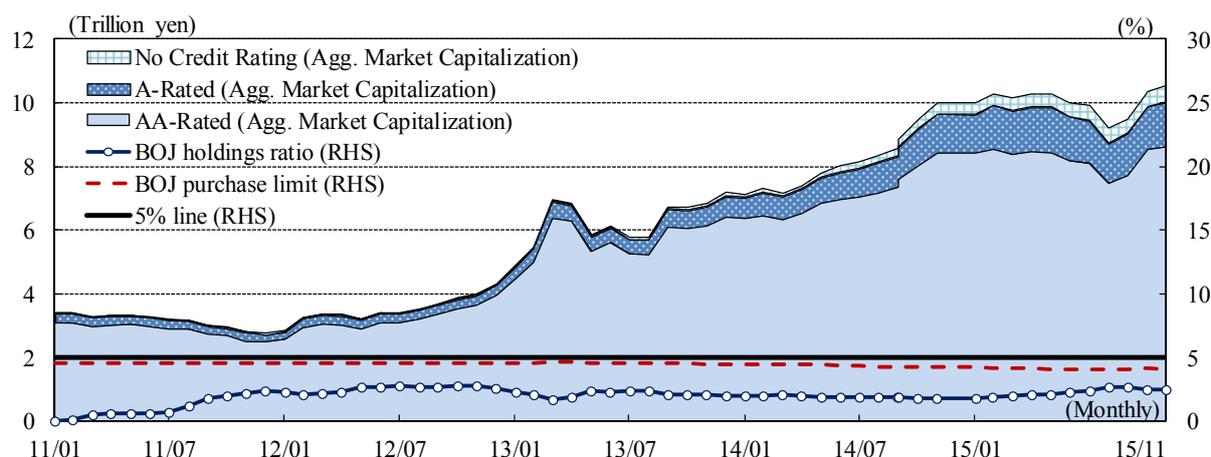
(ii) Real Estate Investment Trusts (REITs)

Moving on to REITs, as with ETFs, the BOJ began purchasing REITs at the end of 2010. Its current buying limit is 90 billion yen per year and there are other restrictions, for example, the BOJ can only buy REITs rated AA or higher (as of the end of November 2015, 29 issues out of 52) and the buying limit per issue is set at 5% of total issued and outstanding investment units¹⁹. In 2015, the amount of purchases reached 87.3 billion yen by the end of November 2015. So is there any room for expansion in the amount of REIT purchases?

Figure C3 shows a breakdown of outstanding issues by rating and the share of the total market value held by the BOJ. As of the end of November 2015, the total market value of the AA-rated issues eligible for purchase by the BOJ amounted to 8.6 trillion yen, and AA-rated issues account for the majority (86=1/7%) of the REIT market. The share held by the BOJ is 2.5% of the total market and 3.1% of AA-rated issues.

¹⁹ In addition, purchases are limited to REITs whose purchase and sale have been transacted on a financial instruments exchange 200 days or more per annum with a total trading value of 20 billion yen or more per annum.

Figure C3 BOJ Purchases of Real Estate Investment Trust is also reaching its Limit



Note: Maximum purchasable amount for the BOJ = Market value of AA-rated REIT x 5%

Source: Bank of Japan, NEEDS-FinancialQUEST, Japan Credit Rating Agency, Ltd., Rating and Investment Information, Inc.

Since the REIT issues held by the BOJ are not made public, it is impossible to verify limits to purchases by issue. Here, we assumed that the value of REITs the BOJ could purchase was approximately 5% of the total market value of AA-rated issues and estimated that the amount that could be additionally purchased was 165.3 billion yen²⁰.

Assuming that market size and purchase limits remain the same, the BOJ will only be able to keep buying REITs for a remaining 1.4 years. While some argue that another option for QE expansion is to lower eligibility for purchase from an AA rating to an A rating, this would not lead to any substantial increase in the purchase limit as the total market value of A-rated issues as of the end of November 2015 was no more than 1.4 trillion yen. Raising the upper limit on the holding ratio is also likely to be difficult to achieve in view of the impact on REIT control and market supply and demand.

(iii) Corporate Bonds and CPs

Can increasing purchases of corporate bonds and CPs be an option? The BOJ is still implementing reinvestment measures, maintaining corporate bond holdings of around 3.2 trillion yen and CP holdings of around 2.2 trillion yen²¹. While the BOJ's share of the CP market is high and further purchases would not be easy, the BOJ's share of the corporate bond market is just 4% and there is conceivably room for additional purchases. If the BOJ increased its holdings, setting an upper limit of 5% of the market in the same way as for REITs, this would mean an increase of 0.3 trillion yen per year.

²⁰ Calculated by assuming that the BOJ purchases 5% of the total market value of AA-rated issues (430.0 billion yen) and by deducting the BOJ's holdings as of the end of November 2015 (264.7 billion yen).

²¹ Bank of Japan "Expansion of Qualitative and Quantitative Easing" (October 31, 2014) (https://www.boj.or.jp/announcements/release_2014/k141031a.pdf)

(iv) Local Government Bonds and Government Agency Bonds

Although not currently purchased by the BOJ, quasi-government-bond-type bonds in the form of local government bonds and government agency bonds (comprised of government-guaranteed bonds, non-government-guaranteed bonds, and FILP agency bonds) could also be included in the scope of additional purchases. As of the end of June 2015, outstanding local government bonds and outstanding government agency bonds amounted to 74.4 trillion yen and 76.8 trillion yen respectively, and the market is similar in size to the corporate bond market.

If the BOJ bought both types of assets, the low level of liquidity would be a concern. Looking at the annual turnover (frequency of sales and purchases) of each type of asset, we see that turnover is much lower for local government bonds (0.3), government-guaranteed bonds (0.6) and FILP agency bonds (0.4) than for JGBs (10.0), and that even if the BOJ were to buy them, the scale of such purchases would most likely be limited. If the BOJ purchased such assets in the same way as REITs and corporate bonds until it held a 5% market share, it would be able to purchase 3.7 trillion yen in local government bonds and 3.8 trillion yen in government agency bonds.

Based on the above, the maximum amount of assets other than JGBs the BOJ could purchase is no more than about 10 trillion yen in total. From a quantitative perspective, there are not really any alternative assets to long-term JGBs. Also considering the risks to the BOJ of purchasing the individual assets and the question of excessive market intervention, this is also not the ideal way to sustain its current QQE program.

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Japan Center for Economic Research (JCER)

Nikkei Inc. Bldg. 11F 1-3-7 Otemachi, Chiyoda-ku, Tokyo 100-8066, Japan

Phone: +81-3-6256-7710 / FAX: +81-3-6256-7924