



Action Program for Strengthening the Functions of the Cash Equity Market

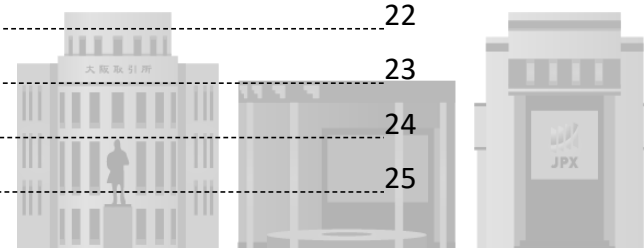
- Toward Further Improvement of Resilience and Convenience of the Market -

Total smart exchange

Tokyo Stock Exchange, Inc.

October 27, 2021

1. Background	3
2. Extension of Trading Hours	4
• Extension of Trading Hours Background	5
• Summary of Comments from Securities Companies and Investors	6
• Summary of Comments about Timely Disclosure, etc. from Listed Companies	7
• Response Options for Post-Market Close Operations related to Investment Trusts, etc.	8
• Outlook on Extension of Trading Hours	10
• Necessary Action on Post-Market Close Operations for Investment Trusts, etc.	11
• Trading Hours of Markets Before and After Extension	12
3. Closing Auction	13
• Background of Discussions	14
• Outline of Closing Auction Rules and Others	15
4. Measures to Further Strengthen Resilience	16
• System Operation Updates to Further Strengthen Resilience	17
• Strengthening Trading Functions and Revisions to Market Information Dissemination	18
5. Schedule	19
6. Handling of Consecutive National Holidays	21
• Background	22
• Summary of Comments from Securities Companies and Investors	23
• Summary of Comments on Timely Disclosure, etc. from Listed Companies	24
• Summary of Issues	25



- In response to the failure that occurred in its arrowhead cash equity trading system in October 2020, Tokyo Stock Exchange, Inc. (TSE) established a Council for Recurrence Prevention Measures. The Council held discussions along with a variety of market users on necessary rules and procedures to create an environment that enables a quick and smooth resumption of trading in order to improve resilience. In March 2021, TSE compiled a report based on the discussions at the Council.
- The Council discussed the possibility of extending trading hours to ensure trading opportunities even in the event of a system failure, with a focus on being able to provide trading opportunities on the same day wherever possible. However, given the wide-ranging impacts of extending trading hours, the report stated that "(t)he extension of trading hours will be separately discussed after the Council has closed."
- Furthermore, TSE plans to upgrade its cash equity trading system in H2 FY2024.
- Given these circumstances, from the perspective of responding to changes in the environment surrounding the market and diversifying investor needs, as well as further improving resilience, convenience for market users and international competitiveness, TSE established a Working Group for Strengthening the Functions of the Cash Equity Market (hereinafter the "Working Group" or "WG") in May 2021 and discussed with market participants on the following topics, finally compiling an "Action Program for Strengthening the Functions of the Cash Equity Market".
 - Extension of trading hours and introduction of closing auction
 - Strengthening resilience, strengthening trading functions and revisions to market information dissemination
 - Deciding how to handle consecutive national holidays

2. Extension of Trading Hours



- TSE started to discuss extending trading hours after the system failure in October 2020 that caused trading to be suspended for the whole day, with the aim of increasing the possibility that trading opportunities can be secured on the day that a system failure occurs - i.e., to improve resilience.
- In addition, given that trading hours on cash equity markets in Japan are shorter than those in Europe and the U.S., and even Asian countries, extending them on a permanent basis will expand trading opportunities for investors and improve market convenience. As such, it is crucial to consider the matter in terms of not only improving resilience, but also how we can strengthen the functionality and competitiveness of Japanese markets in the world for the medium to long term.
- Needless to say, improving the functionality and competitiveness of the market is not a matter of extending trading hours alone, and in addition to action that has already been taken, in order to enhance the appeal of the market we will need to steadily move forward with various initiatives. The extension of trading hours is an important part of this, and we consider it necessary to move forward with its implementation. Based on discussions by the WG, we will begin detailed preparations for implementation, going on the assumption of a 30-minute extension.
- Comments taken from the WG, individual interviews, and other sources, and points to note for making detailed preparations for the extension are on the following pages.

- We received a wide range of comments from the WG and through individual interviews. This section focuses on comments about the impact on post-market close operations related to investment trusts, as many comments indicated that it would be particularly significant.

Impact on post-market close operations related to investment trusts

- While processes for calculating Net Asset Values (NAVs) of investment trusts by securities companies and investment trust companies are now generally automated, fund distributors and the media strongly request that NAV data is shared promptly. Therefore, a long extension of trading hours would require fundamental changes of operational frameworks and practices.

Impact on other post-market close operations

- In addition to post-market close operations related to investment trusts, the following points need to be considered:
 - ✓ Impact on the systems of securities companies and other players
 - ✓ Cut-off time for applications to Japan Securities Finance Co., Ltd. (JSF)
 - ✓ Trading hours for derivatives and the ToSTNeT Market, etc.

- With the cooperation of the Keidanren (Japan Business Federation)'s Committee on Financial and Capital Markets, we were able to collect a wide range of comments from the committee members. This section focuses on timely disclosure.

Not affected

- Concerning timely disclosure, some said that there will be no impact for reasons such as that they disclose promptly after decisions are made or issues have occurred, even during a trading session, or that they have a company policy that disclosure will be conducted by 14:00.

Affected

- Many commented that as they conduct timely disclosure after the market closes, the following concerns grow bigger the further trading hours are extended:
 - ✓ The series of activities that includes the information disclosure, press conferences, media interviews, and investor relations would all be pushed back in turn
 - ✓ There would be an increased risk of information leakage and insider trading from a longer wait before disclosure
 - ✓ There would be an impact on shareholders, analysts, and the media from pushing back the time of disclosure

(Reasons that were given for conducting timely disclosure after market close included: avoiding doing it during trading sessions considering the inequality among shareholders that arises from a time difference until information provision; and difficulty in conducting timely disclosure before the start of trading due to internal schedules.)

Others

- There were comments calling on TSE to also consider providing support for disclosure and the time limits for posting on EDINET.
- There was a small number of comments saying that their companies announce and hold briefing sessions on financial results after the market closes, but if the time of market closure is pushed back, they would consider doing this after the close of the morning session.

- Comments were given at the WG regarding possible response options suggested by the WG and through individual interviews, as shown below, based on the following two scenarios: (1) a 30-minute extension and (2) a multi-hour extension.

(1) A 30-minute extension

i. Adjustments to transmission timing of various market price data by vendors	<ul style="list-style-type: none"> - Currently, various market price data are transmitted by vendors at around 16:20. - Depending on when vendors transmit this data, the time allowed for post-market close operations could be shortened (for instance, if trading hours were extended 30 minutes but data transmission was only pushed back 20 minutes).
ii. Enhancement of operational efficiency	<ul style="list-style-type: none"> - Enhance efficiency of not only the operations of each company but also data sharing, by standardizing the formats used within each company and business sector for various products - Other ideas to enhance efficiency further are, for instance, to create a common platform and adopt straight-through processing (STP).
iii. Responses from fund distributors and the media	<ul style="list-style-type: none"> - Investment trust companies set the cut-off time for sending NAVs to relevant parties, in principle, at 18:00 (or 19:00 at the latest in special cases). Fund distributors start batch processing around 20:00. - This is because fund distributors and investment trust companies have built an operational flow with sufficient margin to be able to respond in case of any problems. The media also require punctuality. As such, the operational flow tends to be inflexible. - Therefore, if trading hours are extended, a flexible operational flow would be necessary to respond to problems, for example by allowing the cut-off time for NAV calculation and submission to be pushed back.
iv. Launch of "single NAV calculation" (no dual results collation)	<ul style="list-style-type: none"> - Currently, trustee companies and asset management companies both calculate NAVs. By adopting a single NAV calculation system (no collation of the dual calculation results), some of that process could be shortened (although there is also the possibility that new processes will be required).

