

# Liquidity in the Cash Market: An Evaluation from Detailed Transaction Data



August 2018

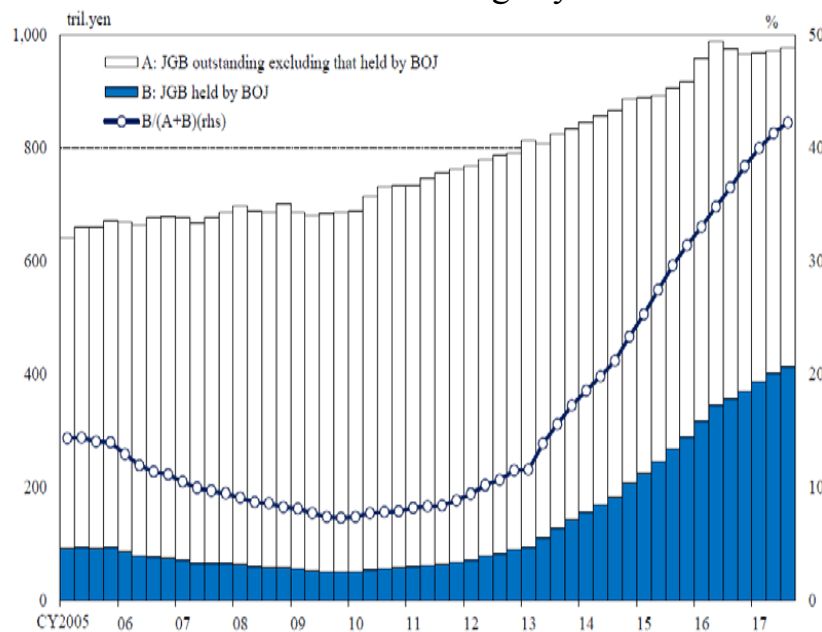
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# Importance of grasping JGB cash market liquidity

- BoJ has been purchasing massive amounts of cash JGBs since the introduction of “Quantitative and Qualitative Monetary Easing (QQE)” in April 2013 (In September 2016, BoJ introduced a new framework, “QQE with Yield Curve Control”). As a result, BoJ holds over 40% of all JGB issuances. Therefore, it is important to grasp in more detail the liquidity in the JGB cash market, from which BoJ purchases JGBs in particular.
- The definition of “market liquidity” is not necessarily uniform and its quantitative measurement is not simple. Therefore, BoJ tries to capture market liquidity from a broader range of perspectives by utilizing liquidity indicators, market surveys and dialogues with market participants.

Share of JGB holdings by BoJ



Source: Bank of Japan

BoJ’s initiative for grasping JGB market liquidity

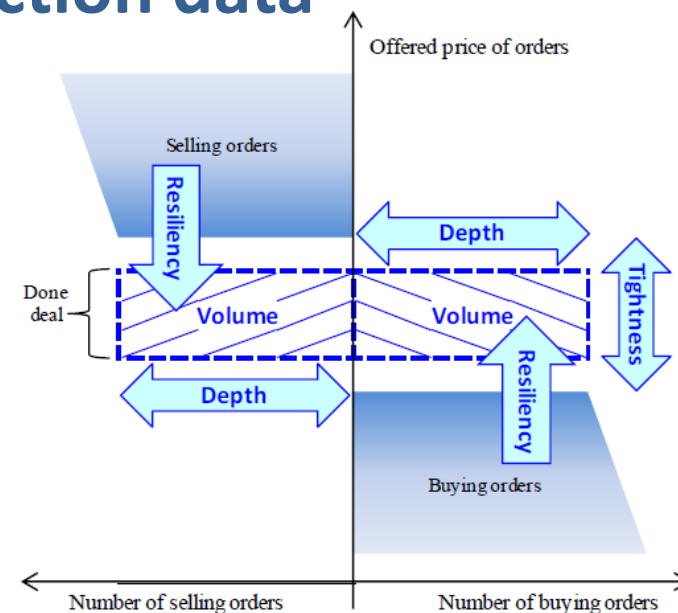
	(i) Liquidity Indicators in the JGB Markets	(ii) Bond Market Survey
Contents	Liquidity indicators using individual transaction data to monitor liquidity in the JGB markets from multiple angles	Market participants’ views on functioning of the bond market, outlook of interest rates
Focus	Indicators include both those for the JGB futures market and for the JGB cash market.	Respondents are banks, securities companies, insurance companies etc.



