



ASX 24 Bond Futures Roll

Consultation Paper
3 October 2019



Invitation to comment

ASX is seeking submissions on this consultation by 3 December 2019.

Submissions should be sent to:

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ASX Limited
20 Bridge Street
Sydney NSW 2000

ASX prefers to receive submissions in electronic form.

If you would like your submission, or any part of it, to be treated as confidential, please indicate this clearly. All submissions will be provided to regulators on request. Submissions may also be published on the ASX website, unless they are clearly marked as confidential or ASX considers that there are reasons not to do so.

ASX is available to meet with interested parties for bilateral discussions on the ASX Futures Bond Roll.

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ASX 24 Bond Futures Roll

1. Purpose of this Paper

This consultation paper outlines a number of potential changes to the market structure for the roll of ASX's Bond Futures contracts. ASX is seeking feedback from market users to understand whether there are opportunities to improve the efficient functioning of the bond roll for a broad range of market users.

ASX invites submissions on the options set out in this paper and any alternative approaches that market users may wish to raise for consideration. ASX welcomes feedback on the options individually and in combination. Please provide written feedback by 3 December 2019.

If you or your organisation would like to discuss this topic further, please contact ASX (see contact details on page 2).

2. Background

2.1. ASX's Treasury Bond Futures

ASX's 3 and 10 Year Treasury Bond Futures products (Bond Futures) are Australia's most actively traded medium and long term interest rate listed derivative products. The Bond Futures offer deep, liquid markets providing market users with an efficient market for hedging and trading purposes. Open Interest in the Bond Futures has grown significantly¹ and ASX has seen increased participation in the product in terms of number of firms and size of overall activity.

ASX's Bond Futures market is supported by the Australian Government Bond market. As at 12 July 2019, Australian Treasury Bonds on issue consisted of 25 bond series totalling AUD500 billion in face value terms with a maturity profile out to 28 years. (See *Appendix B*).

For further information on the contract specification refer to the [3 and 10 Year Bond Futures factsheet](#).

In addition to the 3 and 10 Year Bond Futures, ASX also has a 20 Year Bond Futures contract. ASX is not proposing changes to the roll for the 20 Year Bond Futures contract at this stage.

2.2. Purpose and Structure of the Bond Roll

The purpose of the ASX Treasury Bond Futures Roll ("the Roll") is to facilitate the timely and efficient movement of existing futures exposure from the front contract to the next futures contract, allowing position holders to maintain market exposure. As such, the quarterly Roll is an important period in the contract lifecycle. The increase in activity during the Roll also provides a revenue opportunity for some participants, who undertake a variety of trading strategies.

The Roll period typically commences two weeks out from expiry with most activity occurring in the last five business days. ASX aims to have a market structure that facilitates the timely and efficient migration of open positions.

The ASX 24 Roll market uses the First In First Out (FIFO) matching algorithm, meaning that gaining good queue position is a key objective for participants. A higher queue position increases the likelihood of orders being passively filled. To support the efficient migration of open interest, ASX reduces the minimum tick increment of the Bond Futures contracts by 50% for the five days of the Roll. This has the effect of lowering the total transaction cost for aggressive orders that cross the bid-offer spread.

¹ See Chart 1 and 2 in Section 2.3

2.3. Historical Changes to the Roll

Markets change over time, and therefore market structure needs to continually evolve to ensure that they operate as intended. Over the last 13 years, ASX has delivered a number of market structure changes to the Bond Futures contracts. These changes were implemented following feedback from market users collected via formal and informal consultations as well as interest rate working groups.

The following table provides a timeline of significant developments since 2005:

Year	Action
2005	Consultation on minimum tick increment for 3 Year Bond Futures
2006	Reduced minimum tick from 1 to 0.5 basis points for 3 Year Bond Futures Roll
2012 - 2014	Consultation paper for 3 and 10 Year Bond Futures Roll resulted in a reduced minimum tick from 0.5 to 0.25 basis points for 10 Year Bond Futures Roll
Oct 2015	Increased the minimum contractual period for ASX 24 Liquidity Cross Connects (LCC) gateways from 1 to 3 months
Mar 2017	Transition from SYCOM to NTP. Introduced Pre-Trade Risk Management (PTRM) limit controls
Dec 2018	Minimum tick size for 3 Year Bond Futures changed from 1 to 0.5 basis points for normal trading periods, making it the same as the tick size for the roll period.
Sep 2019	Implementation of PTRM rule amendments to limit the number of message rejects

The graphs below (Chart 1 for the 3 Year Bond Future, and Chart 2 for the 10 Year Bond Future) illustrate the changes made to the 3 and 10 Year Bond Futures Roll market structure since 2006, overlaid on the Roll activity over time.