(2) A multi-hour extension

i. Pushing back the start of batch processing by fund distributors	<ul style="list-style-type: none"> - Push back the start of batch processing by fund distributors, currently around 20:00 - However, there are a wide range of fund distributors including banks and credit unions, and systems related to investment trusts do not work alone but are linked with various systems such as core banking systems.
ii. Setting of valuation points, etc.	<ul style="list-style-type: none"> - Set the reference time for NAV calculation (the "valuation point") at 15:00, regardless of the time of market close - However, there were also comments that it would be strange to have share prices moving after NAV calculation has started, and that NAVs should be calculated based on the closing price determine by Itayose method (call auction) after orders are gathered (i.e. the price formed with higher liquidity).
iii. Consideration of the pros and cons of changing the rules for announcing NAVs, etc.	<ul style="list-style-type: none"> - Necessary considerations could be made with a view to fostering the understanding of all concerned and ensuring that the convenience of investors is not impaired. For instance, in the case of delays in execution processing, measures could be taken such as pushing back the time limit for reporting NAVs to The Investment Trusts Association, Japan (JITA) (8:00 p.m. on the same day) in consideration of the delays, etc.

- An extension of trading hours will affect a wide range of market participants and its implementation will require responses not only from one business sector but from all parties related to the market. As such, close collaboration and sufficient time for preparations are essential.
- With these perspectives in mind, our outlook on the extension of trading hours is as follows:

(1) Extension length

- We will advance the project with the assumption of a **30-minute extension** rather than a multi-hour extension, taking a realistic approach based on the impact on market participants and particularly the preparation needed for post-market close operations including those related to investment trusts.*

(2) Steps for implementation

- Even though the extension is the shorter 30 minutes, **industry-wide discussions on how to deal with post-market close operations for investment trusts (described later) will be necessary and preparation must be based on close collaboration with regulatory authorities and relevant industry organizations.**
- For preparation, we have to work together with market participants. For a smooth extension, we will work hard to provide detailed information by widely carrying out explanations and updates including about the benefits of the extension.

(3) Implementation time (preparation period)

- Even though the extension is the shorter 30 minutes, sufficient time needs to be secured for preparation, considering the above responses and system tests, among other things.
- We will aim for implementation when the cash equity trading system is updated (in H2 FY2024)

*Although some suggested options for expanding trading opportunities such as abolishing the lunch break, moving forward the start of the afternoon session, or creating a new session where trades would be processed as that for the next business day, from the perspective of enhancing resilience, the WG decided to focus its discussions on extension of trading hours.

*With regard to the state of timely disclosure, the Financial System Council's Disclosure Working Group Report (June 2018) states that "Timely disclosure is supposed to be made immediately, but the timing of announcements by many listed companies is concentrated after 3:00 p.m., which is the end of the trading hours of stock exchanges (so-called "after afternoon session")". The Financial System Council's Disclosure Working Group (FY2021) identified the timing of announcements of material information as one of the issues to be addressed.

Necessary Action on Post-Market Close Operations for Investment Trusts, etc.

- The key actions to take in relation to post-market close operations for investment trusts and other aspects are indicated in the table below.
- We will utilize the existing frameworks of market participants and related organizations to move forward with discussions within and among different business sectors. At the same time, we will closely share information on the progress of discussions with regulatory authorities and relevant organizations.

Responses	Main related organizations and notes
<ul style="list-style-type: none"> - Improve efficiency across the industry ✓ Standardize the various formats for data sharing ✓ Adjust transmission time for various market price data from vendors ✓ Make changes to rules for NAV announcements ✓ Launch single NAV calculation etc. 	<ul style="list-style-type: none"> - JITA and Trust Companies Association of Japan ■ Rather than considering and implementing everything all at once, we need to consider and implement measures in order of priority based on expected merits, costs, and other considerations. ■ Given the discussions on single NAV calculation that have already taken place at JITA and the effects of single NAV, there have been suggestions that judgment on this issue should be taken with caution. ■ Vendors of all types should also be involved in discussions.
<ul style="list-style-type: none"> - Fund distributors (banks, etc.) ✓ Timing and method of sharing of NAVs ✓ Organizing cut-off times for application and cancellation 	<ul style="list-style-type: none"> - Japan Securities Dealers Association, JITA
<ul style="list-style-type: none"> - The media ✓ Timing and method of sharing of NAVs 	<ul style="list-style-type: none"> - Nikkei Inc., K.K. Kyodo News, JITA
<ul style="list-style-type: none"> - Cut-off time for applications to JSF 	<ul style="list-style-type: none"> - JSF

Note: For the post-market close operational flow for investment trusts, see page 37.

Trading Hours of Markets Before and After Extension

Before

Trading Hours (JST)	8	9	10	11	12	13	14	15	16	17	18	19 to next morning
Cash Equity Market (auction)	9:00~11:30			12:30~15:00								
Cash Equity Market (ToSTNeT)	8:20~17:30											
Cash Equity Market (Sapporo, Nagoya, and Fukuoka)	9:00~11:30			12:30~15:30								
Index Futures/Options Trading (auction)	8:45~15:15								16:30~6:00			
Transmission of Difference and Amount of Money (JSCC)									Amount determined (around 18:00)		★	
Transmission of Amount of Clearing Margin (JSCC)							SPAN RPF (early) (around 15:40)		★	Amount of clearing margin (around 19:00)		★

After

Trading Hours (JST)	8	9	10	11	12	13	14	15	16	17	18	19 to next morning	
Cash Equity Market (auction)		9:00~11:30				12:30~15:30			Closing Auction (15:25~15:30)				
Cash Equity Market (ToSTNeT)		8:20~18:00											
Cash Equity Market (Sapporo, Nagoya, and Fukuoka)		9:00~11:30				12:30~15:30							
Index Futures/Options Trading (auction)		8:45 ~15:45									17:00~6:00		
Transmission of Difference and Amount of Money (JSCC)									Amount determined (around 18:30)		★		
Transmission of Amount of Clearing Margin (JSCC)								SPAN RPF (early) (around 16:10)	★		Amount of clearing margin (around 19:30)	★	

Points to be considered:

- ✓ Derivatives trading hours will be extended and the timing of transmission from JSCC will be pushed back the same amount of time as the extension of cash equity trading hours.
- ✓ Trading hours for commodity futures/options will be changed in line with index futures/options. The closing time of securities option trading (currently 15:15) will be pushed back in the same way.
- ✓ For index futures/options and commodity futures/options, the close of the day session and start of the night session for the J-NET (off-auction) market will be pushed back in the same way as the auction market.
- ✓ For JGB futures/options, there will be no change for the auction or J-NET (off-auction) market.

Note: Trading hours for Sapporo Securities Exchange, Nagoya Stock Exchange, and Fukuoka Stock Exchange are those in place currently.