**We expanded liquidity indicators by acquiring tick data**

# Expansion of Liquidity indicators based on detailed transaction data

- BoJ has been releasing “Liquidity Indicators in the JGB Markets” each quarter since 2015. In compiling indicators, we focus on four evaluation axes: volume, tightness, depth, and resiliency.
- However, compilation of liquidity indicators in the JGB cash market was inadequate due to difficulty of obtaining detailed transaction data. We decided to acquire tick data from Japan Bond Trading, the largest company for intermediation of inter-dealer transactions, and expand liquidity indicators.



Liquidity Indicators in the JGB Markets” released by the BoJ

	JGB futures market	JGB cash market	
		Dealer-to-client	Inter-dealer
Volume	◎ Transaction volume	△ Transaction volume	○ Transaction volume
Tightness	◎ Bid-ask spread	○ Bid-ask spread	
Depth	◎ Volume of orders at the best-ask price	△ Best-worst quote spread	
Resiliency	◎ Price impact		

## Newly compiled liquidity indicators

JGB cash market
Inter-dealer
◎ Transaction volume
◎ Bid-ask spread
◎ Total observation time of bid-ask spreads*
◎ Volume of orders at the best-ask (best-bid) price
◎ Ratio of issues by total observation time of the best-ask (best-bid) price*
◎ Price impact

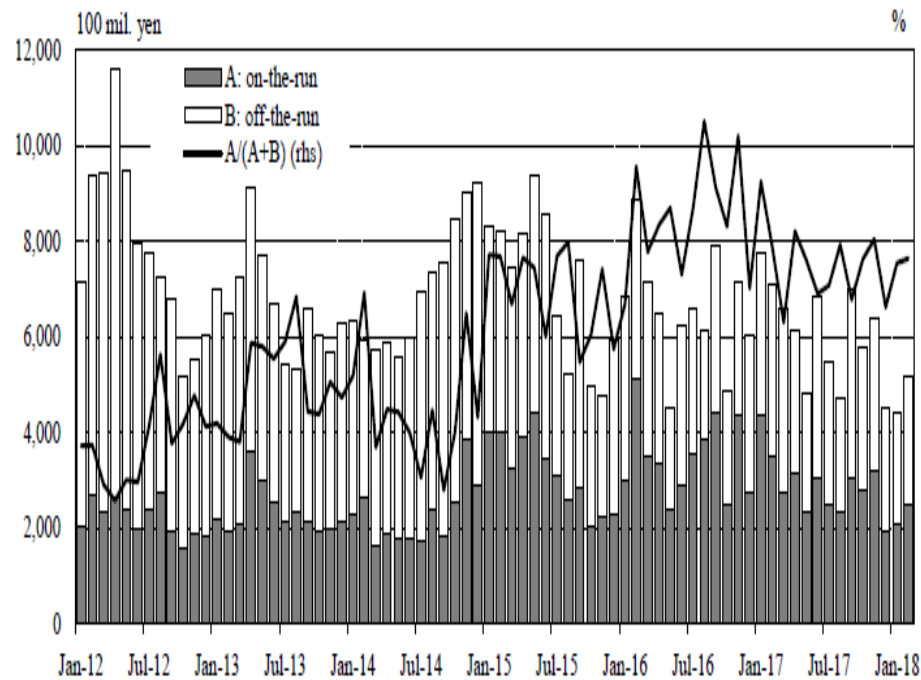
Notes: 1. ◎ : compiled with detailed transaction data, ○ : compiled with daily data, △ : compiled with monthly data.

2. ※ : compiled from new perspectives.

