

What Did the Yield Curve Control Policy Do?

CIGS Conference on
Macroeconomic Theory and Policy

May 28, 2024

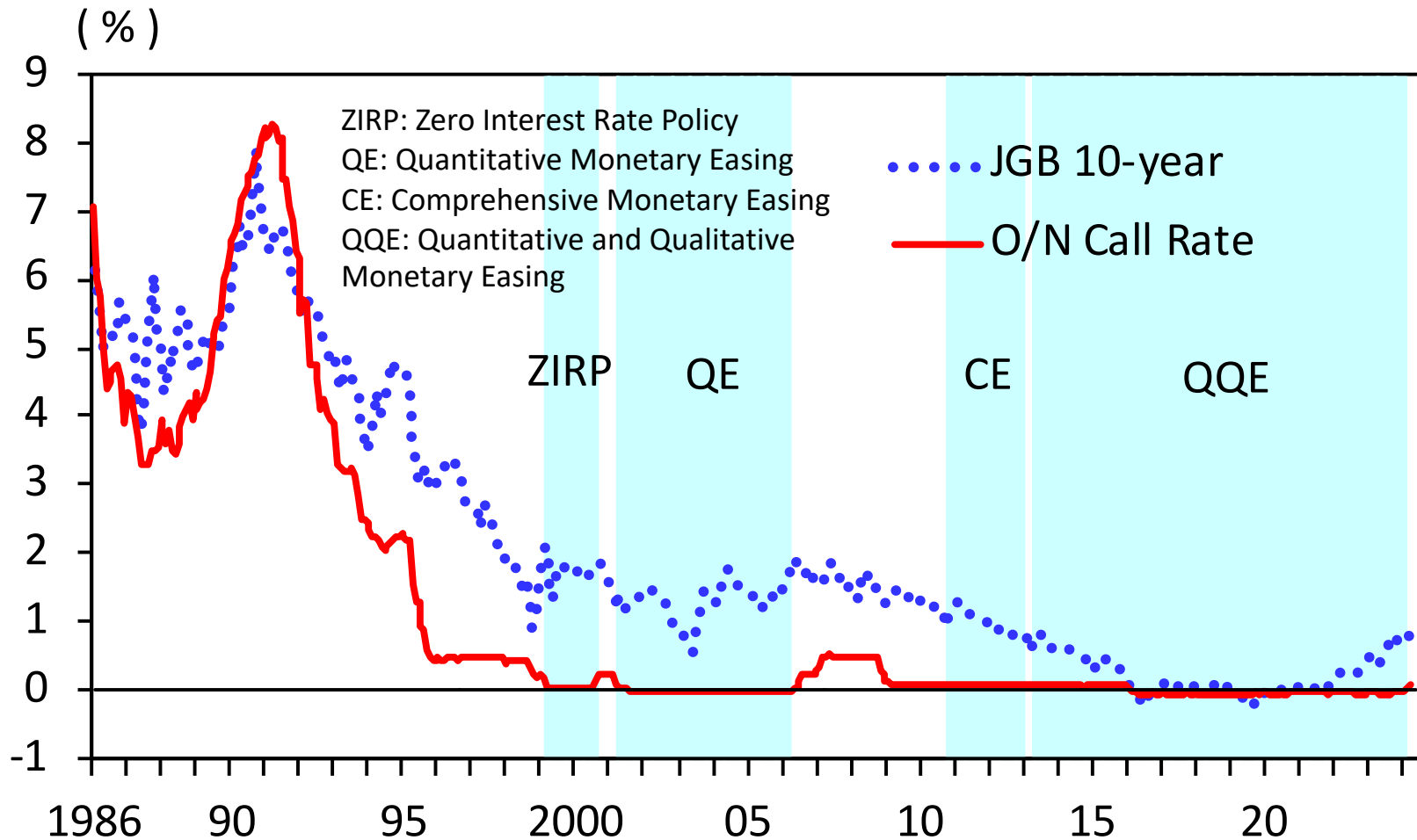
Keio University

Shigenori SHIRATSUKA

Today's Talk

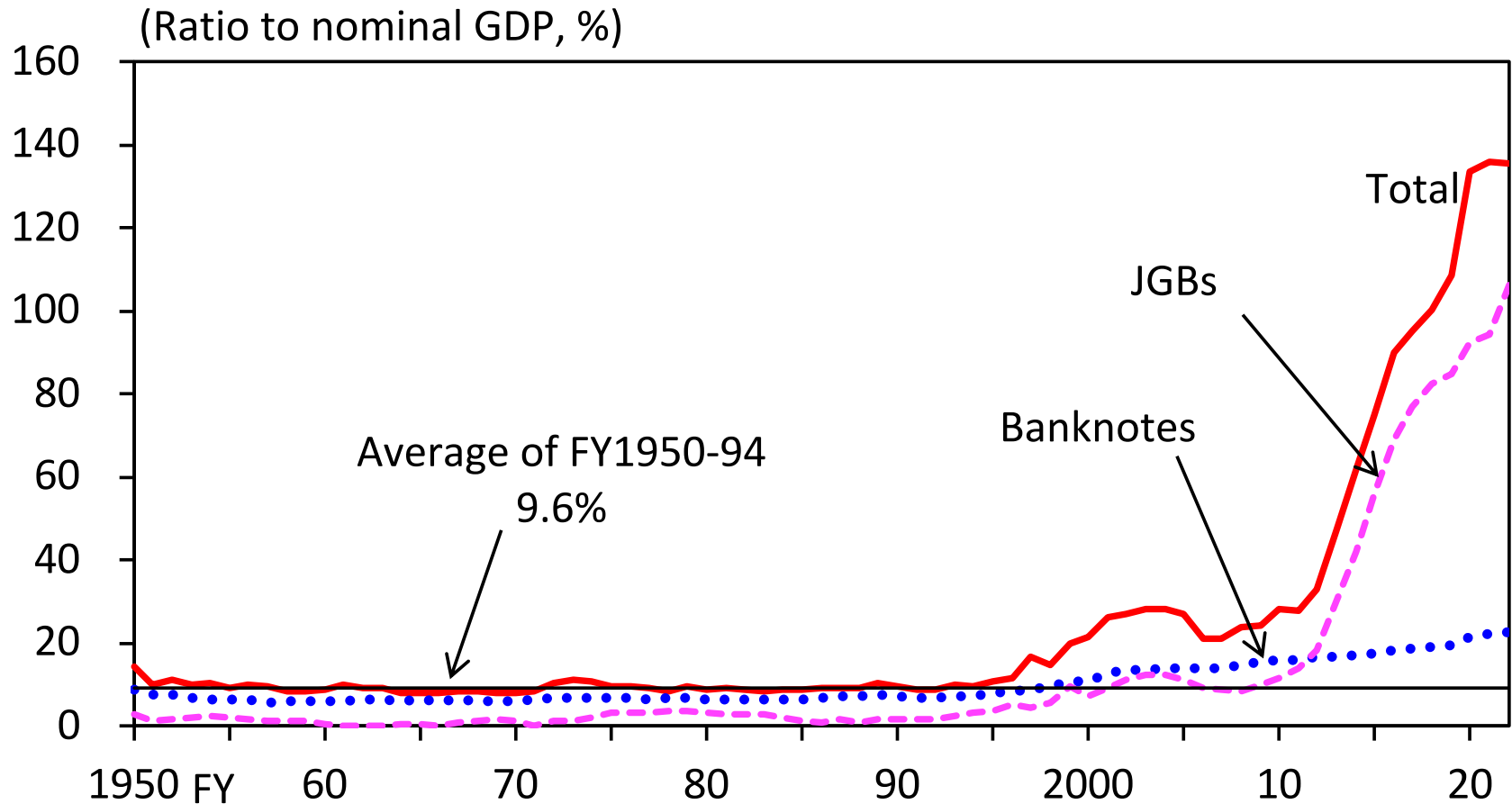
- History of Japan's Unconventional MP
- YCC Policy Framework
- BOJ's Operations under YCC Policy
- OIS-JGB Spreads as an MKT Stress Indicator
- Estimation of BOJ's JGB Market Interventions

Short- & Long-term Interest Rates



Sources: Bank of Japan, Ministry of Finance.

BOJ's Balance Sheet

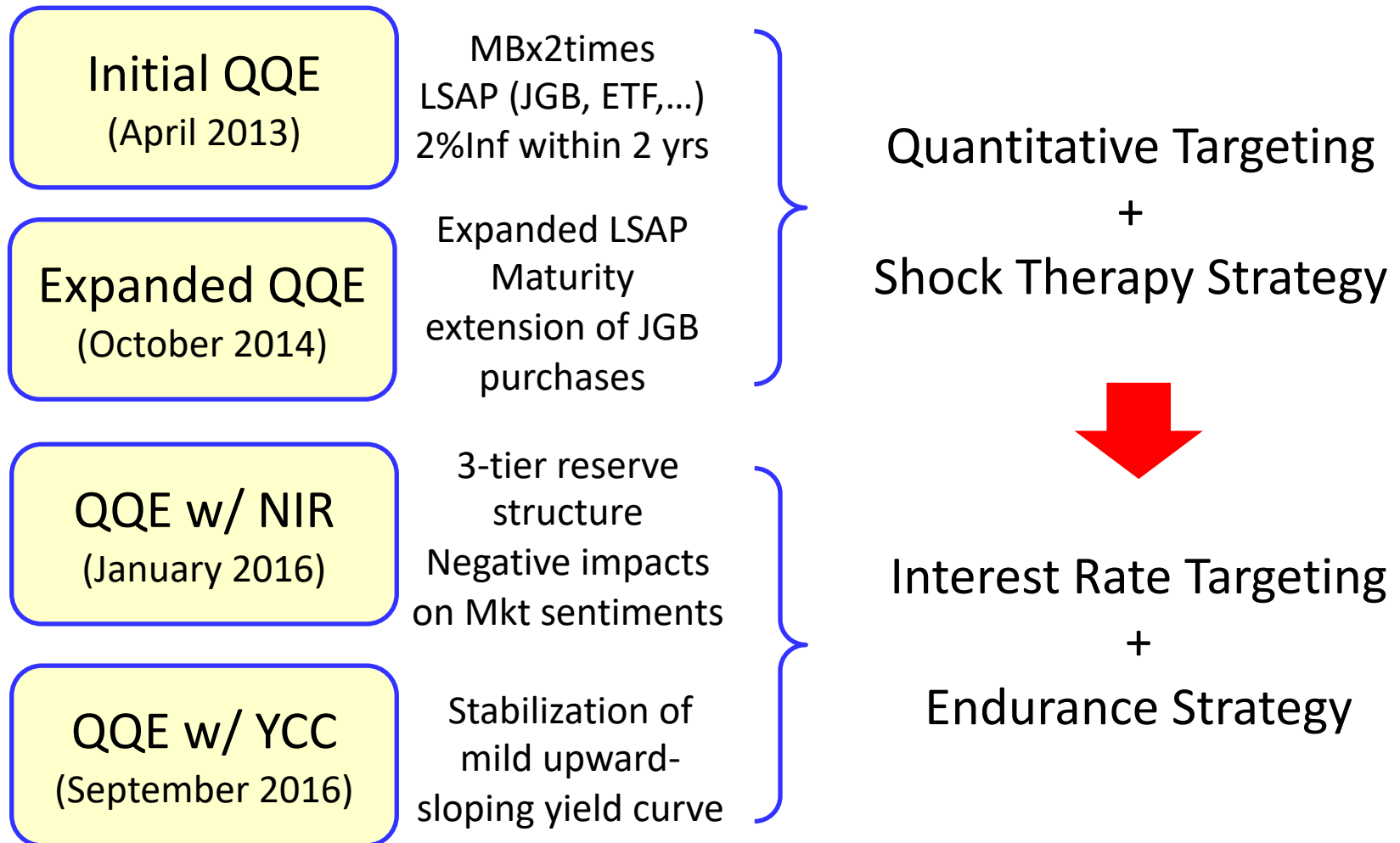


Sources: Bank of Japan, Cabinet Office.