3. Closing Auction

- In the past, closing prices could only be formulated within the renewal price interval calculated from the last price in Zaraba (continuous auction). With a shift occurring toward passive investment, there were some instances where issues were closing at Zaraba price, including for large-scale index rebalancing, which hindered smooth trading at the Itayose auction at the close of the afternoon session (hereinafter "afternoon close Itayose").
- In response to this, in 2019 TSE expanded the executable price range at the afternoon close Itayose from within the renewal price interval to within twice the renewal price interval, reducing the risk of non-execution.
- However, with the continued increase in trading share at the afternoon close Itayose due to the shift toward passive investment and other factors, the following issues need to be considered.
 - ✓ Due to short selling regulations, market participants cannot fully assess the situation of bids and offers at the afternoon close Itayose where there are "on close" orders.
 - ✓ Under the current system of conducting an Itayose auction immediately after Zaraba ends, market participants have difficulty confirming the last price before placing orders.
 - ✓ As a result, some market participants are partially executing their orders within the Zaraba session before the afternoon close Itayose, even though they would like to execute their orders at closing prices.
- Taking the above into consideration, we have been discussing the possibility of introducing a closing auction, which is widely available at overseas exchanges, at the time of upgrading the trading system, along with details of rules if it were to be introduced.

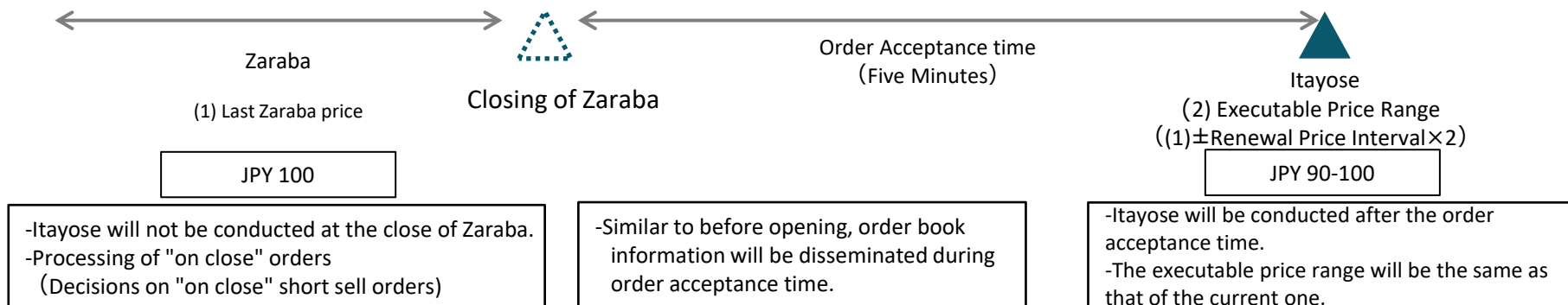
Outline of Closing Auction Rules and Others

- By introducing a closing auction which puts in place a certain amount of order acceptance time before the Itayose auction, TSE believes that it will be possible to conduct price formation that further reflects supply and demand because it will lead to increased opportunities for investor participation, as well as increase foreseeability of closing price formation. With this in mind, TSE will move forward with detailed planning for implementation.

-TSE has compiled the detailed rules for implementation such as order acceptance time as below, while comprehensively taking into consideration, among other things, the balance and simplicity of the rules such as for price continuity from Zaraba and a wide spread of order concentration.

-At first, TSE will introduce the simple rules illustrated below at the time of the system upgrade. TSE will then analyze the situation post-implementation to consider revisions to the rules or other changes as necessary.

Rule	Details	Other comments
Order acceptance time	- Five minutes	-Set at five minutes with consideration of the impact on price continuity (same as derivatives) -In preparation for gaming of closing price formation or other unfair trading, TSE will take measures including publishing, where necessary, the cancellations or other types of activity subject to monitoring by TSE
Executable price range	- Twice the renewal price interval	-Based on impact analysis on volatility and price continuity at the afternoon close Itayose after the rule changes in 2019, there will be no changes to the current executable price range.
"On close" orders	- Processing at the close of the Zaraba session	-Decisions on "on close" short sell limit orders will also be made at the close of the Zaraba session.
In case of matching at prices outside executable price range	- Orders are executed by allocation at upper/lower limit of executable price range	-For the purpose of expanding the chances of execution, even in cases where orders are matched at prices outside the executable price range, they will be executed at the upper/lower limit of the range in the same manner as "closing auction at the limit price", thereby ensuring opportunities to trade at closing prices .



4 . Measures to Further Strengthen Resilience

System Operation Updates to Further Strengthen Resilience

- While TSE is in the process of improving the current system, in order to further strengthen resilience and market participants' convenience at the time of the system upgrade, we have considered additional measures as shown below through mainly discussion in the WG and interviews with related parties.

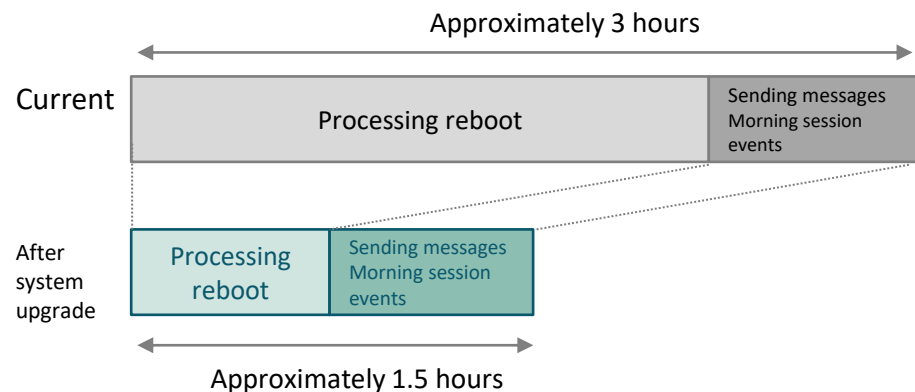
	Measure	Future direction and thoughts
1	Shortening system reboot	<ul style="list-style-type: none"> -TSE will act on the assumption of not changing the standards and procedures for trading resumptions set out by the Council for Recurrence Prevention Measures. -On the exchange side, TSE will continue to work on significantly shortening the time required for system reboot from the current system.
2	Improving recovery measures in the event of a system failure	<ul style="list-style-type: none"> - TSE is at the stage of checking operational flows through drills going forward. - TSE will work to improve recovery measures on an ongoing basis in line with feedback from the drills.
3	Unifying ToSTNeT Protocol	<ul style="list-style-type: none"> - TSE will continue to work on moving from a multi-protocol system using both the TSE original protocol and the FIX protocol to a unified system of just the FIX protocol. - TSE plans to provide details of specifications at the same time as other changes to connection specifications, at an explanatory session for trading participants which is scheduled to be held after the start of development.
4	Unifying recovery method in the event of a system failure	<ul style="list-style-type: none"> - For ToSTNeT, TSE plans to introduce drop-copy, which is supported in arrowhead, as well as increase the configurable number of connection source addresses that can be used for authentication. - TSE plans to provide details of the specifications at the same timing as for 3.

(Reference) Shortening system reboot

By upgrading the exchange system, TSE plans to shorten the period from the time the system halts/starts rebooting to the time orders for the afternoon session are accepted by about half (Expected to be shortened from approx. 3 hours in current system to approx. 1.5 hours when the system is upgraded in FY2024).

(In practice, the timing of trading resumption will be decided with consideration of the preparation status of trading participants for placing orders.)