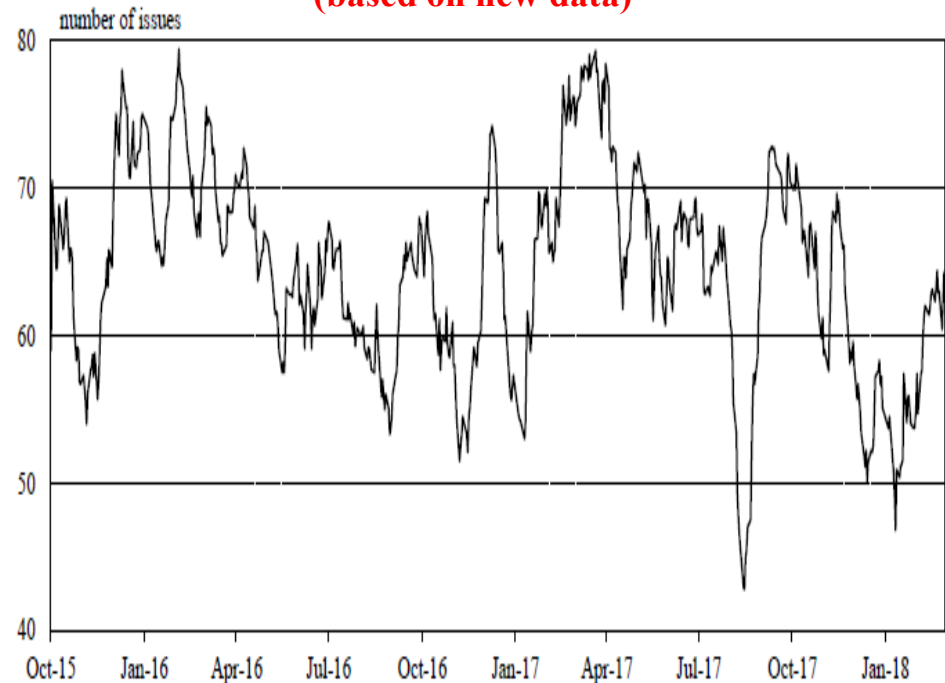
# Liquidity indicators – transaction volume

- From the trend of inter-dealer transactions since 2016, we found that transaction volume remained close to the same level.
- However, with the newly acquired detailed transaction data, we have been able to examine the number of issues of cash JGBs traded each day, which amounted to 50–80 after fall 2015, and then decreased several times to less than 50 in the second half of 2017.

Inter-dealer daily transaction volume



Inter-dealer daily traded issues  
(based on new data)



Notes: 1. Transaction volume is the sum of 2-year, 5-year, 10-year, 20-year, 30-year, and 40-year JGBs via Japan Bond Trading.

2. Number of issues indicates 10-day backward moving average. Latest data as at end-February 2018.

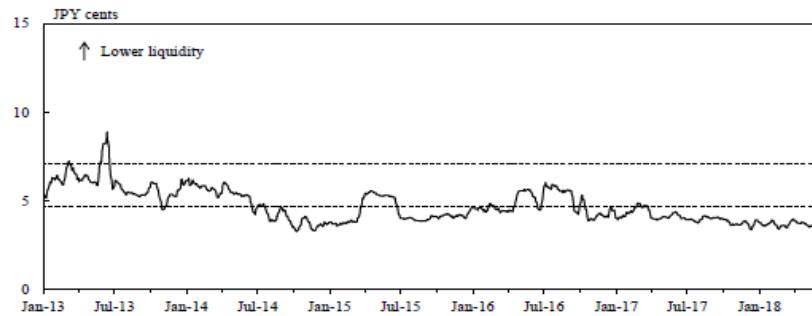
Sources: QUICK, the Japan Bond Trading

# Liquidity indicators – tightness

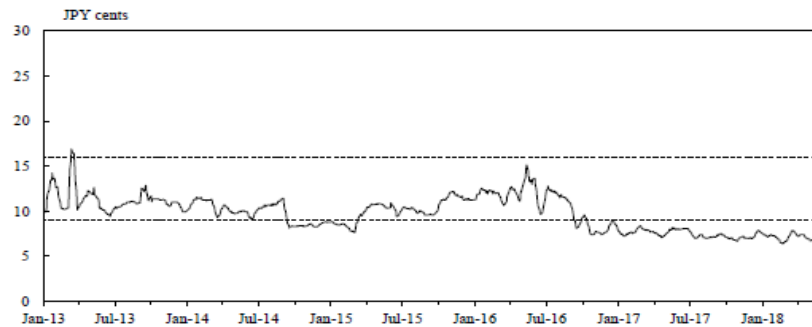
- By using new data, we can also check tightness (measured by bid-ask spreads) in more detail.