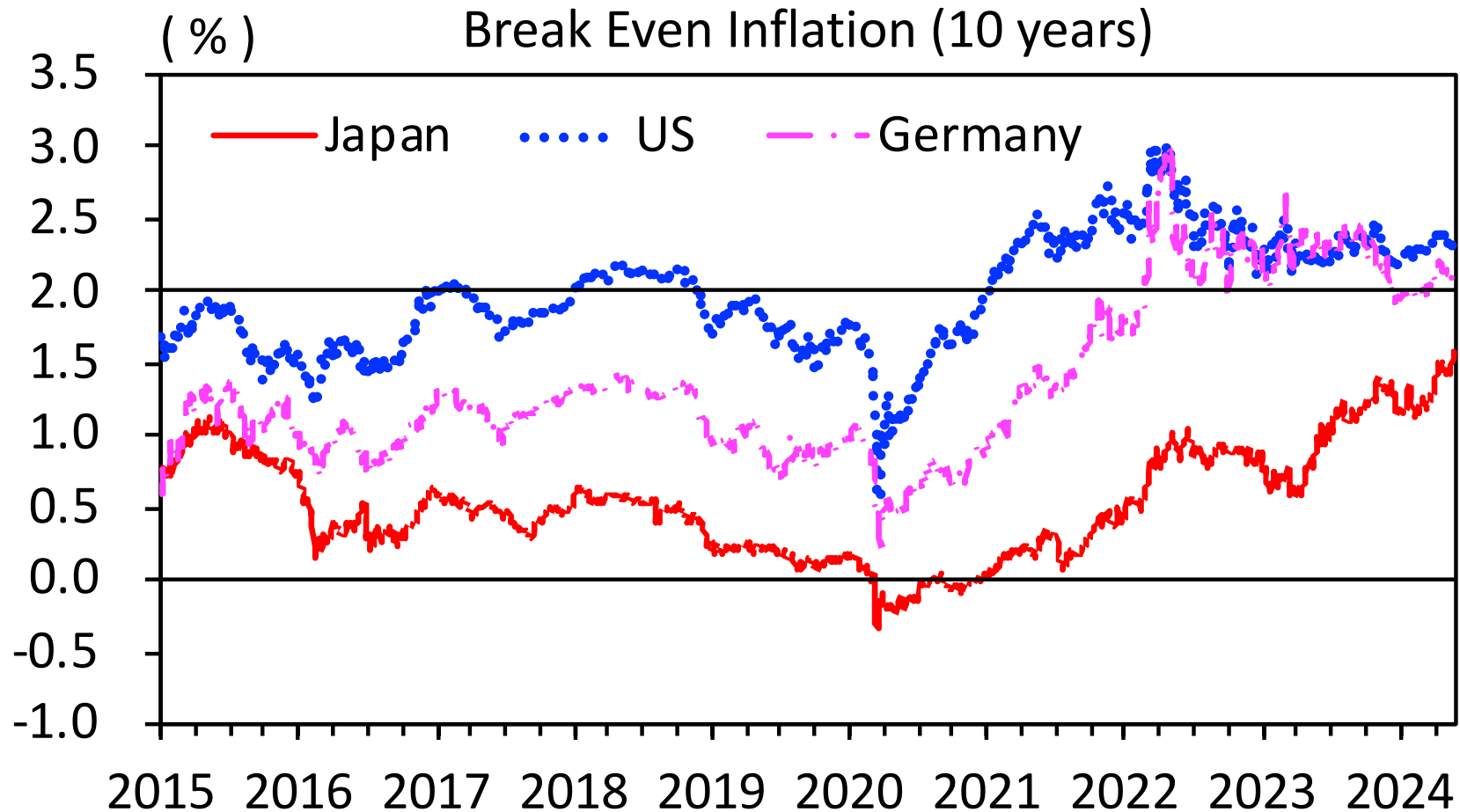
History of Unconventional Policy

- ZIRP (Feb 1999 to Aug 2000)
 - Policy commitment
- QE (Mar 2001 to Mar 2006)
 - Reserve targeting w/ policy commitment
- CE (Oct 2010 to Mar 2013)
 - Expansion of variety for assets purchased
 - Separating accounts for conventional/unconventional assets
- QQE (Apr 2013 to Mar 2024)
 - LSAP for achieving 2% inf within 2 years

Evolution of QQE



Inflation Expectations

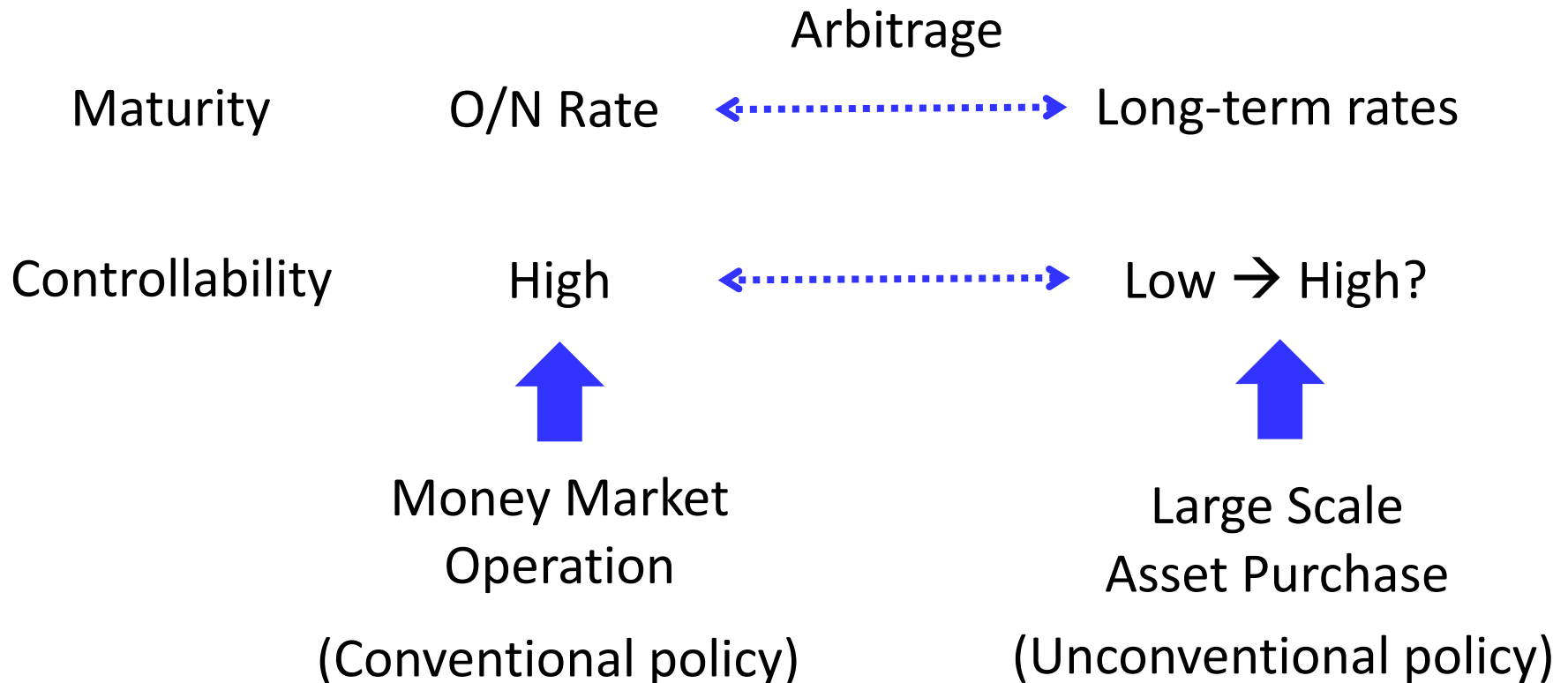


Source: Bloomberg

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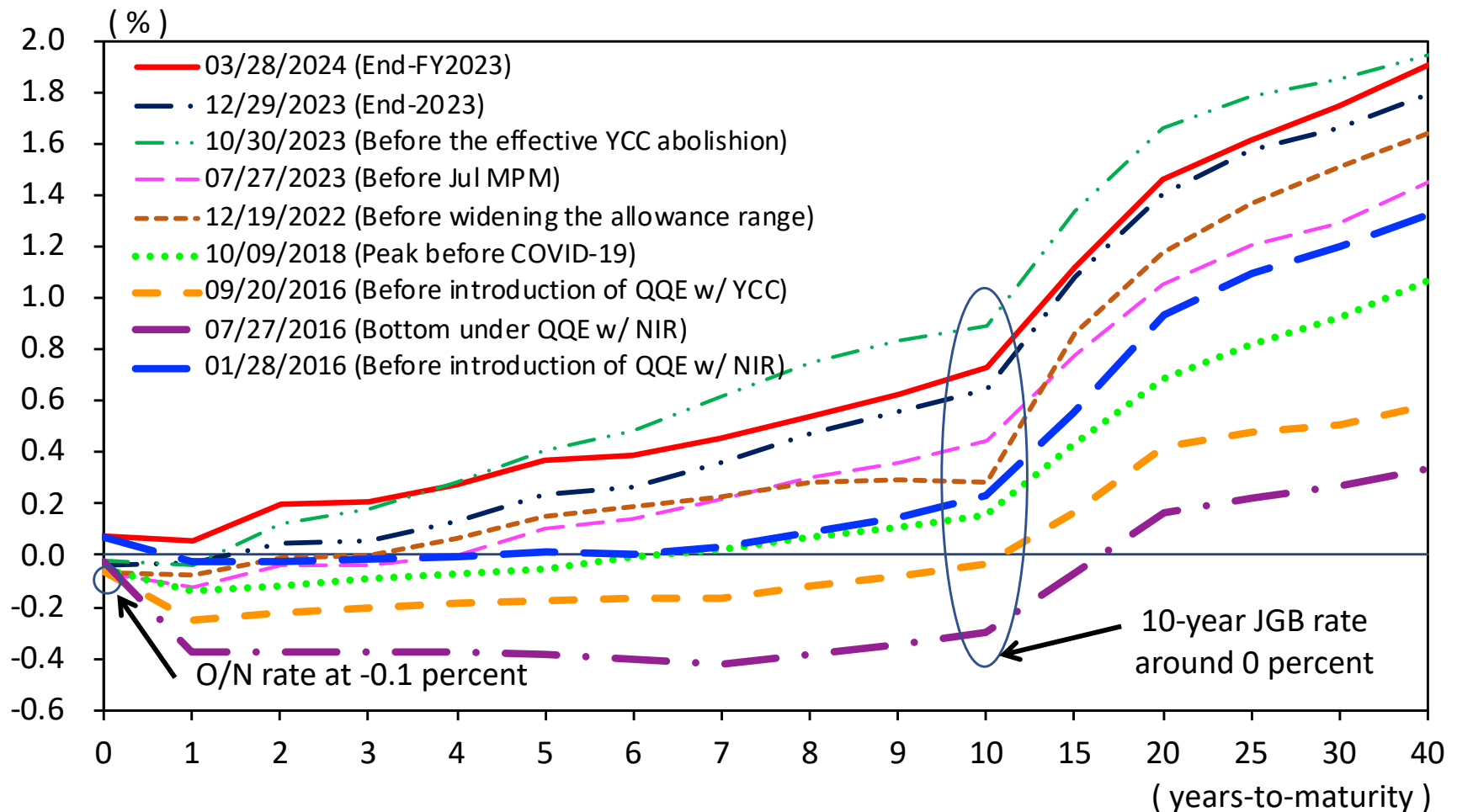
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Interest Rate Control