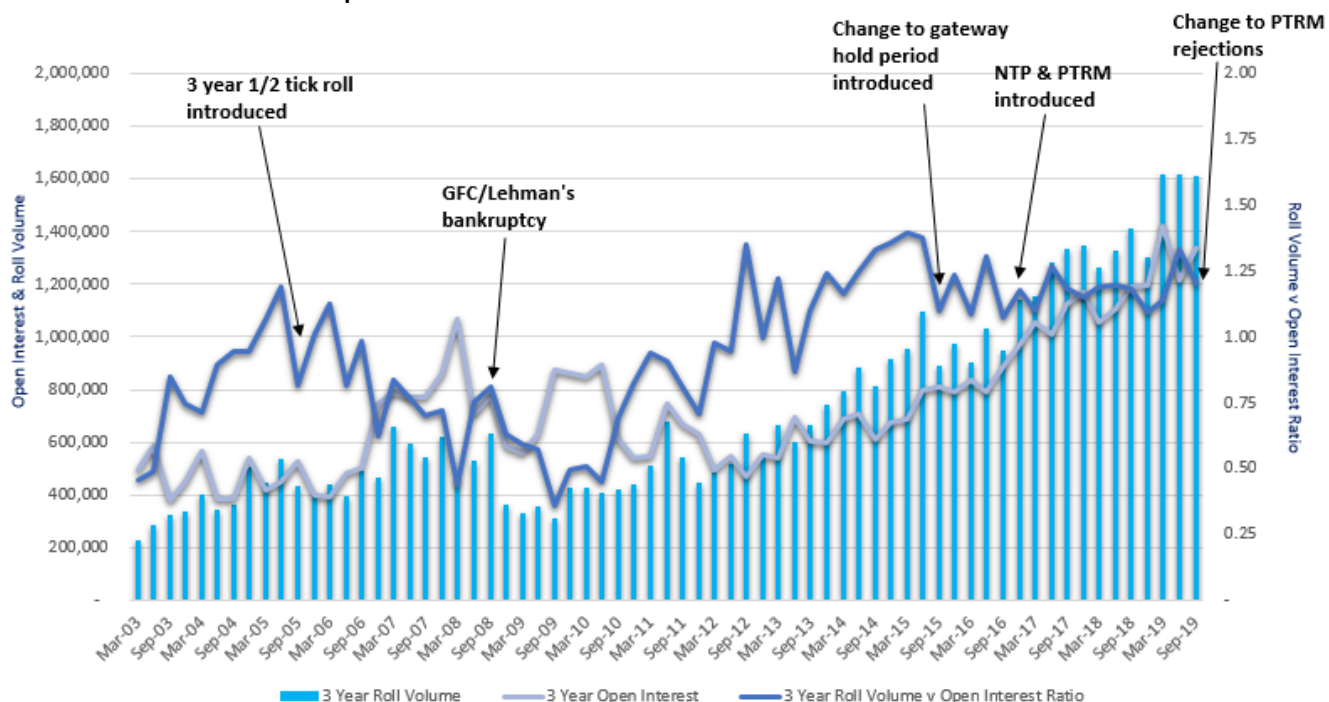
The charts show the following information:

Roll volume: the number of calendar spreads executed during the five days of the expiry period.

Open Interest: the published number of open positions as at the end of the month prior to the Roll month. This is an indicator of the number of open positions that could roll.

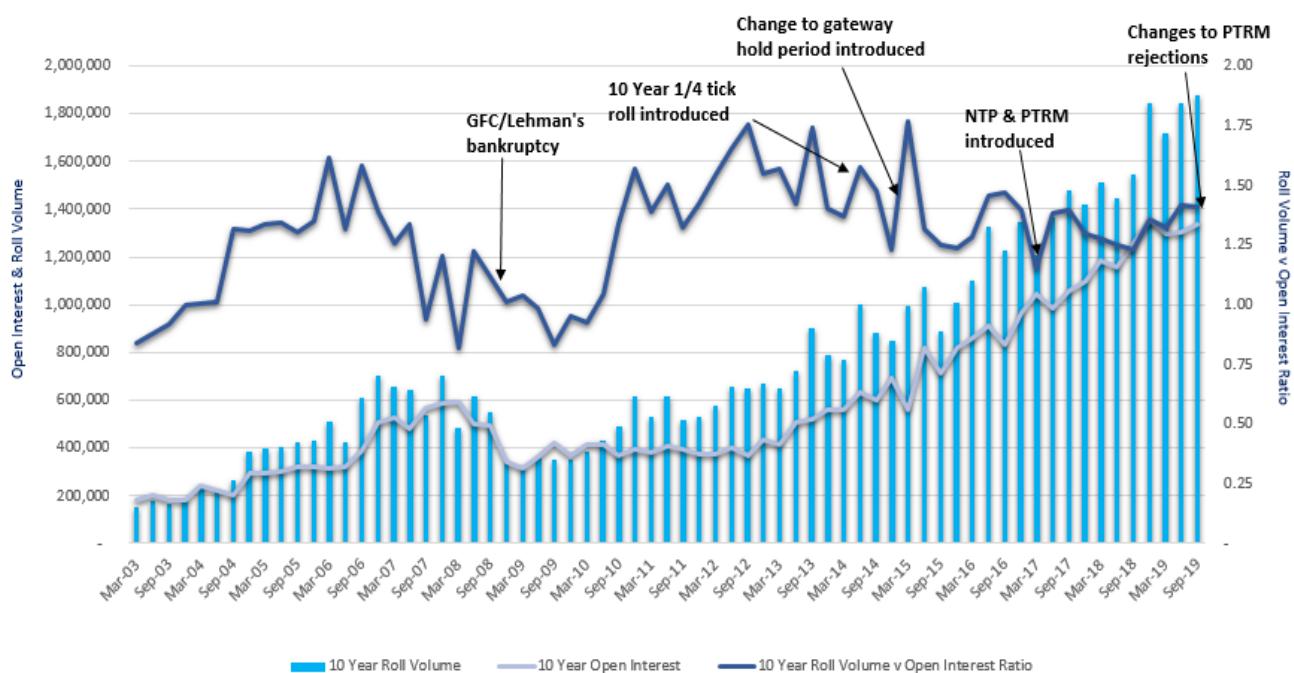
Ratio of Roll volume vs. Open Interest: The ratio divides the total Roll volume by the end of month Open Interest. This measure is an indicator of the amount of trading taking place in the Roll over and above those users who are transferring their positions from one expiry to the next.