## Bid-ask spreads of dealer-to-client transactions

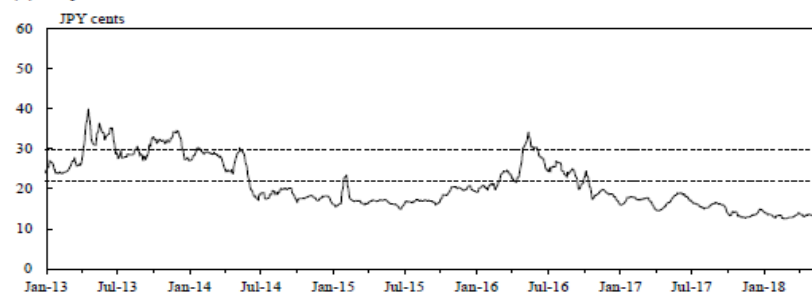
(1) 5-year JGBs



(2) 10-year JGBs



(3) 20-year JGBs

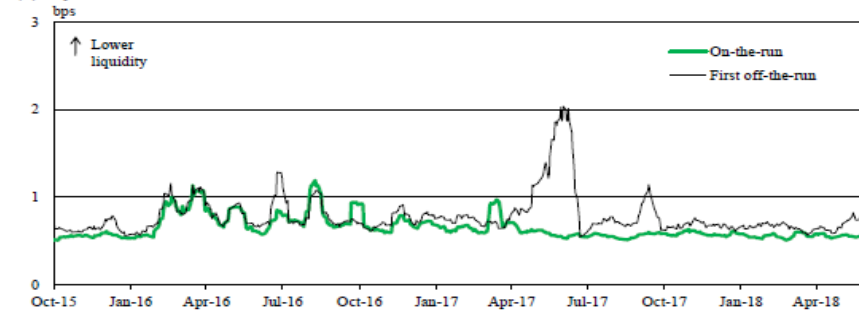


Note: Quotations through Trade web as of 3:00 p.m. Dotted lines indicate the first/third quartile spreads between January 2010 and March 2013. 10-day backward moving average. Latest data as at end-May 2018.