Responses of TSE system (until resumption of order acceptance for afternoon session)

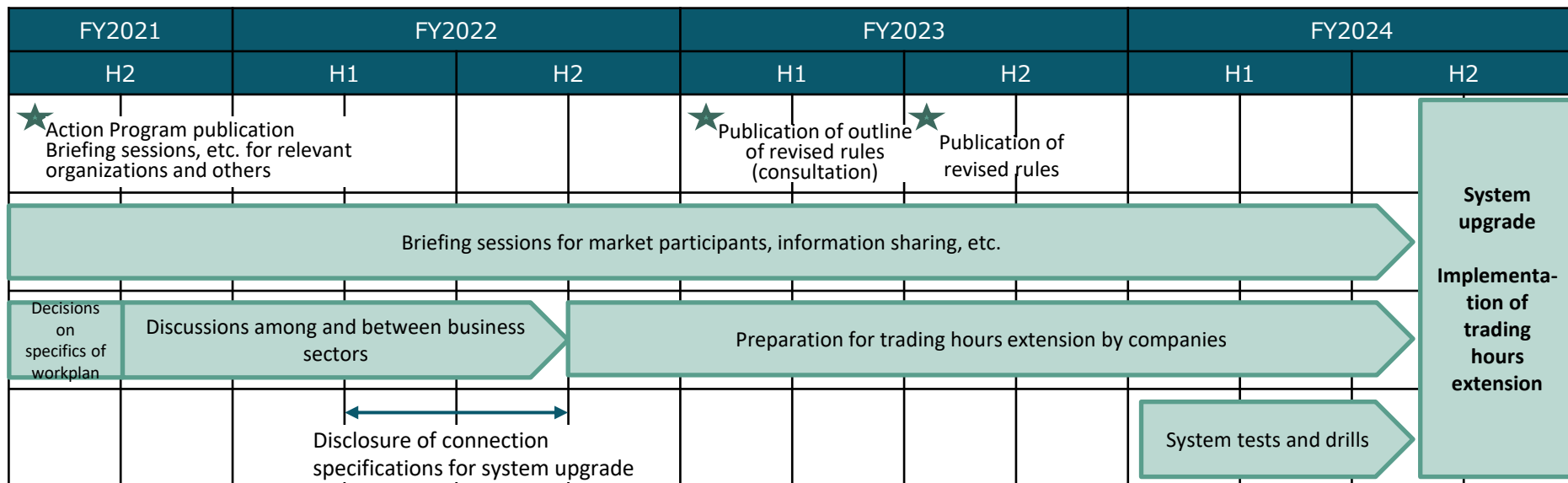


	Measures	Future direction and thoughts
1	Quote management	- Partially simplifying the rules for Special Trade Quotes/Special Quotes (maintaining the current framework in principle)
2	Introduction of mass cancel	- Introducing a mass cancel function which enables a user to perform bulk cancellation of all their orders on the order book
3	Introduction of Market by Order	-In place of FLEX Full, introducing dissemination of "Market by Order" type market information, which enables users to understand individual order statuses in addition to the quantity of orders at each price level (please see p. 36 for an outline of this and other information)
4	Revisions to market information dissemination	-Stopping provision of Flex Full in conjunction with the introduction of Market by Order -Stopping provision of FLEX Standard (100M) and High Speed Index -Continuing provision of Flex Standard WB

Note: We plan to provide details of functions and other information in explanatory sessions for operations staff and other occasions.

5. Schedule

- The outline of the schedule for the system upgrade including the trading hours extension and other measures to be taken is shown below.
- Details on the trading hours extension, including how the work will progress and a more concrete schedule, will be discussed with relevant parties and determined later.



Note: The above schedule is based on current assumptions and may be subject to change.

6. Handling of Consecutive National Holidays



- In 2019, all markets in Japan were closed for six consecutive business days, meaning an unprecedentedly long ten consecutive holidays.
- As investors would have no opportunities to trade in the Japanese market and no way to respond to risks stemming from price changes in overseas markets for ten consecutive days, the entire securities industry actively notified investors, and securities companies set up temporary systems. However, some commented that looking from an international perspective, having no trading opportunities for a long period of time is a problem.
- After the ten-day holiday, in light of these comments and those pointing out the risk management issues facing investors during a long market closure, we began discussing derivatives holiday trading. As a result, we decided to introduce holiday trading on Osaka Exchange (OSE) and Tokyo Commodity Exchange (TOCOM) around September 2022.
- Given the above circumstances, we decided that the WG should discuss providing trading opportunities for cash equities during consecutive national holidays and aimed to summarize on the necessity of this as well as possible issues.

- We received comments as follows from members of the WG and other market participants through individual interviews and other means.

The ten-day holiday in 2019

- The majority commented that no problems occurred in the end.
- As only a few investors close their positions before the usual long holidays like Golden Week, securities companies did not carry out any special actions.

Price formation and settlement, etc.

- There are concerns about liquidity and price formation if only a limited number of traders participate. Inappropriate price formation would undermine confidence in the market.
- The majority commented that it would be essential to include settlement operations if the market opened during consecutive national holidays.
- There were concerns that if settlement operations were not included, special actions would be needed which would further increase system costs.
- If settlement operations were not included, even fewer investors would participate, which would deepen issues of liquidity and price formation.

Actions needed from market participants, etc.

- Unless the overall operations including aspects other than settlement (such as handling of loan/margin transactions and indices) were the same as those on weekdays, it would have a significant impact as participants would need to specially alter their systems.

- With the cooperation of the Keidanren (Japan Business Federation)'s Committee on Financial and Capital Markets, a wide range of comments were collected from the committee members. (This section focuses on timely disclosure.)

Timely disclosure, etc.

- Issuers would need to respond as usual if unclear information arose even during consecutive holidays.
- Timely disclosure requires decisions by the responsible internal bodies, and in some cases, communication with outside business partners or lawyers, so structures must be put in place to allow both internal and external communication.
- Systems to enable responses to shareholders and investors during consecutive holidays would need to be established.
- We should discuss whether or not to disclose information during consecutive holidays, and also, to ensure appropriate disclosure, working arrangements for related regulators, market participants, and experts, and operation of the disclosure system.
- Standard actions that issuers should take should be sufficiently discussed in advance.

Price formation

- There are concerns that even if trading were available, it may not be active, causing extreme price swings.

Other

- If hedging opportunities are secured through derivatives, etc., then it is hard to see why the cash equities market needs to open.

- Based on the received comments, issues around handling of consecutive national holidays are summarized as follows:

Price formation and liquidity	<ul style="list-style-type: none"> - Since trading of various indices and derivatives is conducted based on share prices, fair price formation is essential. If it is damaged, confidence in the securities market would be undermined. - For appropriate price formation, ensuring liquidity is vital. For this purpose, participation of a wide range of investors is necessary.
Settlement	<ul style="list-style-type: none"> - The daily amount of capital settled for cash equities is large, around JPY 200 billion (https://www.jpx.co.jp/jscs/en/listed_products.html) and settlement operations are necessary to manage risks even during consecutive national holidays. - There would be a meaning to providing opportunities to investors to convert their shares into cash during consecutive national holidays. - If settlement operations were not conducted, the number of participants would be limited further, which would deepen the issue of liquidity as mentioned above.
Necessary action by market participants	<ul style="list-style-type: none"> - To avoid only a small number of participants participating, in addition to settlement operations, to allow as wide a variety of investors as possible to participate, a framework would be needed that avoided requiring any special action as much as possible.
Timely disclosure, etc.	<ul style="list-style-type: none"> - Appropriate price formation needs to be secured even during consecutive national holidays. - To achieve this, appropriate information disclosure (timely disclosure, etc.) is essential, but we predict that it would be very hard to maintain the same level of disclosure during consecutive national holidays as that on weekdays.