Chart 1: 3 Year Roll Volume v Open Interest Ratio



*3 Year Bond Future Open Interest data note: From March 2003 until Dec 2010, the Open Interest figures for the 3 Year Bond Futures are inflated when compared to the traded volumes in the 3 Year Futures Bond Roll. During this period, best practice in relation to the daily close out of back to back positions was not consistently followed by Participants. This was more pronounced in the 3 Year contract than the 10 Year contract due to the relative volume traded in the 3 Year at that time. As a result, the Volume vs Open Interest Ratio for this period is not directly comparable to the remainder.

Chart 2: 10 Year Roll Volume v Open Interest Ratio



3. Consultation

3.1. Scope of Market Consultation

The purpose of the consultation is to identify opportunities to improve the efficient functioning of the Roll for a broad range of market users. The following section outlines four options for changes to the Roll structure and order management functionality. It also sets out the rationale, the potential benefits in relation to the efficient functioning of the Roll, and potential risks of implementing each of these options. Each section provides a list of questions on which ASX seeks feedback from market users.

Please note that ASX is not proposing to implement all of these options. Instead, each option will be considered individually. We would like to hear your feedback on which of these individual options you prefer, and why.

Depending on the feedback from the consultation, ASX may consider implementing more than one of these options. If this occurs, ASX's preference will likely be to implement each change individually, allowing us to evaluate the impact of each change before applying further changes. Therefore, in your feedback, please inform us whether there are any combinations of changes and if you have a preference around the order in which these are implemented.

In consideration of these options, ASX also conducted research into international bond rolls, located in *Appendix A* of this paper. These comparisons highlight the differences in order functionality and contract specifications of the various exchanges compared to those offered by ASX. The following exchanges were compared: CME Group (CME), Montreal Exchange (TMX), Eurex Exchange (Eurex), ICE Europe Exchange (ICE), and Japan Exchange Group (JPX).

3.2. Reduction in Minimum Tradeable Tick Increment for the Roll

Option 1	To reduce the minimum tick increment for the 3 and 10 Year Bond Futures for the Roll
Rationale	<p>Commencing five (5) business days from the Bond Futures expiry, ASX reduces the tradeable tick increment on the 10 and 20 Year Bond Futures contract². The reduction in the tick increment is applied to both the outright contracts and the Roll.</p> <p>The 10 and 20 Year Bond Futures currently trade at 0.5 basis point increment during non- expiry periods. During the Roll period, the minimum tick increment reduces to 0.25 basis point. The 3 Year Bond Future currently trades at 0.5 basis point increment throughout both the normal trading and roll periods. ASX has received requests from market participants to consider a further reduction in the minimum tick increment for the 3 and 10 Year Bond Futures Roll.</p> <p>Out of scope</p> <p>A reduction in the Bond Futures tick increment to 1/8th of a basis point or 0.125 basis points is not an option for consideration due to a technical restriction on the number of characters a price can support in systems. This restriction of 8 characters is a global issue for vendor systems used to support futures products.</p> <p>ASX is also not proposing to make changes to the 20 Year Bond Futures tick increment for the Roll.</p>

² Prior to December 2017, ASX also reduced the tick increment on the 3 Year Bond Futures contract. In December 2017, ASX permanently reduced the 3 Year Bond Futures tradeable tick increment to 0.5 basis points.

Current and potential minimum tick increment levels and values

The following table outlines the dollar value associated with each tick increment option:

Contract	Tick Increment Dollar Value ³			
	Current	Potential		
	0.5bp	0.25bp	0.2bp	0.1bp
3 Year Bond Futures	Approx. AUD16*	Approx. AUD8	Approx. AUD6.4	Approx. AUD3.2

*International comparison: EUREX 2yr AUD8.16; 5 yr AUD16.31; CME 2 and 5 yr AUD11.20; ICE Europe 2 and 5 yr AUD 18.20; JPX 5yr AUD13.20; TMX 10 yr AUD10.70.

Contract	Tick Increment Dollar Value ³		
	Current	Potential	
	0.25bp	0.2bp	0.1bp
10 Year Bond Futures	Approx. AUD30 [^]	Approx. AUD23.7	Approx. AUD11.8

[^]International comparison: EUREX 10yr AUD16.10; CME 10 yr AUD11.20; ICE Europe 10 yr AUD 18.20; JPX 10yr AUD13.20; TMX 10 yr AUD10.70.

Potential benefits of a reduced tick increment

- Reduces total cost of rolling existing Bond Futures positions, provided there is sufficient liquidity at the top of the order book.
- May encourage participants with open positions to cross the spread rather than passively work bids or offers, resulting in a more timely outcome for open position holders.
- May introduce additional trading opportunities through the provision of additional tradeable price levels.

Potential risks of a reduced tick increment

- A reduced tick increment may reduce the attractiveness of liquidity provision in the roll, and perhaps thereby reduce liquidity in the order book both inside and outside the Roll period.
- Reduced liquidity may result in less available volume in the order book, increasing potential for price slippage and volatility.
- Changing the 3 Year Bond Futures tick increment to 0.25 basis points would have a longer implementation timeframe and complexity for ASX, vendors and participants due to the additional decimal place. It is not possible to change the 10 Year Bond Futures tick increment to 0.125 basis points due to limitations on the total number of decimal places which can be supported across futures market vendors and participants at present; a halving of the current 0.25bp tick size is therefore not suggested below.