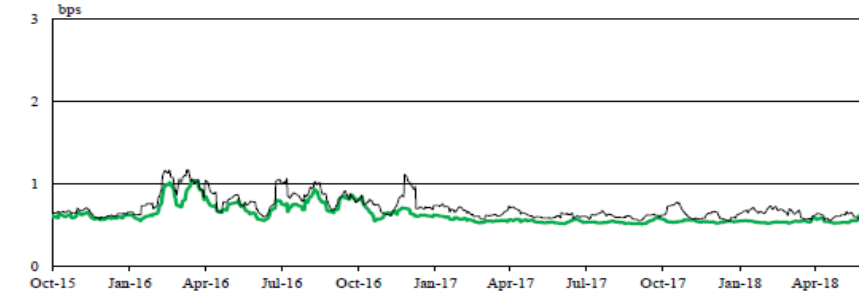
Source: Thomson Reuters

## Bid-ask spreads of inter-dealer transactions (based on new data)

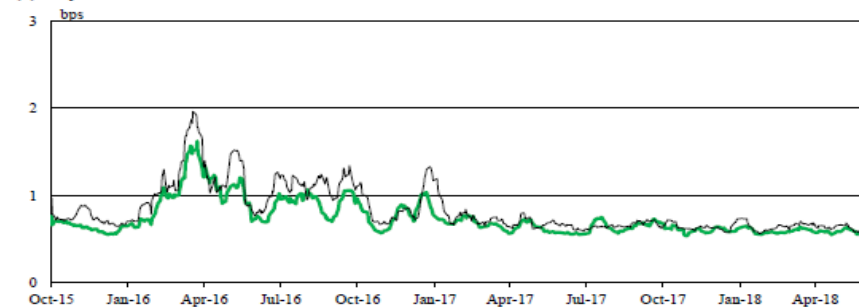
(1) 5-year JGBs



(2) 10-year JGBs



(3) 20-year JGBs

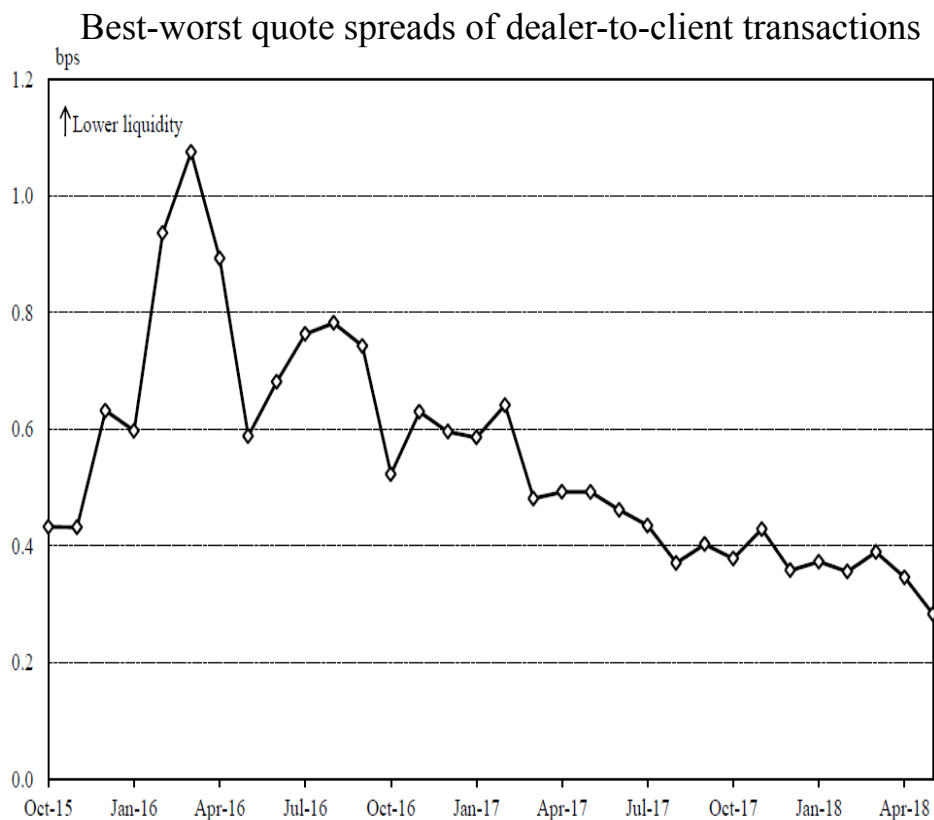


Notes: Figures indicate the average of bid-ask spreads with a 1-second frequency. Bid-ask spreads are calculated only for time periods in which both best-bid and best-ask prices were submitted. 10-day backward moving average. Latest data as at end-May 2018.

Source: Japan Bond Trading.

# Liquidity indicators – depth

- Without newly acquired data, we couldn't construct a "depth" (The larger the volume of orders at the current price level, the smaller the difference between the investors' intended prices and the actual prices).
- Based on the new data, we can construct a new measure – "the volume of orders at the best-ask(bid) price"- which enables us to capture liquidity in the intraday market by issue.



Note: Calculated by averaging the spreads between the best and worst quotes offered by dealers against each client request. Transactions with spreads wider than 10 bps are excluded from the calculation. Latest data as at end-May 2018.