- The above issues will widely affect not only the securities industry but also settlement infrastructure and listed companies, so there would be a wide range of issues to consider.
- When derivatives holiday trading starts, we will be able to understand the trading behavior of investors and their needs during holidays. Therefore, we will continue to monitor changes in the market environment and impact on investors, including by confirming investors' intentions to participate and actual participation in derivatives holiday trading from September 2022.

Note: In addition to these, many practical issues are also expected to arise, such as NAVs of investment trusts and handling of market price calculations.

Reference Material



Working Group Members

- Comprised of specialists in charge of the relevant areas on the ground from trading participants, institutional investors, system vendors and others.
- The Financial Services Agency of Japan and other related organizations participated as observers.

Category	Company/Org.	Category	Company/Org.
Trading participants	SMBC Nikko Securities Inc.	Trust banks	Custody Bank of Japan, Ltd.
	Okasan Securities Co., Ltd.		Sumitomo Mitsui Trust Bank, Limited
	Goldman Sachs Japan Co., Ltd.	Data vendors	QUICK Corp.
	Daiwa Securities Co. Ltd.		Bloomberg L.P.
	Tachibana Securities Co., Ltd.		Refinitiv Japan K.K.
	Tokai Tokyo Securities Co., Ltd.	System vendors	Japan Information Processing Service Co
	Nomura Securities Co., Ltd.		Nomura Research Institute, Ltd.
	Barclays Securities Japan Limited	Observers	The Financial Services Agency of Japan
	Monex, Inc.		Japan Securities Dealers Association
	Morgan Stanley MUFG Securities Co., Ltd.		The Investment Trusts Association, Japan
	UBS Securities Japan Co., Ltd.		Sapporo Securities Exchange
Institutional investors	Rakuten Securities, Inc.		Nagoya Stock Exchange, Inc.
	Nippon Life Insurance Company		Fukuoka Stock Exchange
	Nomura Asset Management Co., Ltd.		
	Fidelity Investments (Japan) Limited		
	BlackRock Japan Co., Ltd.		

(Listed in Japanese alphabetical order in each category)

- Opinions, etc. from listed companies were gathered/confirmed through related organizations.

Meeting		Topics
1 st Meeting	May 28	<ul style="list-style-type: none"> • Extension of trading hours (1) • Handling of consecutive national holidays (1)
2 nd Meeting	June 18	<ul style="list-style-type: none"> • Specific measures (1) (strengthening resilience, trading rules and functions, market information dissemination)
3 rd Meeting	July 16	<ul style="list-style-type: none"> • Extension of trading hours (2) • Handling of consecutive national holidays (2) • Closing auction (1)* • Specific measures (2) (market information dissemination) <p>*Although the closing auction was one of the issues included in specific measures (trading rules and functions), it was discussed separately as a topic since there are so many points to consider.</p>
4 th Meeting	Sept. 3	<ul style="list-style-type: none"> • Extension of trading hours (3) • Closing auction (2)
5 th Meeting	Sept. 17	<ul style="list-style-type: none"> • Closing auction (3) • Handling of consecutive national holidays (3) • Specific measures (3) (Strengthening resilience, trading rules and functions, market information dissemination)
6 th Meeting	Oct. 1	<ul style="list-style-type: none"> • Extension of trading hours (4)、closing auction (4)
7 th Meeting	Oct. 15	<ul style="list-style-type: none"> • General matters

(Trading Hour Extension) Trading Hours Around the World (JST, Winter Time)

(Closing auction, etc. indicated in red)

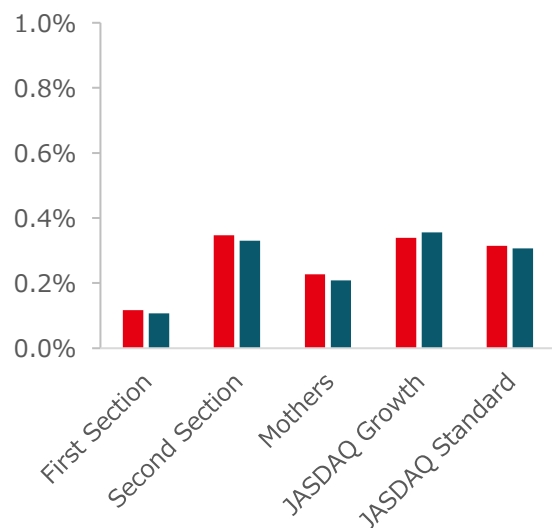
	Time difference	Local time	Trading hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Tokyo	0	9:00-11:30 12:30-15:00	5																									
Osaka (Index)	0	8:45-15:15 16:30-6:00	20																									
Sapporo, Nagoya, Fukuoka	0	9:00-11:30 12:30-15:30	5.5																									
South Korea	0	9:00-15:30	6.5																									
Singapore	-1	9:00-12:00 13:00-17:00	7																									
Hong Kong	-1	9:30-12:00 13:00-16:00	5.5																									
Netherlands (Euronext)	-8	9:00-17:30	8.5																									
London	-9	8:00-16:30	8.5																									
New York	-14	9:30-16:00	6.5																									

Note: For markets in Tokyo, Osaka, Sapporo, Nagoya, and Fukuoka, trading hours for auction sessions are indicated. For others, those for regular sessions are indicated.

(Closing Auction) Review of 2019 Rule Changes

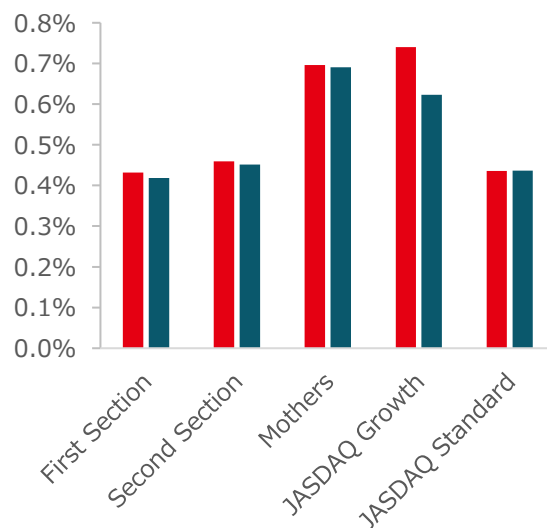
- TSE analyzed the impact of the 2019 rule changes, but did not see any particular shift in deviation between execution prices at the afternoon close Itayose and execution prices immediately prior to them, nor changes in volatility during the last 15 minutes prior to the afternoon close Itayose, compared with before the changes.
- TSE considers that the 2019 rule changes reduced the risk of non-execution at the afternoon close Itayose without having a negative impact on volatility or other aspects.
- We can also see that after the rule changes, closing at Zaraba price is relatively more likely to occur in growth markets.