Border w/ Government Debt Management Policy?

Yield Curve Control



Sources: Ministry of Finance, Bank of Japan.

Monetary Policy Events

	Date	Event	YCC Range
(1)	Oct 5, 2010	Introduction of Comprehensive Monetary Easing (CE)	---
(2)	Jan 22, 2013	Introduction of the Price Stability Target	---
(3)	Apr 4, 2013	Introduction of Quantitative and Qualitative Monetary Easing (QQE)	---
(4)	Oct 31, 2014	Expansion of QQE	---
(5)	Jan 29, 2016	Introduction of QQE with Negative Interest Rates	---
(6)	Sep 21, 2016	Introduction of QQE with Yield Curve Control	-0.1/+0.1%
(7)	Jul 31, 2018	Enhancing the sustainability of QQE with YCC	-0.2/+0.2%
(8)	Mar 16, 2020	Monetary easing to the outbreak of COVID-19	Unchanged
(9)	Mar 19, 2021	Further effective and sustainable monetary easing	-0.25 /+ 0.25%
(10)	Dec 20, 2022	Modification of YCC	-0.5 / +0.5%
(11)	July 28, 2023	Greater flexible management of YCC	?/ +1.0%
(12)	Oct 31, 2023	Further increased flexible management of YCC	?/ +1.0+ α %
(13)	Mar 19, 2024	Termination of QQE	

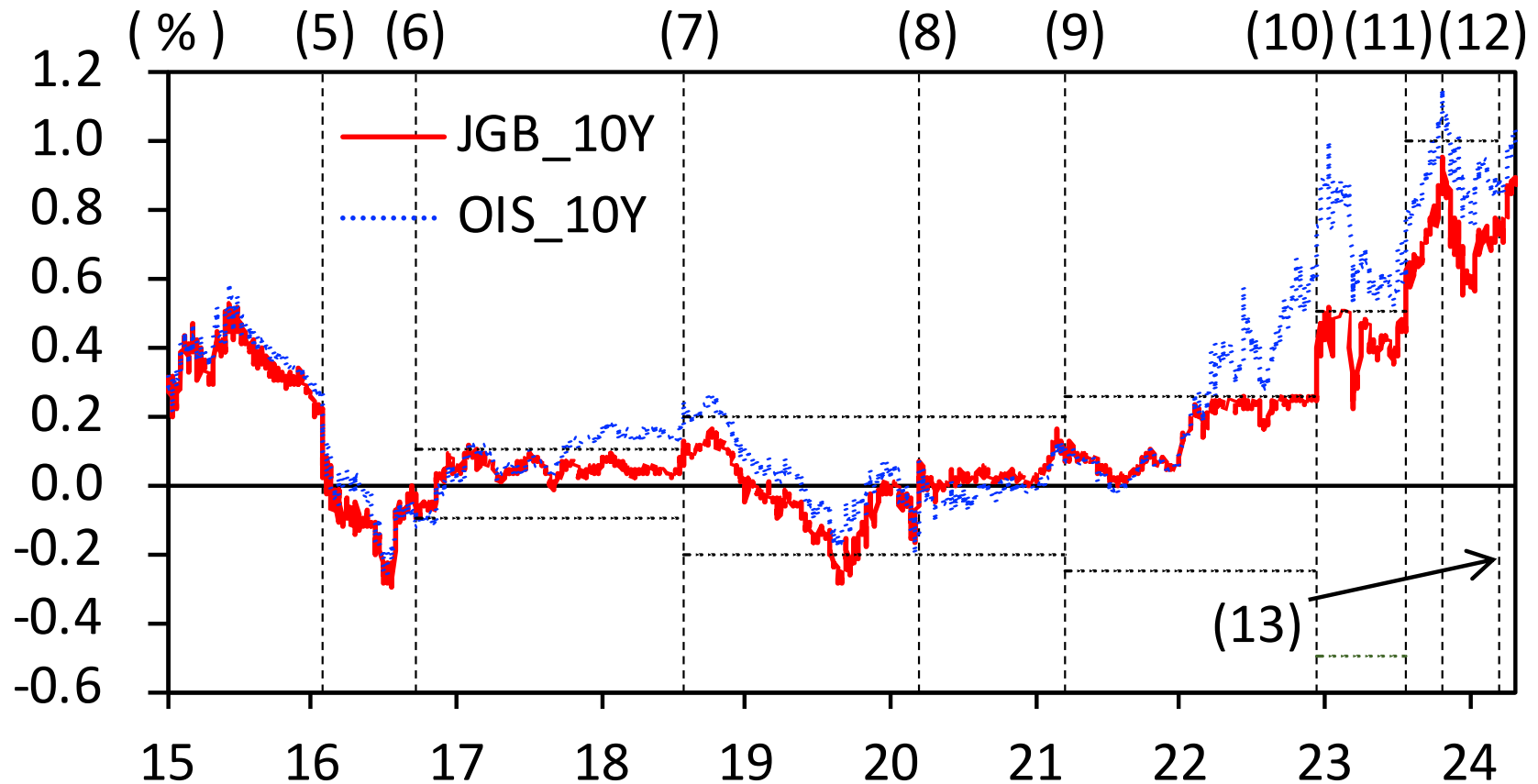
Main Points

- BOJ's JGB Purchases under YCC policy:
 - Massive & intentional Mkt interventions
 - A typical feature of unconventional policy but very limited easing effects
 - Seemingly aggressive but passive & endogenous
 - Just sustain YCC framework
- Comparison of JGB / OIS Markets:
 - Estimation of OIS/JGB yield curves
 - BOJ's JGB purchasing behavior

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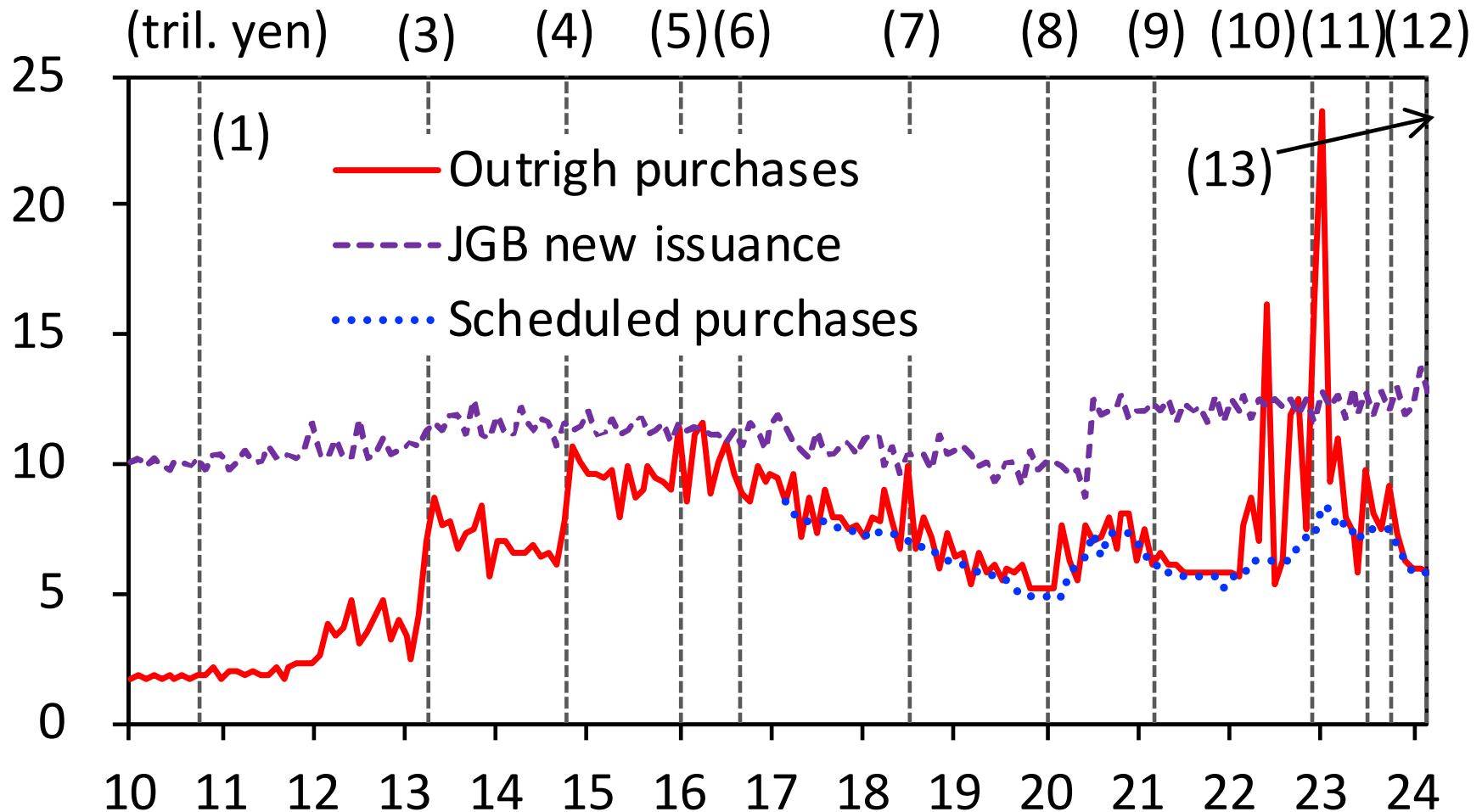
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10-Year JGB Yields & OIS Rates