³ Tick dollar values are determined based on market prices as at 18 September 2019. Tick values may vary depending on the level of interest rates.

Questions

3 Year Bond Futures

	Current			
	Option 1a	Option 1b	Option 1c	Option 1d
3 Year Bond Futures	0.50bp	0.25bp	0.20bp	0.10bp

- Do you support option 1a (leaving the current minimum tick increments unchanged), option 1b, option 1c or option 1d? Would it improve the timeliness and efficiency of the Roll for a broad range of users? Why?
- Could a narrower tick increment have a negative impact on the efficient functioning of the Roll and / or outright markets? Please describe your reasons.
- What would be the impact of leaving the tick increments at the current levels?
- Would narrower tick increments make you more likely to cross the bid /offer spread during the Roll? If applicable would you instruct your futures broker to do so?
- How much time would your business require to implement tick increment changes? Does the time needed change depending on the chosen tick increment?

10 Year Bond Futures

	Option 1e	Option 1f	Option 1g
10 Year Bond Futures	0.25bp	0.20bp	0.10bp

- Do you support option 1e (leaving the current minimum tick increments unchanged), option 1f or option 1g? Would it improve the timeliness and efficiency of the Roll for a broad range of users? Why?
- Could a narrower tick increment have a negative impact on the efficient functioning of the Roll and / or outright markets? Please describe your reasons.
- What would be the impact of leaving the tick increments at the current levels?
- Would narrower tick increments make you more likely to cross the bid /offer spread during the Roll? If applicable would you instruct your futures broker to do so?
- How much time would your business require to implement tick increment changes? Does the time needed change depending on the chosen tick increment?

3.3. Maximum Allowable Order Size

Option 2	To increase the maximum allowable order size for the 3 and 10 Year Bond Futures to 20,000 contracts.
Rationale	<p>The current maximum allowable order size for ASX 24 Interest Rate Futures products is set to 9,999 contracts in the ASX 24 Trading Platform. The size of the underlying market and available volume in the order book has increased significantly over the last decade. Open interest of both 3 and 10 Year Bond Futures has also steadily increased.</p> <p>An increase in the maximum allowable order size would be a reflection of the growth in available executable order book volume in the 3 and 10 Year Bond Futures Roll market and may provide participants with a more efficient way to engage with the available on screen liquidity.</p> <p>An increase to the maximum allowable order size would be applicable at all other times in both the Roll and the outright markets for the 3 and 10 Year Bond Futures.</p> <p>Readers should note that ASX recently requested feedback on changes to the maximum allowable order size as part of the Bank Bill consultation paper. Overall feedback did not support the proposed change. Further details on the feedback received is available in the ASX Submission Response Paper. ASX would like market users to consider whether there are other reasons to support the increase to the maximum order size for the Roll.</p> <p>Potential benefits of an increase to the maximum allowable order size:</p> <ul style="list-style-type: none"> • Will provide participants with the ability to further consolidate multiple client orders in the pre-open to increase order management efficiencies. • May reduce price slippage and increase guaranteed execution order fill size for larger parcels. <p>Potential risks of an increase to the maximum allowable order size:</p> <ul style="list-style-type: none"> • Could result in a further increase in the order book depth and may increase the potential for the order book to lock up, particularly during periods of low volatility. • Increase in maximum allowable order size would be available in the outright contracts as well as the Roll when liquidity in outright contracts is relatively lower than during the non-Roll periods. • May place further emphasis on order management solutions. • Potential for larger fat finger errors, noting that PTRM does allow Participants to set smaller order sizes where required.
Questions <ul style="list-style-type: none"> • Should ASX consider increasing the maximum allowable order size from the current level of 9,999 contracts to 20,000 contracts for the 3 and 10 Year Bond Futures? If not, what maximum order limit would you support? In what circumstances would you use the increased order size? • If you do not support increasing the order size, what are your reasons? 	

3.4. Good Till Cancelled Functionality for Combination Orders

Option 3	To support Good Till Cancelled (GTC) functionality
Rationale	<p>On the ASX 24 platform, combination contract orders – calendar and inter-commodity spreads – are only valid for the current trading session. At the end of each trading session all combination orders are purged from the trading platform. Customers wishing to maintain a Bond Roll order over multiple trading sessions are required to re-enter their orders at the start of each trading session. For the Bond Futures contracts there are two trading sessions per trade date – a night session commencing at 5.10pm (3 Year Bond Futures) and 5.12pm (10 and 20 Year Bond Futures) and a day session commencing at 8.30am (3 Year Bond Futures) and 8.32am (10 and 20 Year Bond Futures).</p> <p>GTC spread orders will have the same order prioritisation rules applied as the rules for the outright orders. Volume decrease will maintain queue position while an increase in the order size will result in the order moving to the back of the queue.</p> <p>Should ASX implement GTC spread functionality, ASX would propose to have the functionality available at all times through the life of the contracts. This would enable Roll orders to be placed up to 3 months ahead of the futures contract expiry. A potential variation would be to switch on the GTC functionality for the Roll on a specified date ahead of the futures expiry.</p> <p>Readers should note that ASX recently requested feedback on GTC functionality as part of the Bank Bill consultation paper. Overall feedback was supportive of GTC functionality for the Bank Bill Futures spread market. Further details on the feedback received is available in the ASX Submission Response Paper. ASX would like market users to consider the application of GTC functionality for the Roll.</p> <p>In 2012 ASX consulted on GTC functionality for the Roll. Feedback received was generally supportive at that time, however, the decision was to implement the tick increment reduction at that point in time. ASX would welcome feedback from previous respondents on whether their views on GTC functionality have changed or are consistent with this previous view.</p> <p>Potential benefits of GTC functionality:</p> <ul style="list-style-type: none"> • May provide improved order management, including reduction of erroneous orders, for some ASX 24 Trading Participants. • May provide participants with the opportunity to get filled on passive orders as orders move up the queue during the entire Roll period. • May benefit participants who place resting orders in the spread market by allowing them to enter GTC orders which can be carried over multiple trading sessions. <p>Potential risks of GTC functionality:</p> <ul style="list-style-type: none"> • May result in an increase in order book depth which may lock up the order book. • May result in an increase in the number of GTC orders in the market, requiring additional operational overheads to manage the higher number of open orders. • Providing GTC spread functionality would involve a complex technical build for both ASX and possibly for vendors and will take considerable time to deliver.