Deviation ratio of execution prices at afternoon close Itayose^{1,2}



■ Before Rule Changes ■ After Rule Changes

Volatility during last 15 minutes prior to afternoon close Itayose^{1,2,3}



■ Before Rule Changes ■ After Rule Changes

No. of issues closing at Zaraba price (daily average)

	No. of issues (daily average)
Before rule changes (From Aug. 2019 to Nov. 1, 2019)	9.4
After rule changes (From Jan. 2021 to Apr. 2021)	0.9

No. of issues closing at Zaraba price by market division

	Average no. of issues closed at Zaraba price* (daily) *Issues whose orders were matched at prices beyond twice the renewal price interval ⁴	Probability of closing at Zaraba price (by market division, per issue) ⁵
First Section	1.32	0.06%
Second Section	0.89	0.18%
Mothers	0.83	0.22%
JQ Standard	1.52	0.23%
JQ Growth	0.07	0.20%

Source: Tokyo Stock Exchange

¹ Before rule changes: From Oct. 1, 2019 to Nov. 1, 2019

² After rule changes: From Nov. 5, 2019 to Nov. 30, 2019

³ (Highest price during last 15 minutes prior to afternoon close Itayose – Lowest price during last 15 minutes prior to afternoon close Itayose) / Average execution price during last 15 minutes prior to afternoon close Itayose

⁴ Total no. of issues closed at Zaraba price from Nov. 5, 2019 to Apr. 27, 2021 / No. of business days for said period

⁵ Total no. of issues closed at Zaraba price from Nov. 5, 2019 to Apr. 27, 2021 / No. of business days for said period / No. of issues by market division (as of end of Apr. 2021)

(Closing Auction) Change in No. of Issues Executed/Matched at Prices Beyond Price Renewal Interval at Afternoon Close Itayose

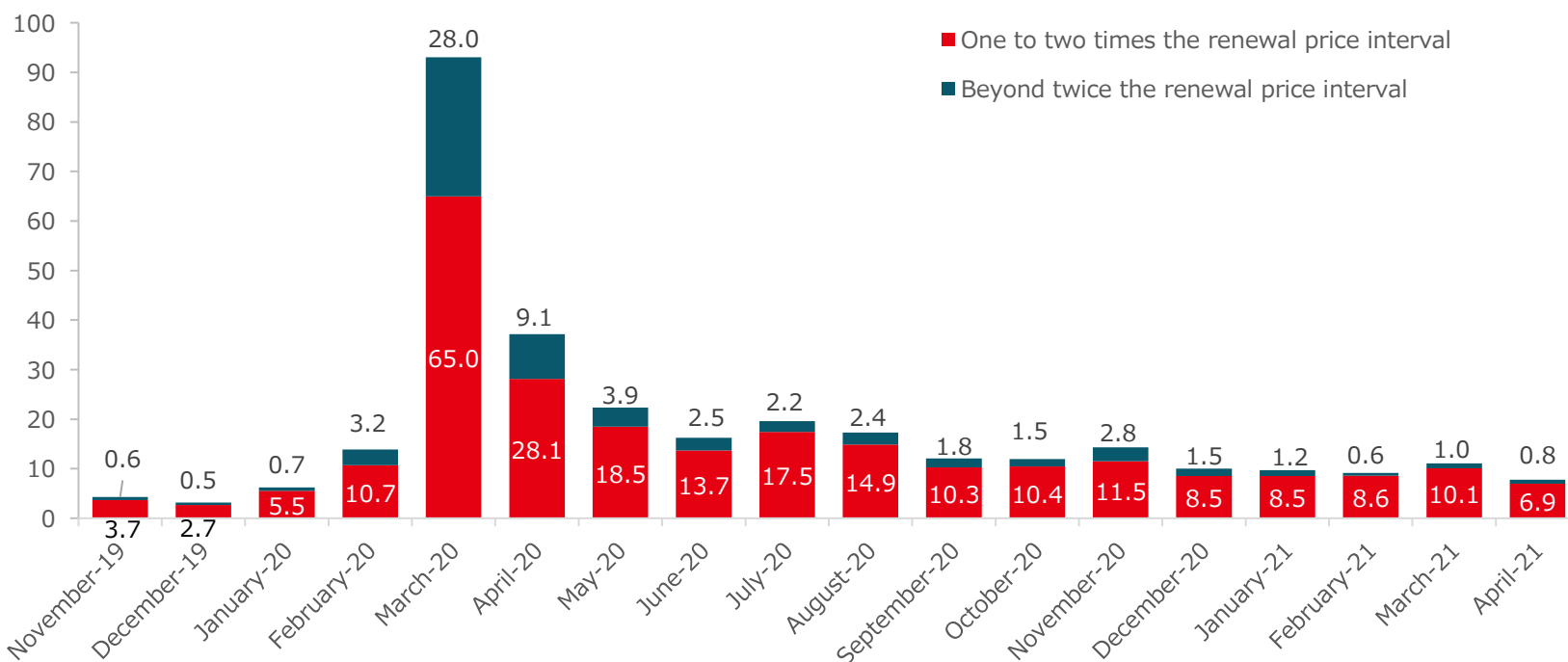
-Changes in the numbers of issues executed/matched at prices beyond the price renewal interval at the afternoon close Itayose are illustrated below.

- Approximately 14 issues¹ (average for business days) were executed at prices within the expanded price interval (one to two times the renewal price interval)

- In March 2020, due to market uncertainty caused by the spread of Covid-19 and other factors, the number of issues whose matching price exceeded the renewal price interval surged, but despite this, approximately 70% of issues were executed at prices within one to two times the renewal price interval.

Changes in No. of Issues Executed/Matched Beyond Price Renewal Interval at Afternoon Close Itayose

Average no. of issues on business days



Source: Tokyo Stock Exchange

¹ Data was obtained from Nov. 5, 2019 to Apr. 27, 2021.

² Renewal price intervals are set at different levels depending on stock prices, and the ratio of renewal price intervals to stock prices is approximately 2%.

³ Beyond 2021, the number of issues (average for business days) executed within one to two times the renewal price interval was 8.3.

(Closing Auction) Distribution of Issues Executed/Matched at Prices within Expanded Price Range at Afternoon Close Itayose

- Looking at the distribution of issues executed/matched at prices beyond the renewal price interval*, a large proportion is executed/matched at around 1 to 1.2 times the renewal price interval, and the proportion drops as the deviation grows.

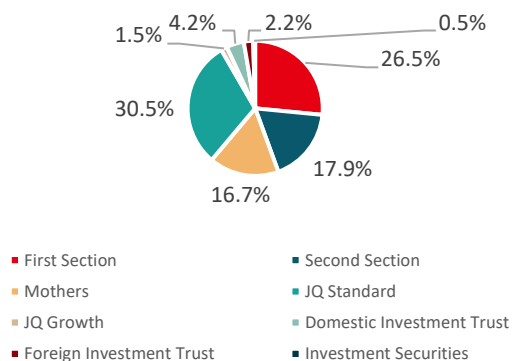
*Issues for whom the result of the following calculation is more than 1: $(A-B)/C$ (where A is the matching price at afternoon close Itayose, B is the execution price immediately prior to afternoon close Itayose, and C is the renewal price interval). This shows the degree of deviation of matching prices at the afternoon close Itayose relative to each renewal price interval.

- Looking at the issues executed at prices within the expanded price range (one to two times the renewal price interval) and those that closed at Zaraba prices (those matched at prices beyond two times the renewal price interval) after the rule change, the proportion of those from growth markets is large compared to the number of issues listed in each market division.