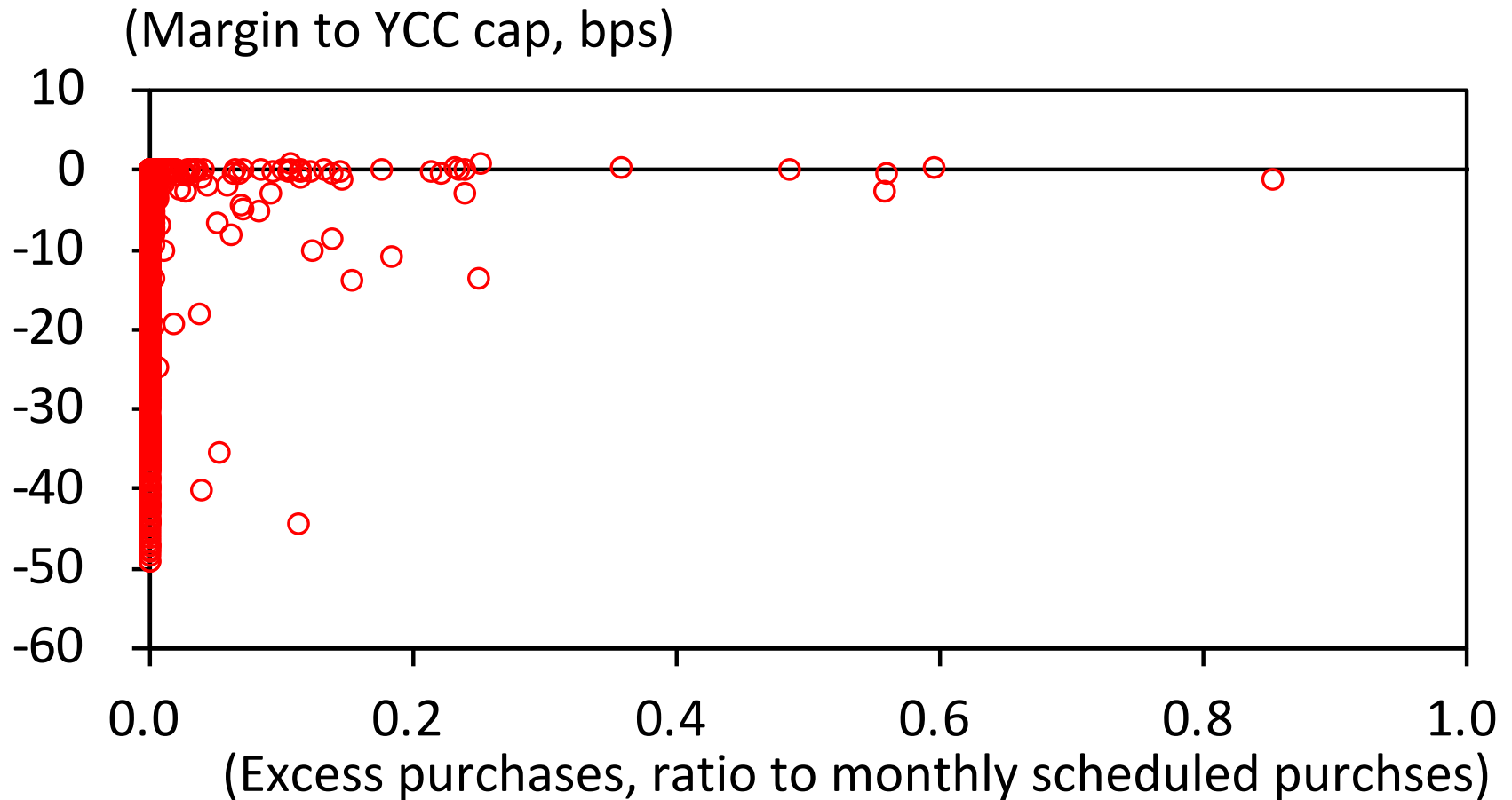
Source: Bloomberg

BOJ's JGB Purchases → Flow interventions

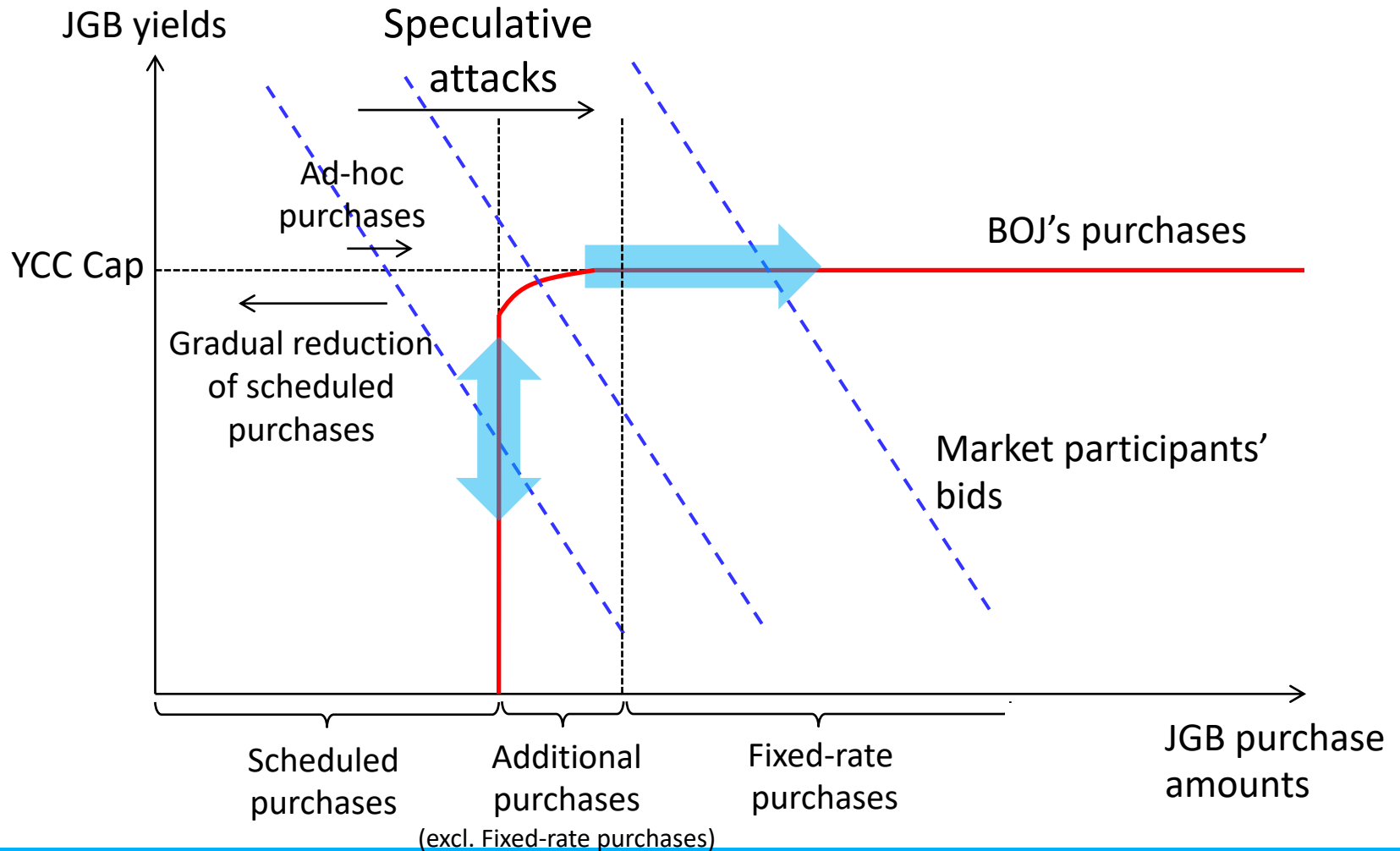


Source: Bank of Japan

BOJ's JGB Purchase Responses



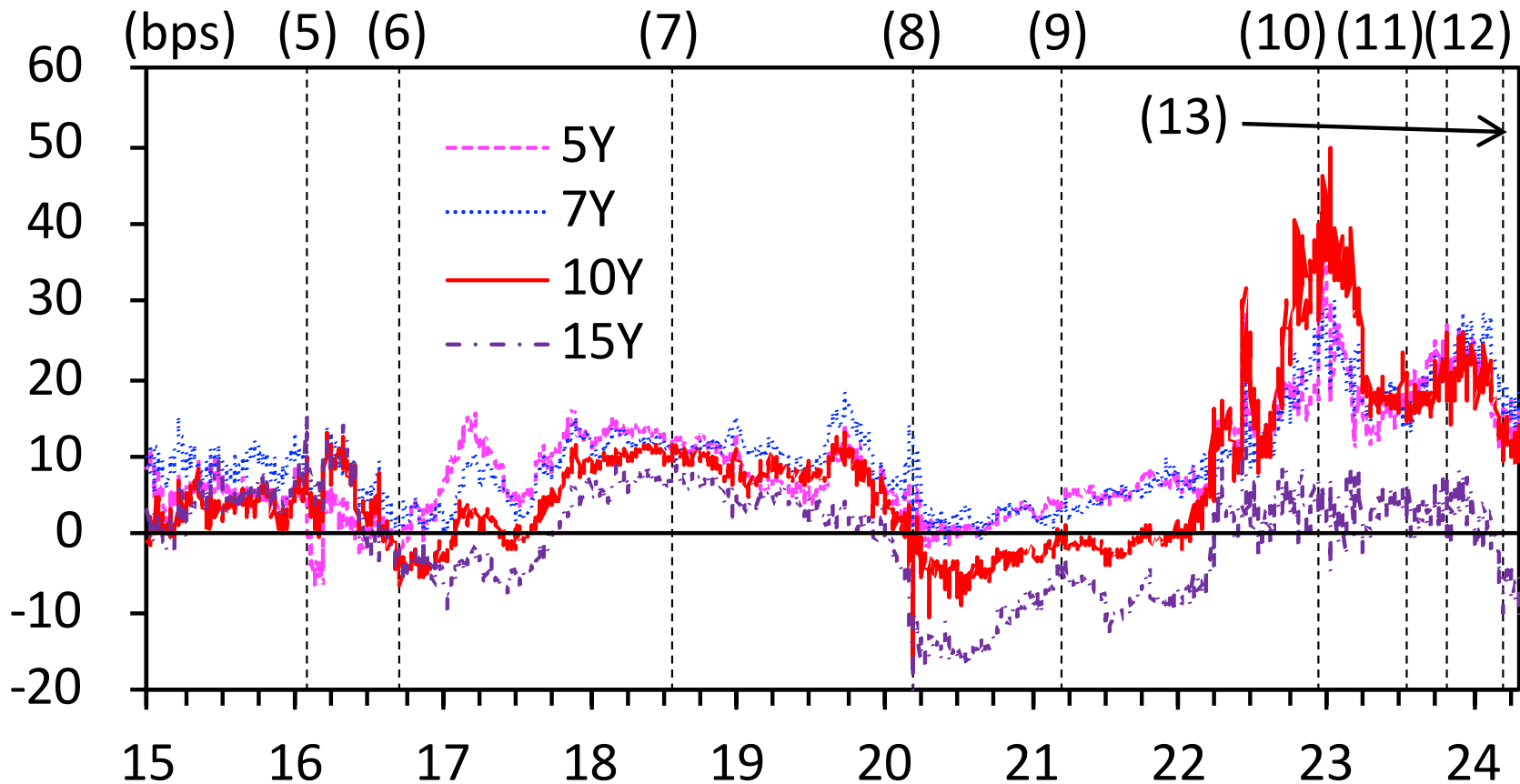
JGB Purchase Operations



Today's Talk

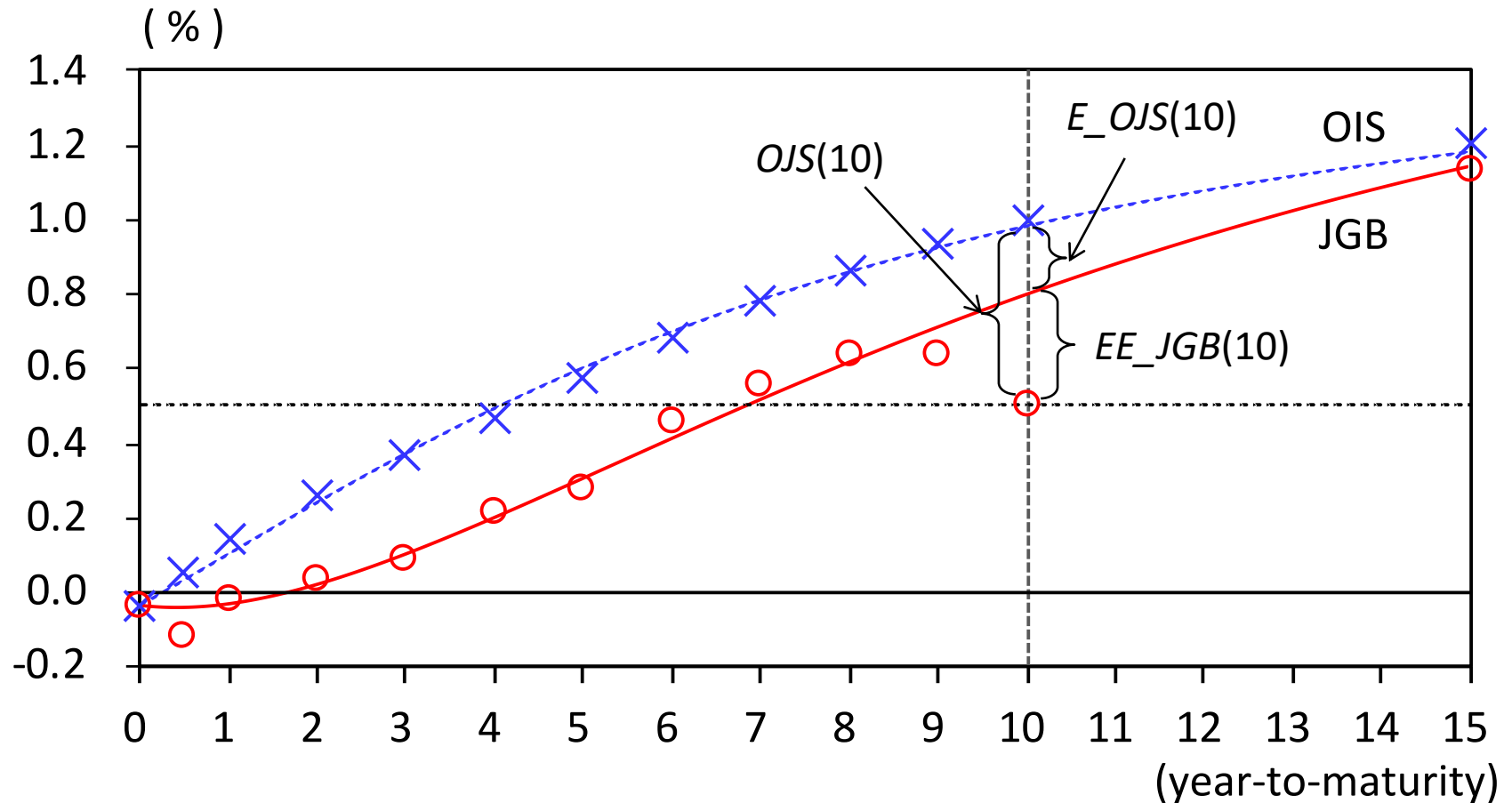
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OIS-JGB Spreads



Source: Bloomberg

Peak of $EE_JGB(10)$: Jan 13, 2023



Source: Bloomberg

Nelson-Siegel Model

- Simple and parsimonious formula
- But flexible enough to capture the general property of yield curve
- Estimation using cross-sectional information

Specification in Instantaneous Forward Rates