Potential GTC spread functionality:

- GTC functionality for the Bond Futures Roll would be available at all times.
- GTC orders would expire when the earliest contract expires.
- Good Till Date (GTD) orders would expire on the earliest of the date and time specified or when the contract expires.
- GTC and GTD spread orders (GT orders) would be reinstated in the order book on market open. GT orders would not participate in the auction process to determine the opening price.
- The matching engine would use an interactive algorithm for reinstating and matching GT spread orders. The following sets out a possible algorithm to re-instate GT orders based on time priority.
 1. Sort all GT orders in each individual spread book in price-time priority (Buy and Sell side is sorted separately)
 2. Insert GT orders one at a time based on price-time priority. If the price of the GT spread order improves the bid or offer, the GT spread order will sit at the top of book at the improved price. If an implied price in the outright market created from the GT spread order improves the bid or offer, the implied leg will sit at top of book at the improved price.

Questions

- Do you support the introduction of GTC spread order types for the 3 and 10 Year Bond Futures?
- What benefits or drawbacks do you see with GTC functionality for spreads?
- Do you agree with the proposal to have GTC spread functionality available at all times? If not, at what point should GTC functionality be available prior to expiry? Please provide your reasons.
- Do you have any comments on the proposed GTC order reinstatement approach outlined in the section above?

3.5. Use of Pre-Trade Risk Management Tools

Option 4	Use of Pre-Trade Risk Management Tools
Rationale	<p>This section seeks feedback on recent changes made to the Rules governing the use of ASX’s Pre-Trade Risk Management (PTRM) system. This is a risk management tool accessible to all direct members of the exchange and as such, may not be relevant to all respondents of this consultation paper.</p> <p>PTRM is provided as part of the ASX 24 system and provides participants with risk management functionality on a pre-trade basis. PTRM allows participants to set pre-trade risk management limits. This risk layer is mandatory for all participants trading on ASX 24, and before being allowed to enter an order, customers must create an account and set up limits for each product they wish to trade.</p> <p>It is mandatory to set maximum order quantity, net long, and net short position limits for each product. Participants can also set options delta and intra-spread weightings to reduce the effect of open orders on the calculated positions in those products.</p> <p>PTRM generates warnings to the user when traded positions and open orders reach 75% and 90% of the account’s net long or net short limits for a product. An order that would exceed the 100% limit if placed will be rejected. Accounts and limits can be created using the ASX Administration and Risk Terminal (ART).</p> <p>PTRM is an important and effective risk management tool that should be used in conjunction with participants’ own risk management systems. PTRM may assist in meeting some but not all the risk management requirements of the Market Integrity Rules.</p> <p>Change to Conditions of Licence for Pre-Trade Risk Management Software</p> <p>On 24 July 2019, ASX published Notice 0738.19.07 setting out new Conditions of Licence for Market Operator Software contained in the ASX 24 Operating Rules and Procedures to limit the number PTRM message rejects that can occur (the Procedure), effective 2 September 2019. Further guidance was issued subsequently in Notice 0894.19.08 and Notice 0923.19.09.</p> <p>The intention of the Procedure and subsequent guidance is to address behaviour where PTRM is being used as an order management tool, with excess messages rejected by PTRM functionality, rather than for risk management. Not all participants have demonstrated this use of PTRM. ASX’s actions in these reforms have been to ensure that PTRM is used for its intended purpose, as promptly as possible. ASX noted feedback regarding some short term issues in complying, and has taken further steps to phase in the approach for certain participants.</p> <p>A phased approach will therefore apply for the interim period and the full effect of the rule will be implemented and enforced from 3 December 2019 ahead of the December roll period.</p> <p>Guidance on compliance with the Procedure contained in Notice 0894.19.08 provides greater detail on the rule. ASX proposes to formally incorporate this guidance into the ASX 24 Operating Rules to provide clarity. Any update to the rule will be actioned following market feedback received within this consultation process.</p> <p>Therefore, as part of this consultation ASX seeks feedback on the effectiveness of the PTRM Procedure.</p>

Questions

- Do you support ASX addressing the use of PTRM as an order management tool?
- Has the additional guidance and wording provided around persistence alleviated the need for real time monitoring? Please provide comments.
- Did you rely on the class waiver? Does the clarification provided on persistence address any concerns?
- Does this remove the need for the class waiver?
- Are there any additional technical developments required to comply with the Procedure? Are there any other impediments to comply with the Procedure?

3.6. General Questions

Questions

- Of the four options presented and notwithstanding the fact that PTRM changes have already been made, if only one were implemented, what would your order of priority be for – minimum tick increment reduction, GTC functionality, increase to maximum allowable order size and the use of PTRM tools?
- Do you think that more than one of the options should be implemented? If so, which would be your preferred combination of initiatives? In what order do you believe they should be implemented, and why? If there are multiple combinations which you would support, please list those in your order of preference and explain why.
- Are there any combinations of the options which you believe should not be implemented together, or which may be detrimental to the quality of the market? Please specify what those combinations are and why.