Source: Yensai.com

## Volume of orders at the best-ask (best-bid) price of inter-dealer transactions (based on new data)

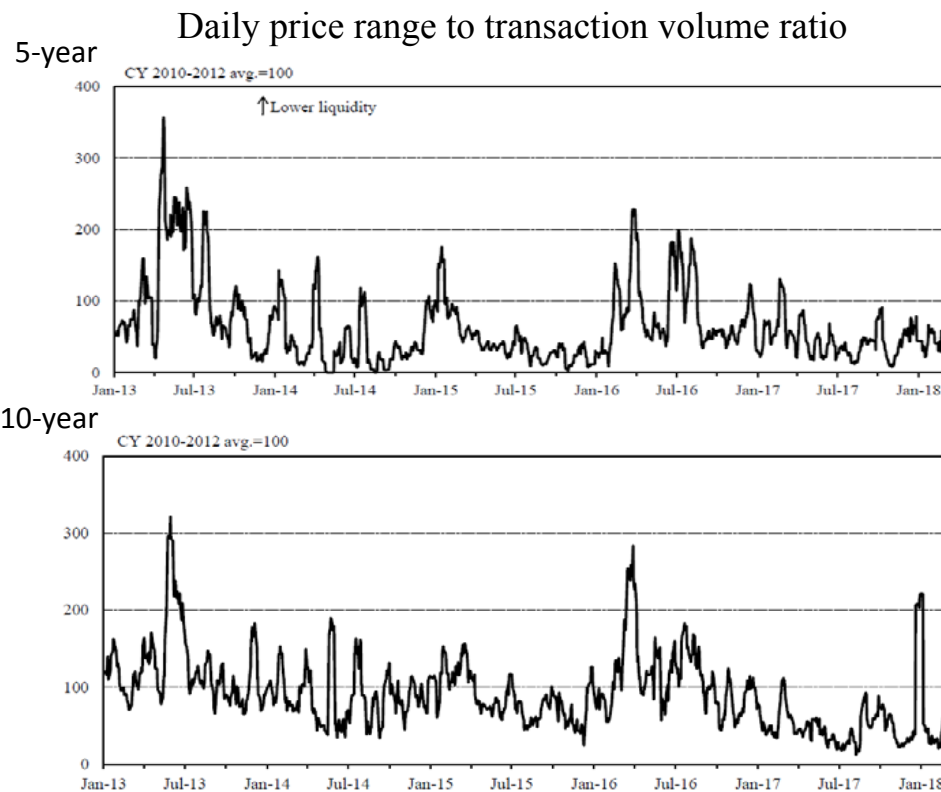


Note: Calculated by summing up the median of volume of orders at the best-ask (best-bid) price with a 1-second frequency per issue. 10-day backward moving average. Latest data as at end-May 2018.

Source: Japan Bond Trading.

# Liquidity indicators – resiliency

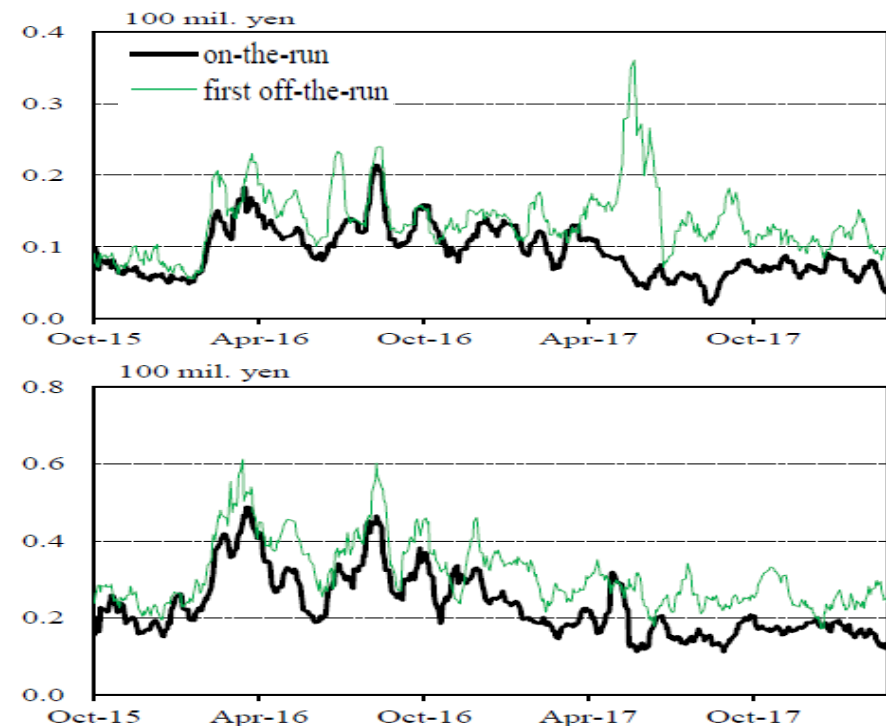
- So far, we depended on a crude measure – “daily price range to transaction volume ratio” – to grasp the resiliency of the JGB cash market.
- Based on the new data, we can construct a new resiliency measure. We have measured the impact of change per unit volume of orders on market prices with information related to orders such as the best-bid and best-ask prices, which is frequently updated rather than with information related to the execution of orders.



Note: Daily price range (the difference between the highest and lowest transaction prices of the day) divided by the transaction volume of the day. 10-day backward moving average. Latest data as at end-February 2018.

Source: QUICK.