$$r(m) = \underbrace{L}_{\text{Level}} + \underbrace{S e^{-\lambda m}}_{\text{Slope}} + \underbrace{C \lambda m e^{-\lambda m}}_{\text{Curvature}}$$

$r(0) = L + S \rightarrow$ Precise estimation on the short-end of the yield curve

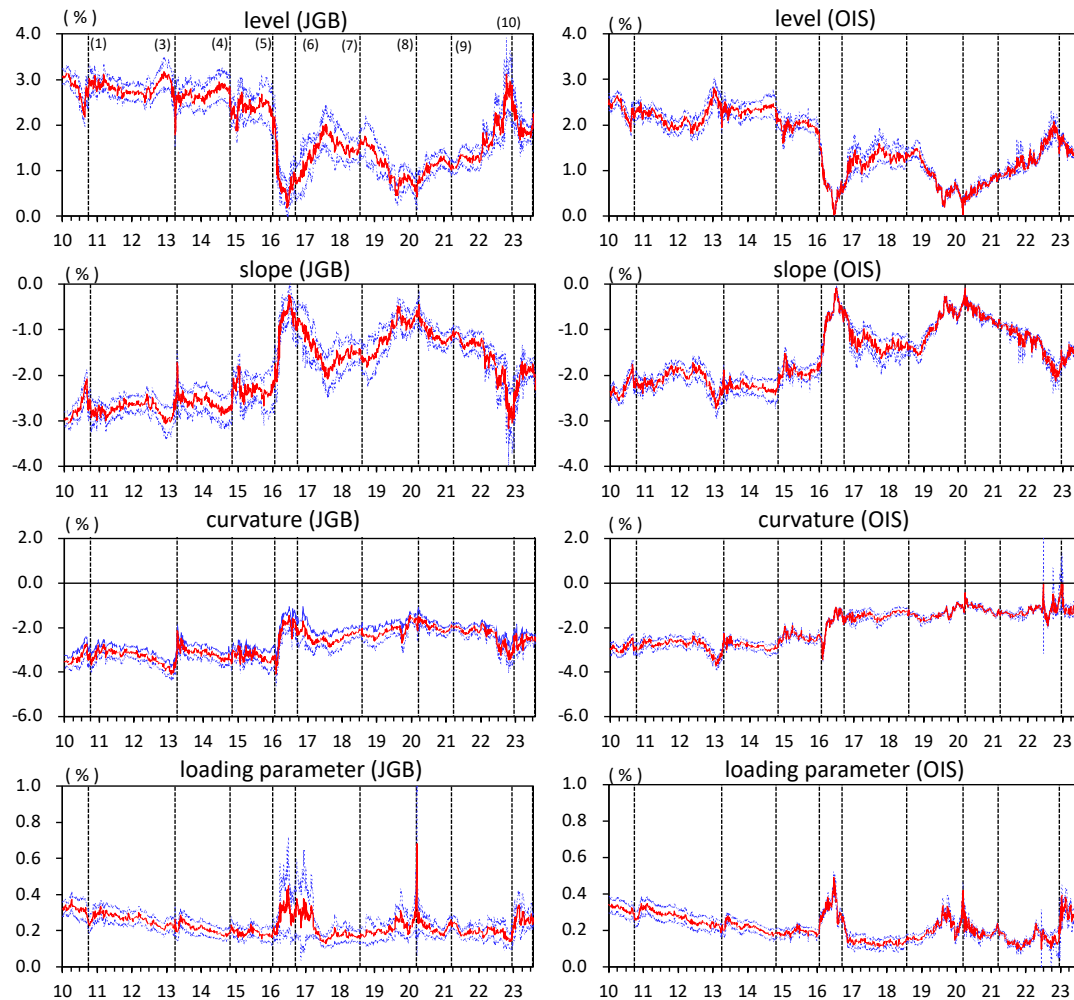
$r(\infty) = L \rightarrow$ Important monetary policy indicator

Decomposition of OIS-JGB Spreads

$$\begin{aligned}
 OJS(10) &= OIS(10) - JGB(10) \\
 &= [OIS(10) - R^{OIS}(10)] \\
 &\quad + [R^{OIS}(10) - R^{JGB}(10)] \\
 &\quad + [R^{JGB}(10) - JGB(10)] \\
 &= EE_OIS(10) + E_OJS(10) \leftarrow \text{General downward pressures on JGB yield curve up to 10-year maturity} \\
 &\quad + EE_JGB(10) \leftarrow \text{10-year maturity cap effects}
 \end{aligned}$$