4. ASX Block Trades

ASX's block trade facility is a rules framework, trade capture and publication mechanism for certain off-market trades. The facility enables professional market users to arrange and transact orders in large size for certain less liquid contracts. Block trades may reduce price impacts and time delays that could occur when transacting large orders in the central, lit market. ASX offers block trade functionality for certain products and trading periods to facilitate large transactions for those products when the required on-screen liquidity is not available. Block trades on ASX Bond Futures may only be executed at price levels consistent with the tradeable tick increment in the central limit order book.

ASX's objective is to encourage as much activity as possible to transact through the central limit order book. This has the benefit of supporting robust price formation; maximising liquidity and therefore efficient trade execution for the whole market, delivering transparency to all market users.

4.1. Block Trades and the Roll Market

ASX does not allow block trades during the 3 and 10 Year Bond Futures Roll and is not currently proposing to change this. ASX believes that block trades are not necessary or appropriate in the Roll because there is already sufficient on-screen liquidity. There are also a number of downside risks to allowing block trades in the Roll, which include:

- Less robust price discovery as on-screen price formation would then represent only a subset of market activity,
- Off screen liquidity would not be available for all market users, allowing some to block certain trades off-market when there may be other market users on-screen who are ahead of them in price-time priority, and

- Reduced transparency of liquidity. This unequal access and fragmentation of the Roll may result in an overall decline in liquidity provision into the central order book, and may cause the market to become less transparent, with less timely information flow.

In addition, block trading in any ASX 24 Roll market is currently prohibited under ASIC ASX 24 Market Integrity Rules (ASIC Market Integrity Rules (Futures Markets) 2017 Section 3.4.2 (2)).

For these reasons, ASX does not propose the introduction of block trading for the Roll. If there are areas where the efficiency of the Roll could be improved (for example, reducing tick sizes to reduce the total cost of crossing the bid-offer spread), ASX believes that it would be better to achieve this by making changes to the market structure for on-screen trading. However, a number of firms have asked us to consider block trades, and we are therefore including questions in this consultation process to enable market participants to submit their views on the topic.

When answering the questions below, if you are supportive of the introduction of block trades for the Roll, please focus particularly on how to ensure that robust price formation, transparency of liquidity and prices, and access to the market for both smaller and larger users, could be maintained.

Questions

- Would you support the introduction of block trading for the 3 Year and 10 Year Bond Futures Roll? Why?
- If yes, please explain how to address the concerns raised around price formation, transparency and equal access for all?
- If ASX permitted block trades for the Roll, what would be the appropriate minimum block trade threshold for the 3 Year and the 10 Year Bond Futures?

5. Appendix A

5.1. International Comparisons

The following table provides a high level summary of the comparative analysis across the following exchanges The CME Group (CME), Montreal Exchange (TMX), Eurex Exchange (Eurex), ICE Europe Exchange (ICE), and Japan Exchange (JPX).

Global Exchange Calendar Spread Specifications and Functionality

	CME	TMX	Eurex	ICE	JPX	ASX
Product	US Treasury Note Futures	Canadian Government Bond Futures	German Bond Futures	UK Gilt Futures	Japanese Government Bond Futures	Australian Treasury Bond Futures
Order Duration	GTC	GTC	GTC	GTC	GTC	Session only
Minimum tick increment for Roll⁴	0-00 $\frac{1}{8}$ - 2yr 0-00 $\frac{1}{4}$ - 5yr 0-00 $\frac{1}{4}$ - 10yr 0-00 $\frac{1}{4}$ - 30yr	0.005- 2yr 0.01- 5yr 0.01- 10yr 0.01- 30yr	0.005-Schatz 2yr 0.01- Bobl 5yr 0.01- Bund 10yr 0.02- Buxl 30yr	0.01- 2yr 0.01- 5yr 0.01- 10yr 0.02- 30yr	0.01- 5yr 0.01- 10yr 0.01-20yr	0.005- 3yr 0.0025- 10yr 0.0025- 20yr
Face Value: 2 YR	\$200,000 USD	\$200,000 CAD	€100,000 EU	£100,000	¥100,000,000	\$100,000 – 3 yr
5 YR	\$100,000 USD	\$100,000 CAD	€100,000 EU	£100,000	¥100,000,000	\$100,000 – 10 yr
10 YR	\$100,000 USD	\$100,000 CAD	€100,000 EU	£100,000	¥100,000,000	\$65,000 – 20 yr
30 YR	\$100,000 USD	\$100,000 CAD	€100,000 EU	£100,000	N/A	
Dollar value per tick (converted into AUD equivalent)	\$11.20 for all tenors	\$10.70 for all tenors	\$8.16- 2 yr \$16.31- 5 yr \$16.10- 10 yr \$32.62- 30 yr	\$18.20- 2 yr \$18.20- 5yr \$18.20- 10 yr \$36.60- 30yr	\$13.25 for all tenors	\$15.99- 3 yr \$28.64-10 yr \$32.88-20 yr
Tick value / face value (bp)⁵	2 YR 0.39 5 YR 0.78 10 YR 1.56 30 YR 3.13	0.50 1.00 1.00 1.00	0.50 1.00 1.00 2.00	1.00 1.00 1.00 2.00	1.00 1.00 1.00 1.00 20yr	1.60 3yr 2.86 5.06 20yr
Tick value / current contract value⁶ (bp)	2 YR 0.36 5 YR 0.66 10 YR 1.20 30 YR 1.94	0.47 0.81 0.70 0.48	0.45 0.74 0.58 0.93	0.96 0.87 0.75 1.14	0.88 0.65 0.60 20yr	1.39 3yr 1.94 3.49 20yr
Block trades and threshold	No	No	Yes >2,000 lots 10 yr >3,000 lots 5 yr >4,000 lots 2yr	Yes >3,000 lots <75, 000 lots	Yes >1 lot All tenors	No
Maximum order size	49,999-2 yr 49,999- 5 yr 49,999 10 yr 29,999 30 yr	9,999- 2 yr 9,999- 5 yr 24,999- 10 yr 9,999- 30 yr	2,000- 10 yr 3,000- 5 yr 4,000- 2 yr	5,000- 2 yr 5,000- 5 yr 75,000-10 yr 2,000-30 yr	N/A	9,999 3 yr 9,999 10 yr. 9,999 20 yr.
Matching algorithm	Pro-rata	FIFO	FIFO	FIFO	FIFO	FIFO