## Price impact of inter-dealer transactions (based on new data)



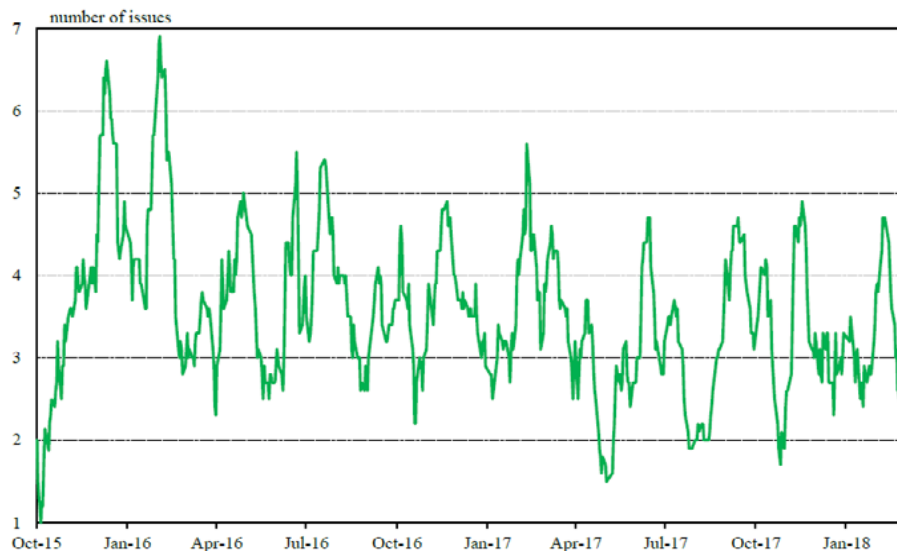
Note: The impact of change per unit of order flow imbalances (OFI, proposed by Cont, Kukanov, and Stoikov(2014)) on market prices measured by dividing change width of the best-bid (best-ask) prices by OFI. 10-day backward moving average. Latest data as at end-February 2018.

Sources: QUICK; Japan Bond Trading.

# Conclusion

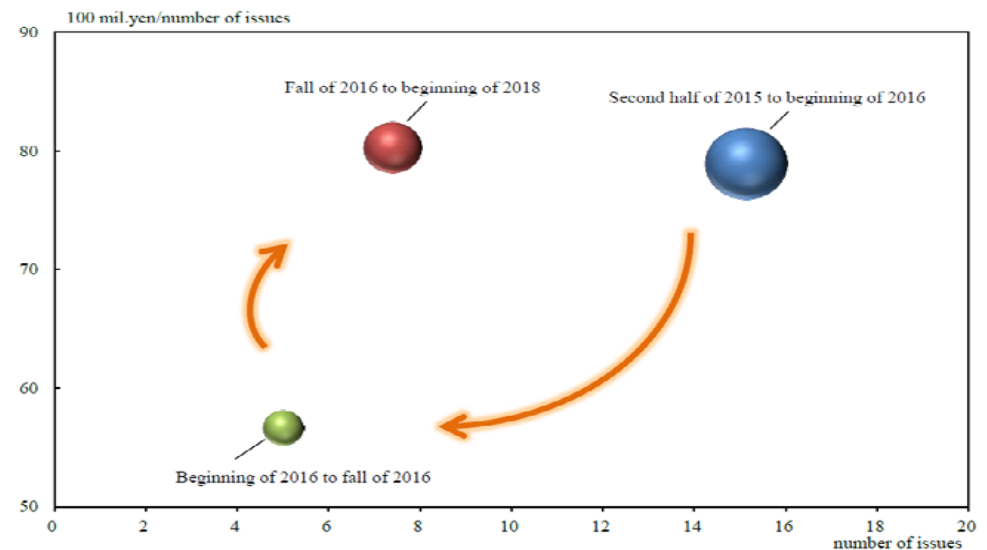
- Examining new liquidity indicators suggests that, as a whole, they have gradually improved since the fall of 2016, after worsening at the beginning of 2016. This suggests it is easier to trade now than it was following the introduction of “Negative Interest Rate.”
- However, we must continue to pay attention to future developments in market liquidity because transaction volume has not increased while some indicators have improved. We also found that improvement in short-term and off-the-run bonds is relatively delayed and have observed situations where liquidity temporarily deteriorates within a day.
- There are remaining points that we cannot grasp very well with indicators (e.g., difficulty in conducting large amount transactions). Thus, it is important to carefully examine these points by using communication with market participants as well as indicators.

**Number of issues thought to be conducted as large amount transactions (based on new data)**



Note: Large amount transactions are 5 billion yen. 10-day backward moving average.  
 Latest data as at end-February 2018.  
 Source: Japan Bond Trading.

**Number of issues and volume of orders assumed as large amount transactions (based on new data)**



Note: Number of issues whose volume of orders at the best-ask exceeds 2.5 billion yen on average per day. Circle size represents the total volume of orders thought to be conducted as large amount transactions.  
 Source: Japan Bond Trading.