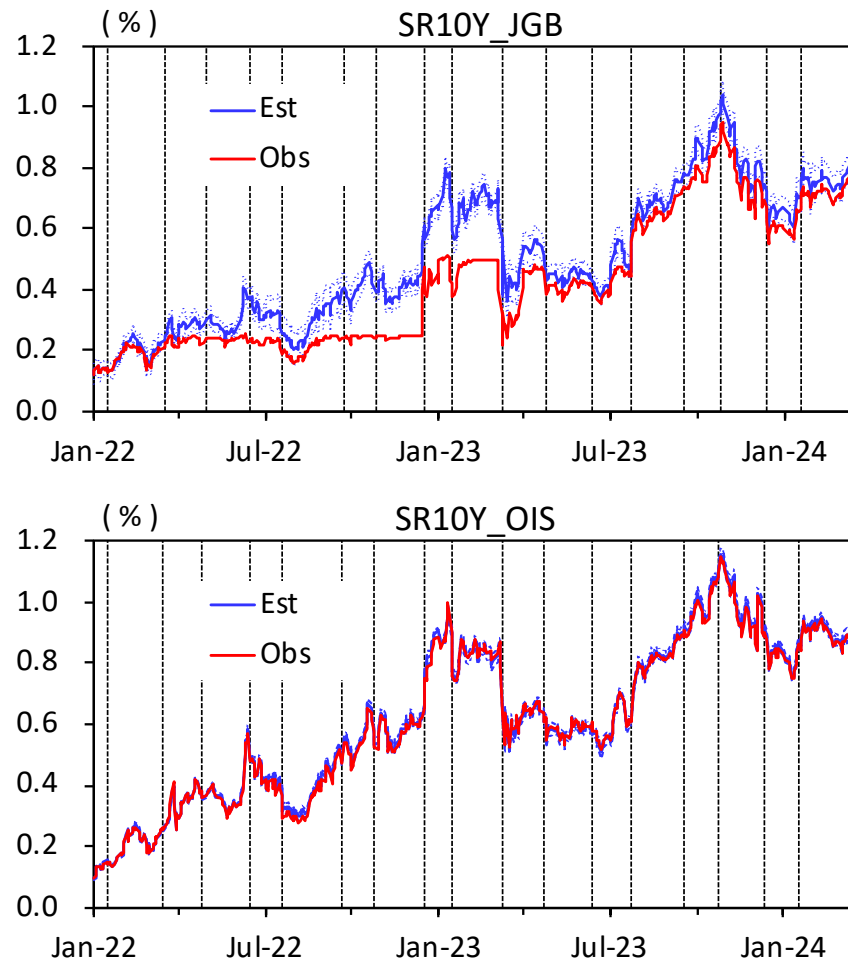
$$\begin{aligned}
 E_OJS(10) &= R^{OIS}(10) - R^{JGB}(10) \\
 &= \frac{1}{10} \int_{m=0}^{10} \{r^{OIS}(m) - r^{JGB}(m)\} dm
 \end{aligned}$$

Estimated Coefficients



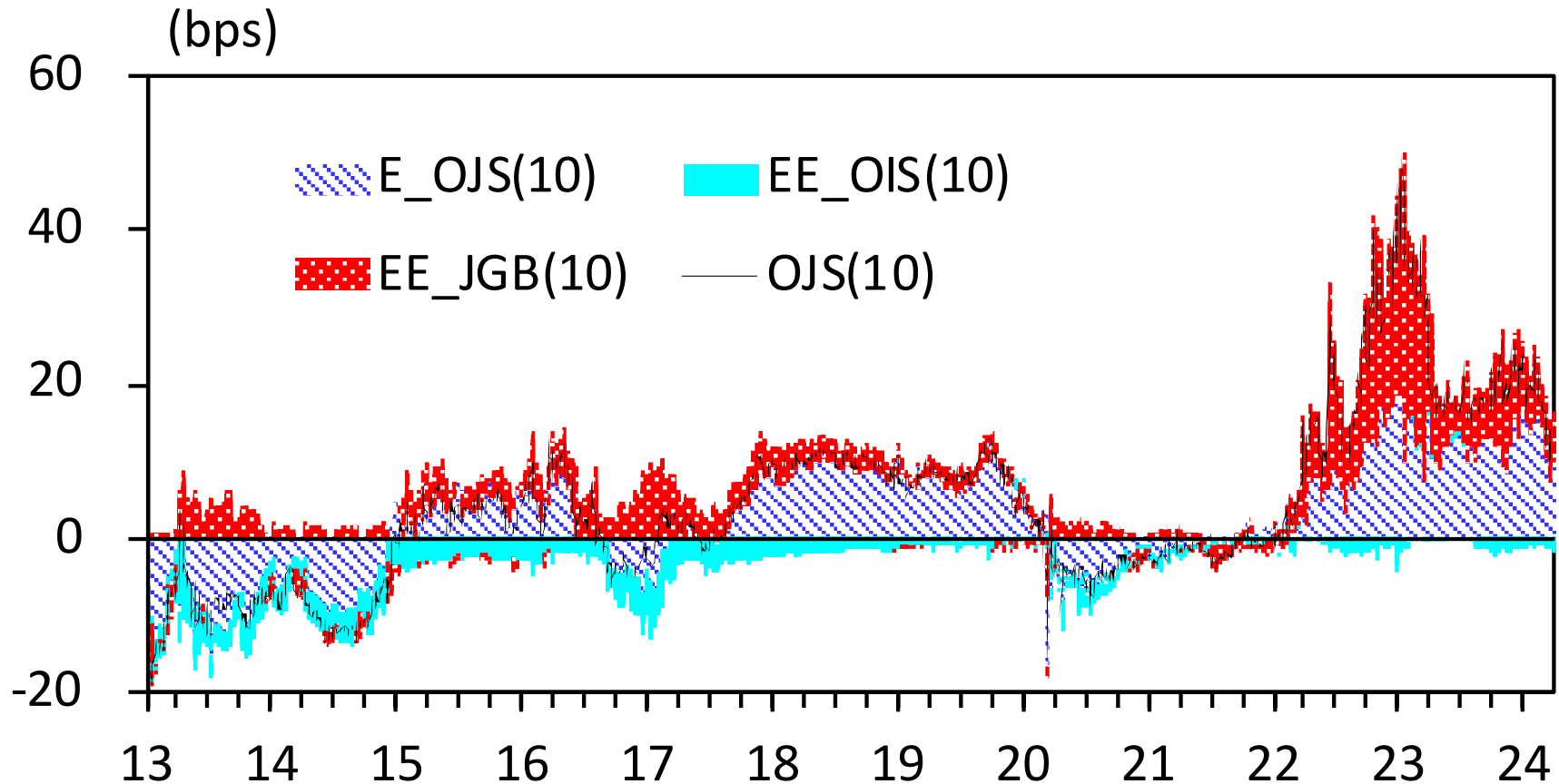
Notes: Blue dotted lines are 95% confidence intervals. The vertical dotted lines indicates the policy events.

Estimated Sport Rates



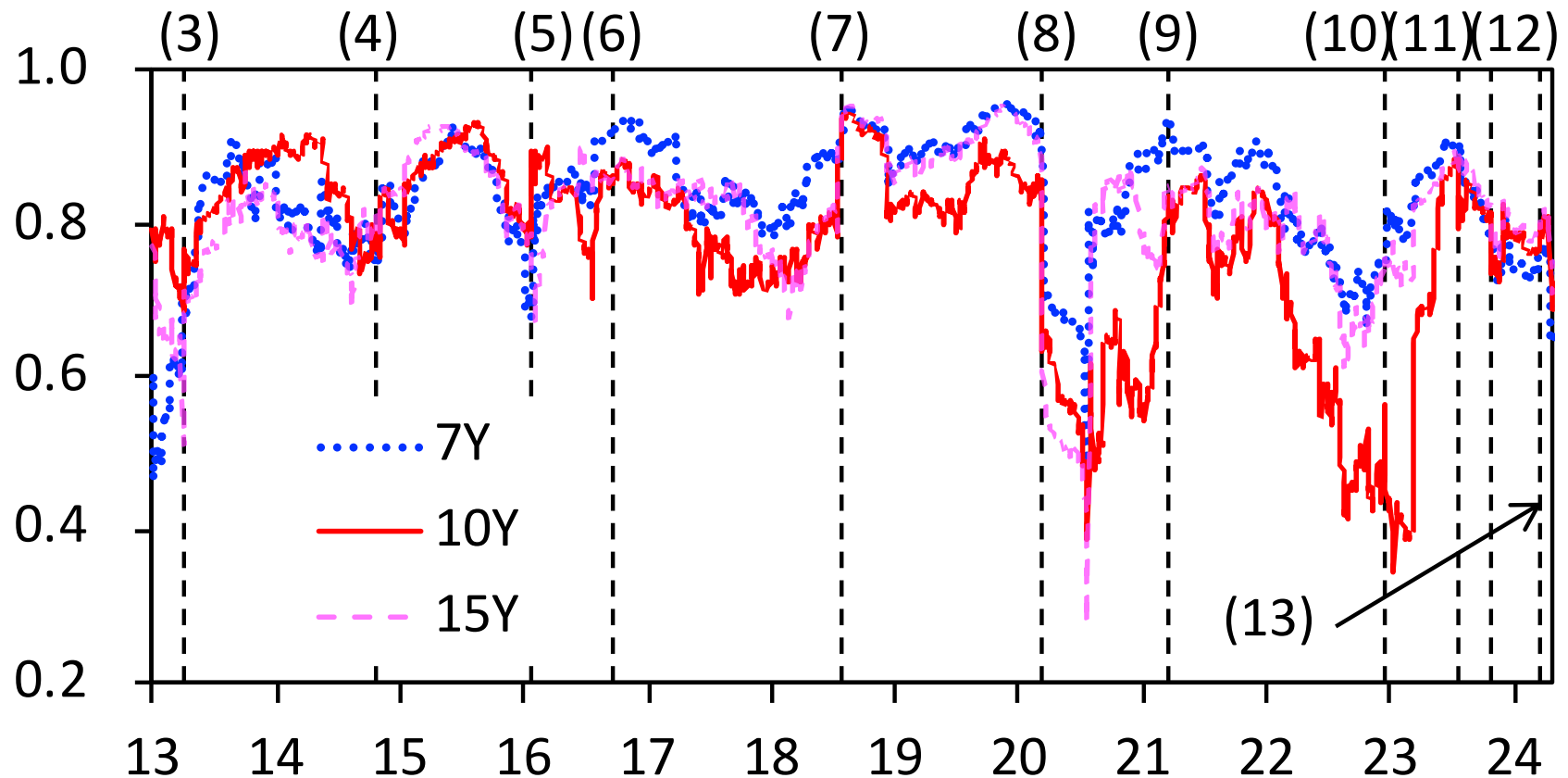
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Decomposed OIS-JGB Spreads