⁴ CME and ASX reduce the tick increment for the Roll. All other exchanges compared maintain the same tick increment throughout the contracts' lifecycle.

⁵ Bid-offer spread as a proportion of contract face value identifies the cost to obtain exposure based on face value.

⁶ Current contract value as at 23rd September 2019.



	CME	TMX	Eurex	ICE	JPX	ASX
Top of book depth -average 10Yr⁷	1,000,000	7,000	220,000	30,000	7,000	600,000
Outright and spread market integration	De linked calendar spread from outrights	Integrated spread and outright market	Integrated spread and outright market	Integrated spread and outright market	De linked calendar spread from outrights	Integrated spread and outright market

Source: Bloomberg. (Data and AUD conversions as at February 2019).

Minimum Tradeable Tick Increment and Dollar Value

In comparing the minimum tradeable increment of global calendar rolls, it should be noted that most global exchanges' bond futures contracts have a different price quotation approach to ASX Bond Futures. ASX Treasury Bond Futures are quoted on a yield basis while global equivalents are quoted on a capital price basis. For ASX's Bond Futures contracts a 1 basis point move is equivalent to a 2 to 3 dollar move in terms of capital price.

For example, in the 3 Year Bond Futures contract, a 1 basis point move is a move over two price points of the minimum 0.50bp increment. As a result, this is not a 1:1 comparison as the equivalent dollar value per exchange varies depending on each individual pricing formula. The dollar value per increment has been converted into Australian dollars to assist in the comparison of the relative cost associated with crossing the minimum tradeable increment.

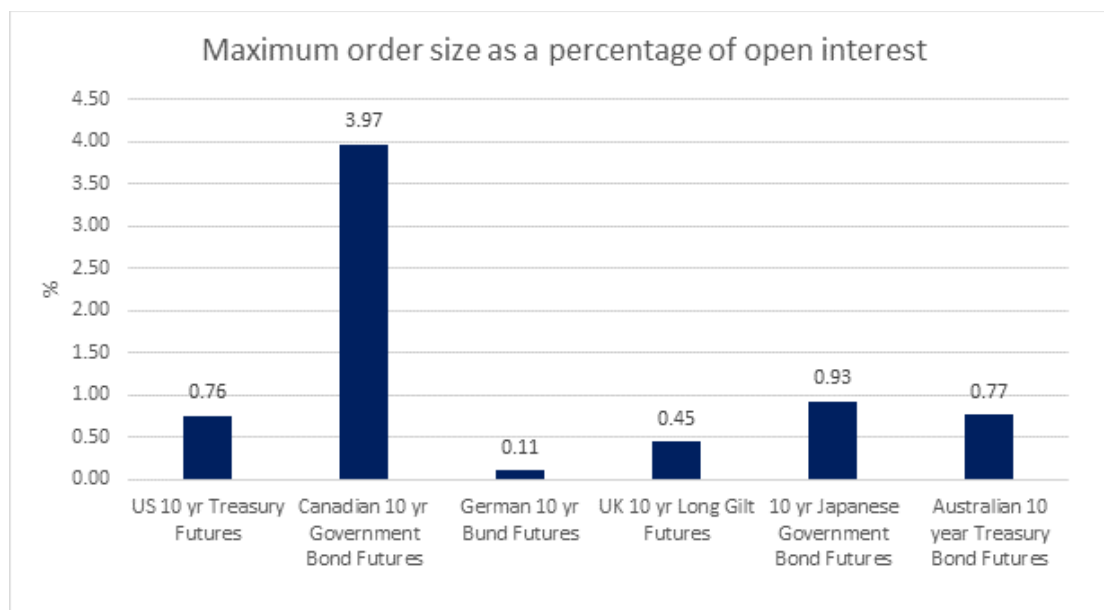
CME reduces the minimum tick increment and de-links the roll product from the outright market for the roll period. ASX is the only other exchange to reduce their minimum tick increment for the purpose of the roll. The other exchanges maintain existing tick increment size for the life of the contract. In terms of cost, CME, TMX and JPX have a standard tick size cost for all tenors during the roll period. The cost of the minimum tick increment for Eurex, ICE and ASX Bond rolls increases from the shorter dated bond rolls out to the longer dated rolls.

Maximum Order Size

When comparing the open interest of global exchanges it should be noted that like for like comparison, due to differences in Clearing House structures and margining approaches such as gross versus net margins, can make analysis difficult. In order to compare how various exchanges allow participants to engage with on screen liquidity, the single maximum order size has been compared to the open interest of the 10 year futures products.