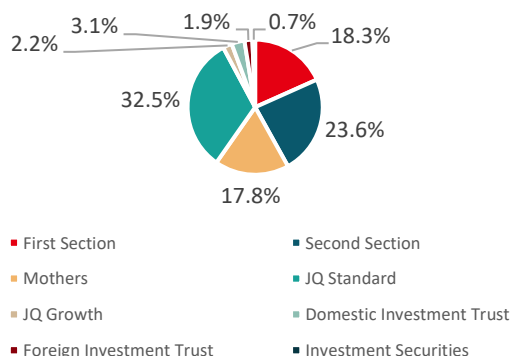
Number of issues executed/matched at prices beyond renewal price interval¹



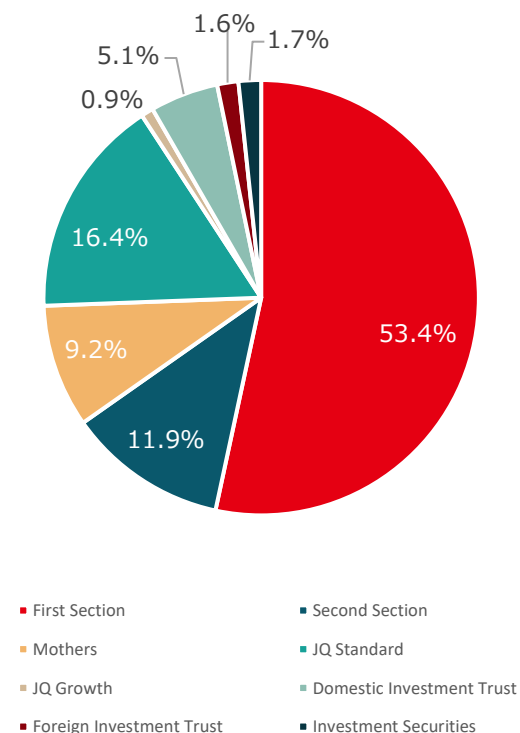
Issues closed at Zaraba price¹



Issues executed at prices within one to two times the renewal price interval¹



No. of listed issues (as of end of April 2021)



Source: Tokyo Stock Exchange

¹ Data was obtained from Nov. 5, 2019 to Apr. 27, 2021

(Closing Auction) Distribution of Issues Executed/Matched at Afternoon Close Itayose Before and After Rule Change

- The table below shows the number of issues within each range of deviation between execution/matching prices at the afternoon close Itayose and those immediately prior to the afternoon close Itayose (average for one business day within the relevant period).
- TSE does not see any major changes in distribution before and after the rule changes, and the vast majority were executed within the renewal price intervals.
- Even in the area that was expanded due to the rule changes (one to two times the renewal price interval), TSE does not see any major changes between matching status before the rule changes and execution status after the rule changes.

Closed at Zaraba price
(daily average: 9.4 issues)

Degree of deviation from last price immediately prior to afternoon close Itayose ¹ (before rule change ²)			
Range ¹	No. of Issues (Daily Average)	Ratio	Accumulated Ratio
0.0~0.1	2,595.6	76.60%	76.60%
0.1~0.2	532.6	15.72%	92.32%
0.2~0.3	123.0	3.63%	95.95%
0.3~0.4	60.4	1.78%	97.74%
0.4~0.5	25.5	0.75%	98.49%
0.5~0.6	14.9	0.44%	98.93%
0.6~0.7	10.8	0.32%	99.25%
0.7~0.8	7.3	0.22%	99.46%
0.8~0.9	4.0	0.12%	99.58%
0.9~1.0	4.7	0.14%	99.72%
1.0~1.1	1.4	0.04%	99.76%
1.1~1.2	1.6	0.05%	99.81%
1.2~1.3	0.9	0.03%	99.84%
1.3~1.4	0.9	0.03%	99.86%
1.4~1.5	0.6	0.02%	99.88%
1.5~1.6	0.6	0.02%	99.90%
1.6~1.7	0.5	0.01%	99.91%
1.7~1.8	0.4	0.01%	99.93%
1.8~1.9	0.2	0.01%	99.93%
1.9~2.0	0.4	0.01%	99.94%
2.0~2.1	0.2	0.01%	99.95%
2.1~2.2	0.3	0.01%	99.96%
2.2~2.3	0.1	0.00%	99.96%
2.3~2.4	0.2	0.00%	99.97%
2.4~2.5	0.1	0.00%	99.97%
2.5~2.6	0.0	0.00%	99.97%
2.6~2.7	0.0	0.00%	99.97%
2.7~2.8	0.1	0.00%	99.97%
2.8~2.9	0.0	0.00%	99.98%
2.9~3.0	0.1	0.00%	99.98%
Over 3.0	0.8	0.02%	100.00%

Closed at Zaraba price
(daily average: 0.9 issues)

Degree of deviation from last price immediately prior to afternoon close Itayose ¹ (after rule change ³)			
Range ¹	No. of Issues (Daily Average)	Ratio	Accumulated Ratio
0.0~0.1	2,484.5	71.03%	71.03%
0.1~0.2	657.8	18.81%	89.83%
0.2~0.3	184.1	5.26%	95.10%
0.3~0.4	80.9	2.31%	97.41%
0.4~0.5	34.9	1.00%	98.41%
0.5~0.6	18.2	0.52%	98.93%
0.6~0.7	11.2	0.32%	99.25%
0.7~0.8	8.7	0.25%	99.50%
0.8~0.9	4.7	0.14%	99.63%
0.9~1.0	3.7	0.11%	99.74%
1.0~1.1	1.6	0.04%	99.78%
1.1~1.2	1.9	0.05%	99.84%
1.2~1.3	1.5	0.04%	99.88%
1.3~1.4	0.9	0.03%	99.91%
1.4~1.5	0.5	0.01%	99.92%
1.5~1.6	0.4	0.01%	99.93%
1.6~1.7	0.3	0.01%	99.94%
1.7~1.8	0.5	0.01%	99.95%
1.8~1.9	0.3	0.01%	99.96%
1.9~2.0	0.5	0.01%	99.98%
2.0~2.1	0.1	0.00%	99.98%
2.1~2.2	0.1	0.00%	99.98%
2.2~2.3	0.1	0.00%	99.98%
2.3~2.4	0.1	0.00%	99.98%
2.4~2.5	0.0	0.00%	99.98%
2.5~2.6	0.1	0.00%	99.99%
2.6~2.7	0.1	0.00%	99.99%
2.7~2.8	0.0	0.00%	99.99%
2.8~2.9	0.0	0.00%	99.99%
2.9~3.0	0.0	0.00%	99.99%
Over 3.0	0.4	0.01%	100.00%

Source: Tokyo Stock Exchange

¹ (Matching price at afternoon close Itayose – Last execution price immediately prior to afternoon close Itayose) / Renewal price interval

² Before rule changes: From Aug. 1, 2019 to Nov. 1, 2019

³ After rule changes: From Jan. 4, 2021 to Apr. 27, 2021

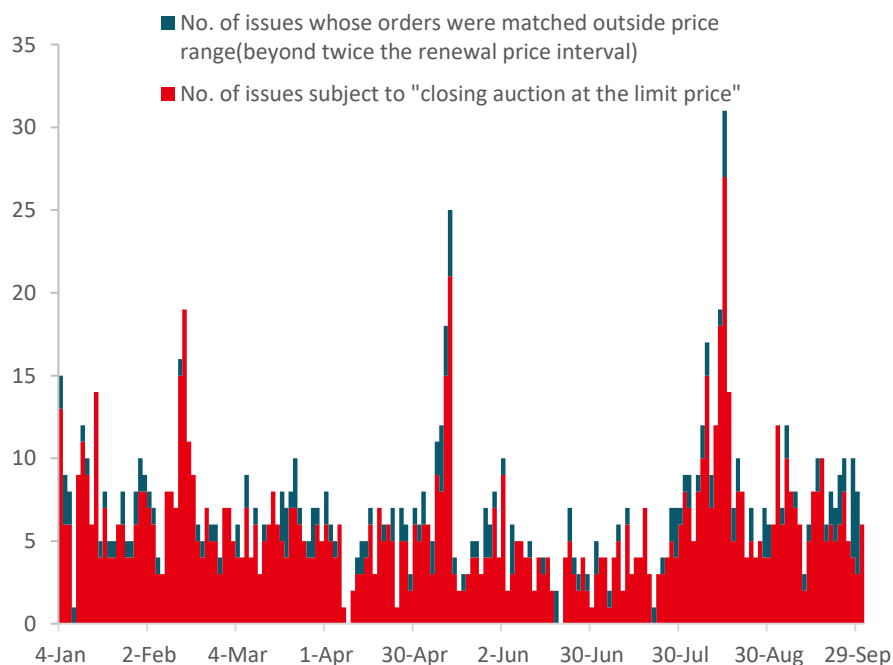
(Closing Auction) Change in No. of Issues Subject to "Closing Auction at the Limit Price"