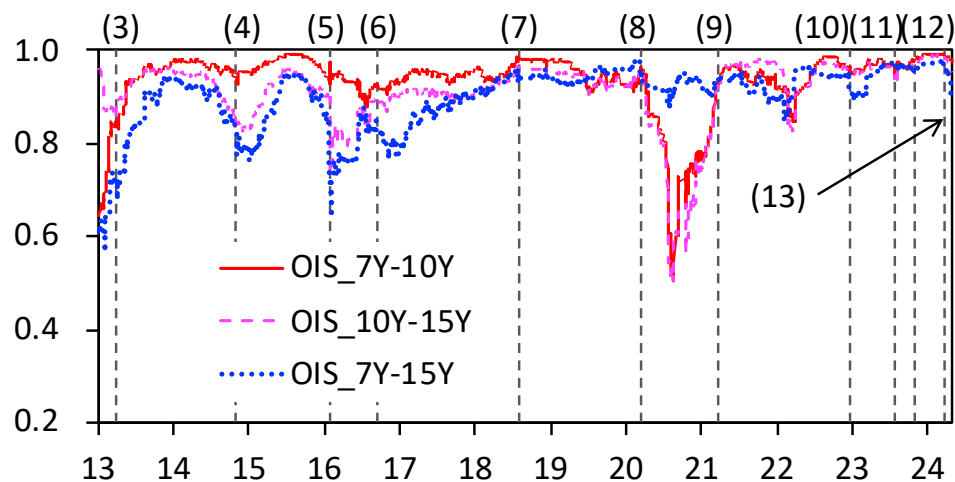
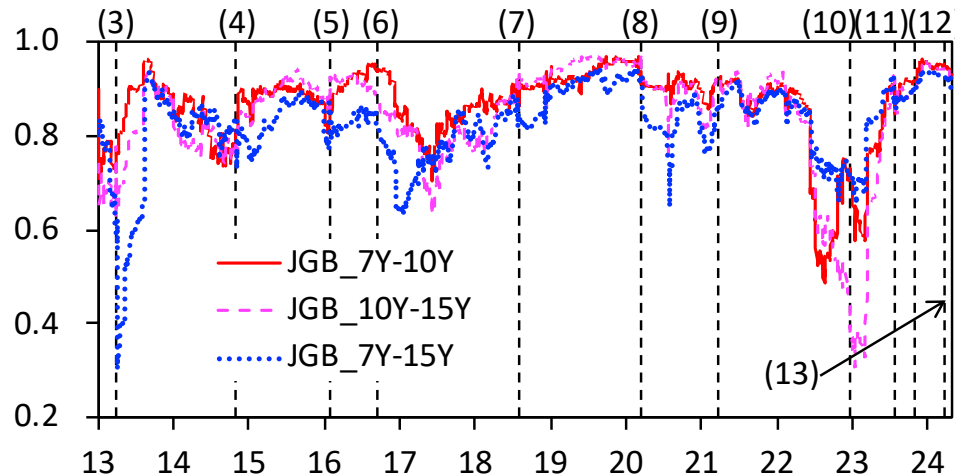
Source: Bloomberg

Correlations of Daily Rate Changes



Source: Bloomberg

Correlations of Daily Rate Changes



Source: Bloomberg

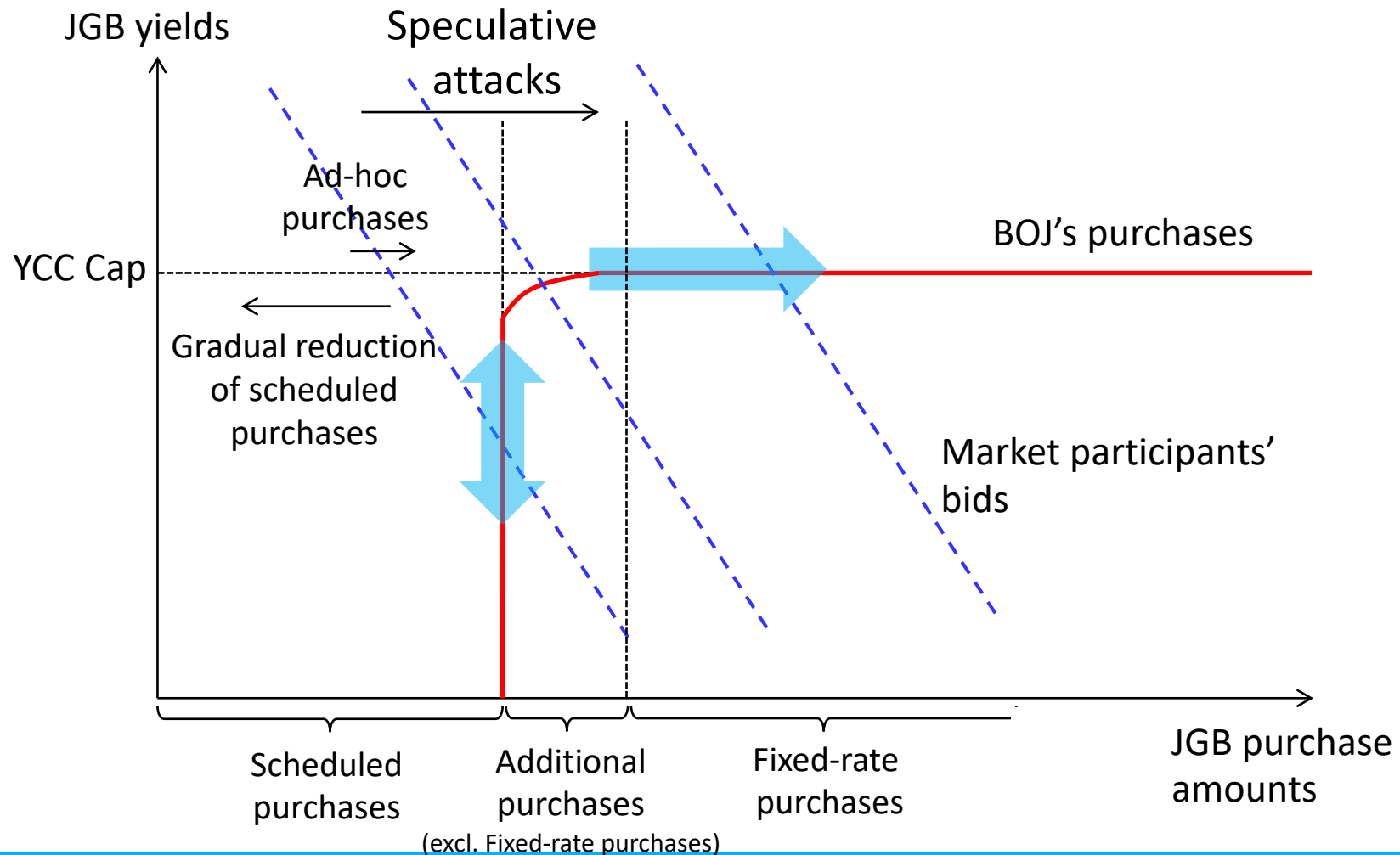
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- History of Japan's Unconventional MP
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- BOJ's Operations und YCC Policy
- Nelson-Siegel Model & MP Indicators
- OIS-JGB Spreads
- **BOJ's JGB Market Interventions**

JGB Purchase Operations



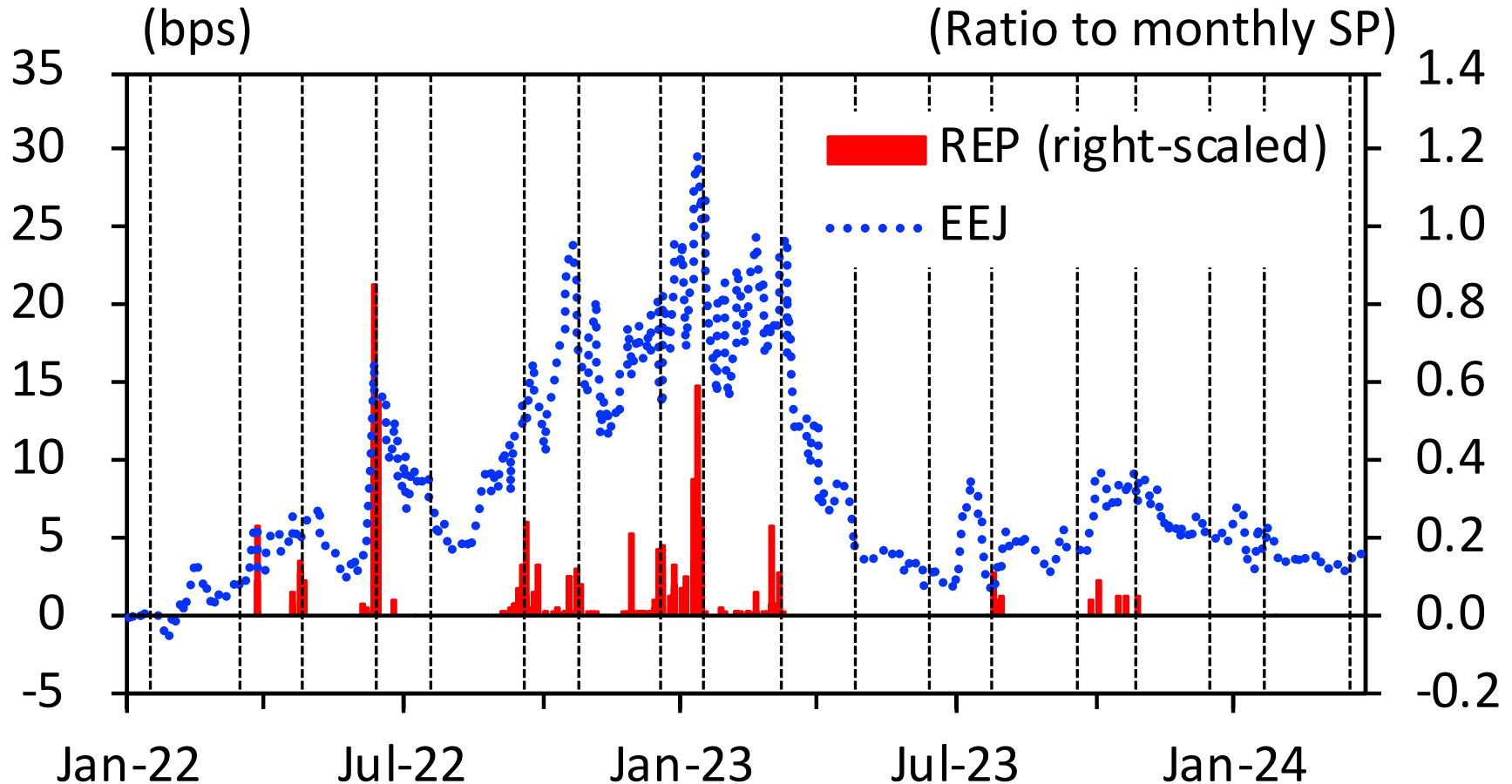
BOJ's JGB Purchases

Types of operations		Abbreviation
	Scheduled purchases	SP
	Additional purchases	AP
	Fixed-rate purchases with unlimited amounts	FP
	Excess purchases (AP+FP)	EP
	Total purchases (SP+EP)	TP

Summary Statistics

	Ratio to monthly announced amounts				
	<i>RSP</i>	<i>RAP</i>	<i>RFP</i>	<i>REP</i>	<i>RTP</i>
	<i>a</i>	<i>b</i>	<i>c</i>	<i>d = b + c</i>	<i>e = a + d</i>
obs.	1,630	1,630	1,630	1,630	1,630
obs. (non zero)	583	82	93	159	667
mean	0.049	0.002	0.004	0.006	0.055
median	0.000	0.000	0.000	0.000	0.000
max	0.263	0.265	0.702	0.852	0.852
min	0.000	0.000	0.000	0.000	0.000
st. dev.	0.075	0.016	0.034	0.042	0.086
skewness	1.213	11.244	12.922	11.876	2.232
ex. kurtosis	0.075	143.731	199.682	176.041	10.052
	<i>MAG</i>	<i>OJS</i>	<i>EOJS</i>	<i>EEJ</i>	
obs.	1,630	1,630	1,630	1,630	
mean	-14.112	7.921	5.562	3.327	
median	-12.250	7.625	7.102	1.827	
max	0.900	49.725	24.154	29.686	
min	-49.100	-17.250	-16.557	-6.080	
st. dev.	10.842	10.327	6.448	5.010	
skewness	-0.759	1.137	0.008	2.344	
ex. kurtosis	0.051	1.235	-0.711	5.593	