CME, TMX and ASX do not offer block capability for the bond futures roll. For these Exchanges the maximum order sizes in the lit market are generally higher than those provided at ICE, Eurex, and JPX (which do provide block trade capability). CME has the largest order size and the largest open interest when compared to the 10 year treasury futures. TMX has the second largest order size. ASX has the smallest maximum order size for those exchanges that do not support block trade capability for the bond roll.

⁷ Order book depth indicative levels based on observations during the March and June 2020 expiries.



Source: Bloomberg (Data as at February 2019)

Order Time in Force Conditions

In terms of order duration, all comparative bond futures roll products support GTC (Good Till Cancelled) order functionality. This allows participants to place orders from a pre-determined time in the lead up to expiry. If a resting bid or offer remains unfilled for the duration of the expiry period, it will be purged upon the expiry of the front contract.

ASX currently provides good for session functionality for bond rolls and inter-commodity spreads. All unfilled calendar or inter-commodity spread orders at the end of the trading session are purged. Participants wanting to maintain an order over multiple trading sessions are required to re-enter the order at the commencement of each trading session.

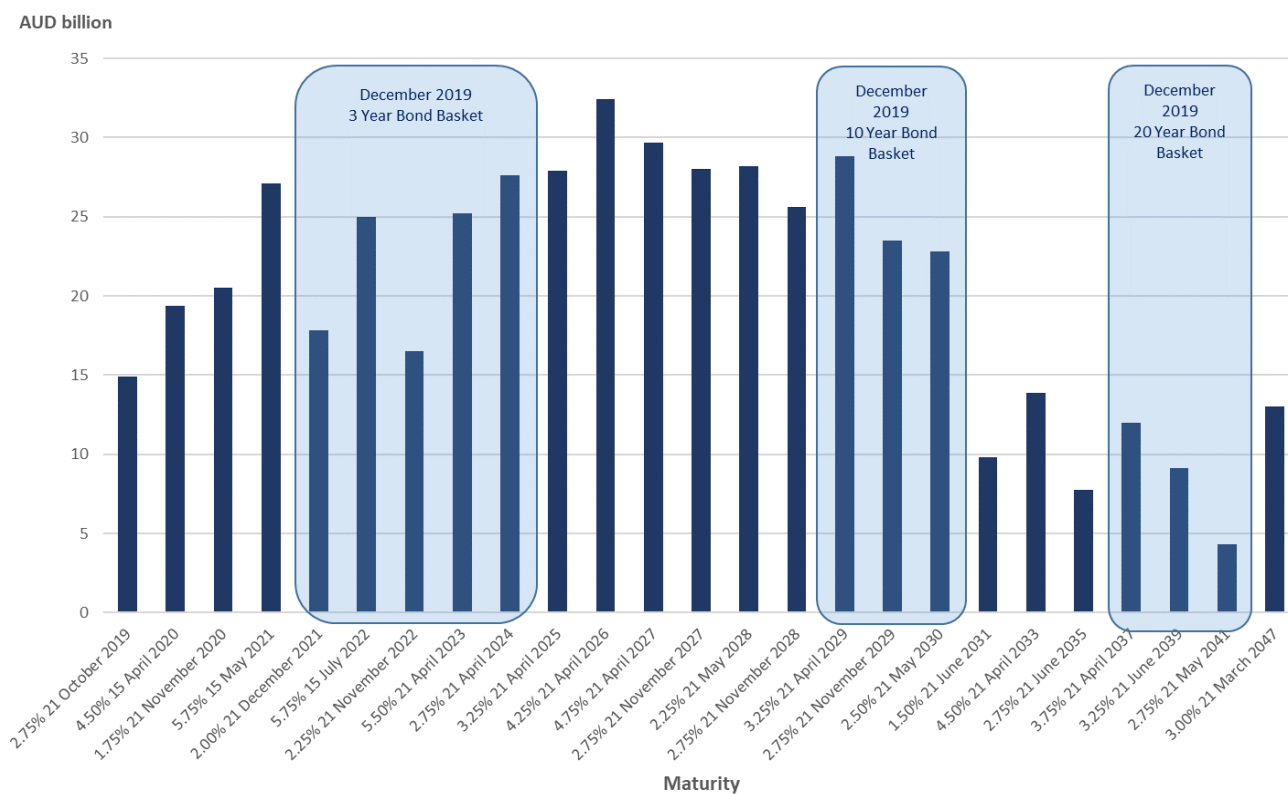
Matching Algorithm

Of the comparable exchanges, most have a First in First out (FIFO) matching algorithm for the roll markets. CME is the only exchange that provides a pro-rata order book for the bond calendar rolls. Under pro-rata matching algorithm, all orders in the resting order book receive a fill based on the orders relative size to the total order book. Pro-rata matching algorithm can result in an increase in the number of trades to complete an order.

CME and JPX calendar rolls are de-linked from the outright market for the duration of the roll period. For these markets the calendar spreads do not interact with the outright market for these products in terms of implied prices and volumes. TMX, Eurex, ASX and ICE all integrate their calendar spreads with the outright market. These exchanges operate on an implied out basis. Under implied out pricing, orders within the calendar spread may create implied orders in the outright individual legs of the calendar roll which when traded will result in a fill in the calendar spread order.

6. Appendix B

6.1. Australian Treasury Bonds on Issue 13 September 2019



Source: Australian Office of Financial Management (AOFM)



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