-When we look at daily changes in the number of issues subject to "closing auction at the limit price" and the number of issues whose orders were matched at prices beyond twice the renewal price interval, while the number of issues subject to "closing auction at the limit price" is around 5 to 10, the number of issues whose orders were matched at prices beyond the renewal price interval is limited to a small number as illustrated below.

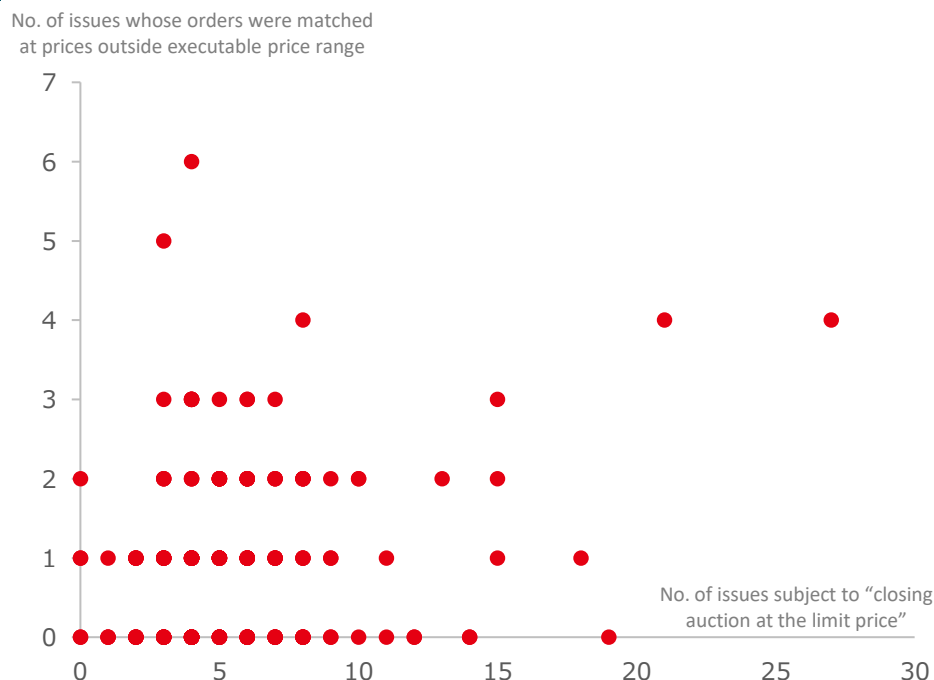
-In addition, the correlation between the number of issues subject to "closing auction at the limit price" and the number of issues whose orders were matched at prices beyond the renewal price interval on every trading day is low (the correlation coefficient is approximately 0.18), and based on data up to now, the possibility that both will increase simultaneously is not high.

-Accordingly, in the closing auction, TSE will expand opportunities for investors to trade at closing prices by processing orders that match at prices outside the executable price range as "closing auction at the limit price". At the same time, for the purpose of contributing to trading participants' smooth internal allocation processing after the close of trading, TSE will provide trading participants with allocation data in the same manner as for the current "closing auction at the limit price".

Changes in no. of issues subject to "closing auction at the limit price" and issues whose orders were matched at prices outside executable price range










Scatter plot of no. of issues subject to "closing auction at the limit price" and issues whose orders were matched at prices outside executable price range



Source: Tokyo Stock Exchange

¹ Data was obtained from Jan. 4, 2021 to Sept. 30, 2021

(Closing Auction) Trading Rules Pertaining to Trading Session Close in Overseas Exchanges

	Types	Pre-Open /Random	Restriction on Order Types	Execution Condition /Price Limit
	- Continuously from Zaraba to closing - One time matching	-None	-Imposed -No orders other than imbalance orders allowed for 10 minutes prior to closing -No cancellation allowed for 2 minutes prior to closing	-Within 10% from the last Zaraba price -If orders are matched at prices outside price range, they may be executed at upper/lower limit of price ranges
	- Closing auction type ¹ - Retry up to twice	-None -Maximum of 30 second random	-None	- Execution of all market orders -Itayose price needs to be within 1% to 5% from the last stock price ²
	- Closing auction type ¹	-None -Maximum of 30 second random	-None	-Itayose price needs to be within 2.5% to 5% from the last stock price
	- Closing auction type ¹	-Provided (10 minutes) -Maximum of 1 minute random	-None	- None
	- Closing auction type ¹	-Provided -Maximum of 2 minute random	-Imposed -No modification or cancellation allowed for 4 minutes prior to closing	-Imposed -Price limit is imposed
	- Continuously from Zaraba to closing - One time matching	-None	-None	-Execution of all market orders -Itayose price needs to be within 2.8% to 6% of last stock price
	- Closing auction type ¹	-None	- Imposed -No modification or cancellation allowed for 1 minute prior to closing ³	-Price limit is imposed

¹ A method providing order acceptance time between Zaraba and closing

² 1% for issues with high liquidity (SETS100), 5% for those with low liquidity

³ For the closing of the day session, the system does not incorporate a non-cancellation period as some have expressed the need to adjust their positions carefully at the close of the cash market afternoon session. However, in the rules for the closing of the day session, OSE prohibits the cancellation or modification of orders immediately prior to the afternoon close Itayose if the volume of orders exceeds a certain level, which is provided for each product.

Dissemination of Market by Order

Sell order	Price	Buy order	
15	JPY 102		
5	JPY 101		
	JPY 100	10	20
	JPY 99	10	
	JPY 98	20	5

If a buy order of 10 units is newly placed at JPY 100

10

Current (FLEX Full)

	Sell/Buy	Price	Quantity
New quote	Buy	JPY 100	40 units

- The total quantity of buy orders at JPY 100 is disseminated as order information.
- Users find out the quantity of a new order by comparing with the previous quantities

Market By Order

	Sell/Buy	Price	Quantity	Feature 1	Feature 2	Feature 3
					Order Identifier	Priority
New Order	Buy	JPY 100	10 units		XYZ002	3

Feature 1: Information on a relevant order including its quantity will be disseminated as new order information.

Feature 2: The "Order identifier" will be disseminated for the purpose of linking market information with a trading participant's own orders.

Feature 3: The priority of an order as of time of registration to order book will also be disseminated.

Current Services

Name of service	Details	Bandwidth
Standard WB	10 best bids/offers, etc.	500 Mbps
Standard		100 Mbps
Full WB	Full-depth, etc.	450 Mbps
Full		100 Mbps
High Speed Index	Disseminated every time specific index changes	150 Mbps

New Services

Name of service	Bandwidth
Standard WB (continued)	500 Mbps
Market by Order	To be determined

(Extension of Trading Hours)Post-Market Close Operations related to Investment Trusts