Mkt Pressures and Ex JGB Purchases



Sources: Bank of Japan, Bloomberg

BOJ's responses to MKT conditions

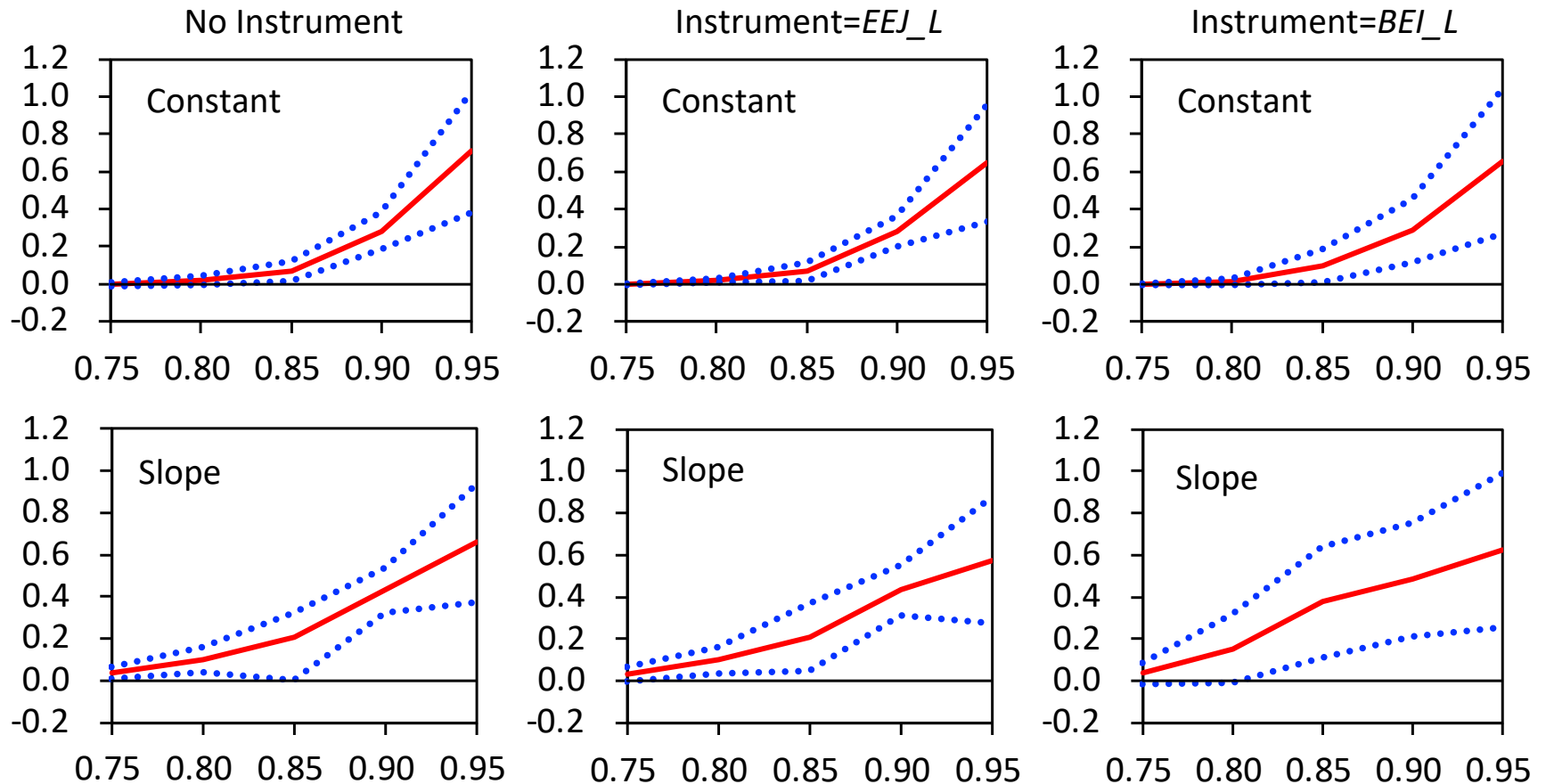
$$REP_t = \alpha + \beta EEJ_t + \varepsilon_t$$

BOJ's excess JGB
purchases beyond
the scheduled
amounts

Approximation errors
for 10-year JGB: EE_JGB(10)

Few Nonzero Obs. → Quantile regression on higher percentiles
Endogeneity Problem → Instrumental QR
Instruments: Lagged EEJ or Break-even-inflation (BEI)

Quantile Regression Results



Notes: Red bold lines, green dashed lines, and blue dotted lines correspond to the estimated coefficients, the estimated coefficients for the quantile regressions without using instruments, and 95% confidence intervals, respectively.

BOJ's JGB Purchasing Behavior

$$REP_t = \alpha + \beta MAG_t + \varepsilon_t$$

Margins to the YCC cap, computed by the differences between the YCC cap and 10-year JGB yields

Sudden transition of JGB purchasing operations to market pressures



Discrete Threshold regression

→ Max # of states is three

→ Threshold variable: EEJ_L

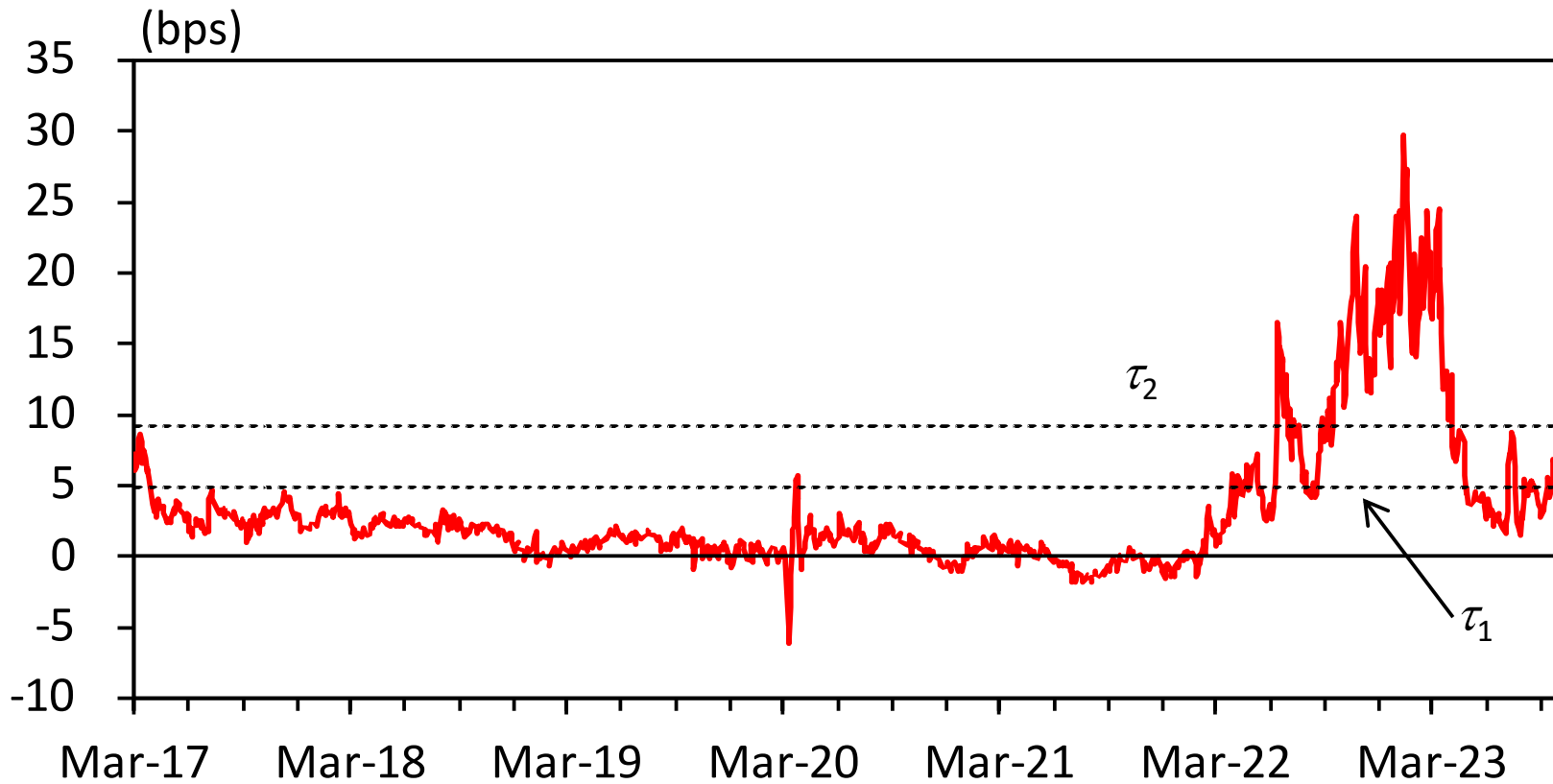
Threshold Regression Results

Dependent variable: *REP*
Sample period: from March 1, 2017, to October 31, 2023

Threshold variable		<i>EEJ_L</i>			
τ_1	4.845	[25,942]		8.629	[26,184]
τ_2	8.629	[26,184]			
State-1					
Const.	0.130	(0.071)		0.365	(0.137) **
<i>MAG</i>	0.002	(0.004)		0.010	(0.006)
State-2					
Const.	1.779	(0.828)	*	4.864	(1.011) **
<i>MAG</i>	0.011	(0.036)		0.160	(0.060) **
State-3					
Const.	4.864	(1.011)	**		
<i>MAG</i>	0.160	(0.060)	**		
AIC	4,537.8			4,533.8	
Obs.	1,630			1,630	
Obs. (State-1)	1,339			1,450	
Obs. (State-2)	111			180	
Obs. (State-3)	180				

Notes: Figures in the brackets and the parenthesis are the sum of squared residuals and robust standard errors for estimation coefficients, respectively. ** and * indicate that the estimated coefficients are statistically significant at 99% and 95% levels, respectively.

Threshold Values (EEJ_L)



Conclusions

- Distorted Yield Curve under YCC:
 - BOJ's massive interventions
 - Impaired JGB market functioning
 - Deteriorated information content of JGB YC
- BOJ's JGB Purchases under YCC policy:
 - Seemingly aggressive but passive & endogenous responses to Mkt pressures
 - Just sustain YCC framework
 - Implications as a Gov debt management policy