

## CIRCULAR 055-19

March 29, 2019

### **COMPARATIVE ANALYSIS BY THE REGULATORY DIVISION OF MARKET DATA IN THE CONTEXT OF THE EXTENSION OF TRADING HOURS**

As announced in the circular dated August 9, 2018 ([circular 135-18](#)), the Regulatory Division of the Bourse (the "Division") conducted a comparative analysis of different market data before and after the extended trading hours came into force. More specifically, the Division collected and analyzed market data including trading volume, price volatility, price correlation between comparable futures contracts and special terms transactions.

#### **Context**

On October 9, 2018, the Bourse de Montréal Inc. (the "Bourse") extended its trading hours for all interest rate products. Prior to the extension of the Bourse's trading hours, some voiced concerns related to the level of participation and liquidity resulting in potential market integrity issues during the trading period from 2:00 am to 6:00 am ET, referred to as "the Early Trading Hours". More specifically, certain participants worried that the perceived lack of support during the Early Trading Hours would lead to a low liquidity environment ripe for market manipulation, and as such threatening market integrity. In anticipation of the extension of the trading hours, the Division made adjustments to its surveillance to monitor the potential lower liquidity trading environment.

This paper summarizes the Division's observations related to the following:

1. Trading volume: volume and volume distribution statistics;
2. Participation: Participation during the Early Trading Hours versus the Regular Trading Hours (from 6:00 am to 4:30 pm ET);
3. Spreads: differences between the bid price and offer price;
4. Market Impact: simulated impact of market orders; and,
5. Market Integrity Considerations: complaints, market analysis and investigations, special terms transactions, pricing, trade cancellations and price adjustments.

The analysis focused on the Bourse's two flagship products, the Ten-Year Government of Canada Bond Futures (CGB) and the Three-Month Canadian Bankers' Acceptance Futures (BAX) which accounted for most of the volume traded during the Early Trading Hours for the period examined.

#### **Data Sources**

For the purpose of this comparative analysis, only the Bourse's trade<sup>1</sup> and quote data was used. No data submitted solely to the Division was utilized.

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<sup>1</sup> Trading data refers to executed transactions.

## 1. Trading volume

This section examines trading volume statistics for both CGB and BAX during the Early Trading Hours from October 9, 2018 to January 31, 2019 (the "Extended Period").

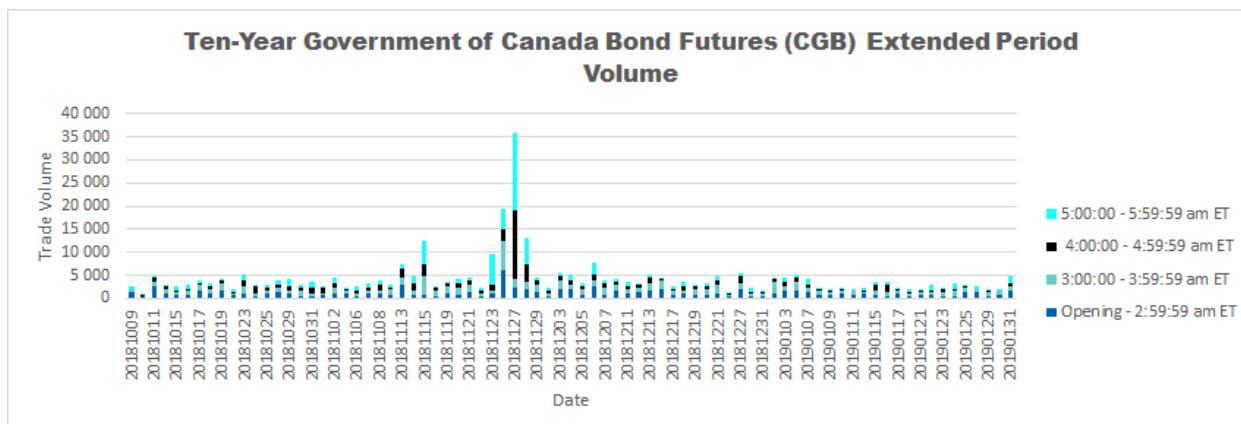
### Ten-Year Government of Canada Bond Futures (CGB)

During the Extended Period, a total of 344,726 contracts traded during the Early Trading Hours with an average daily volume (ADV) of 4,364 contracts. The record volume traded in the Early Trading Hours was 35,974 contracts on November 27, 2018, during the roll period. The percentage of volume traded during the Early Trading Hours ranged from 0.8% to 9.4% of the daily volume.

If adjustments are made to remove outliers for days with volumes greater than 10,000 contracts then the adjusted ADV is 3,360 contracts.

Graph A & B below represent the daily trading volume as well as the percentage of volume traded during the Early Trading Hours.

Graph A



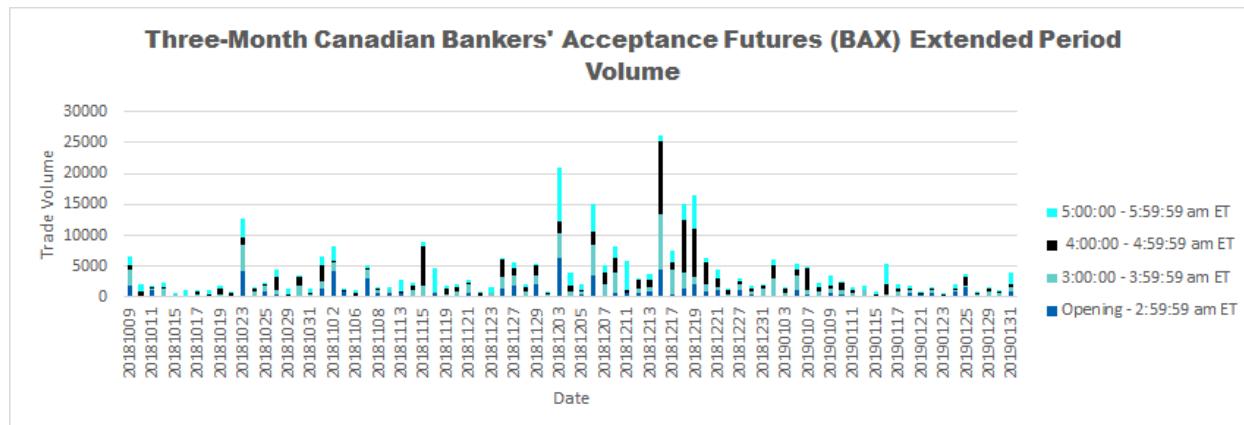
## Three-Month Canadian Bankers' Acceptance Futures (BAX)

During the Extended Period, a total of 327,577 contracts traded during the Early Trading Hours with an average daily volume (ADV) of 4,147 contracts. The record volume traded in the Early Trading Hours was 26,070 contracts on December 14, 2018, in light of economic news. The percentage of trading volume traded during the Early Trading Hours ranged from 0.6% to 17.2% of the daily volume.

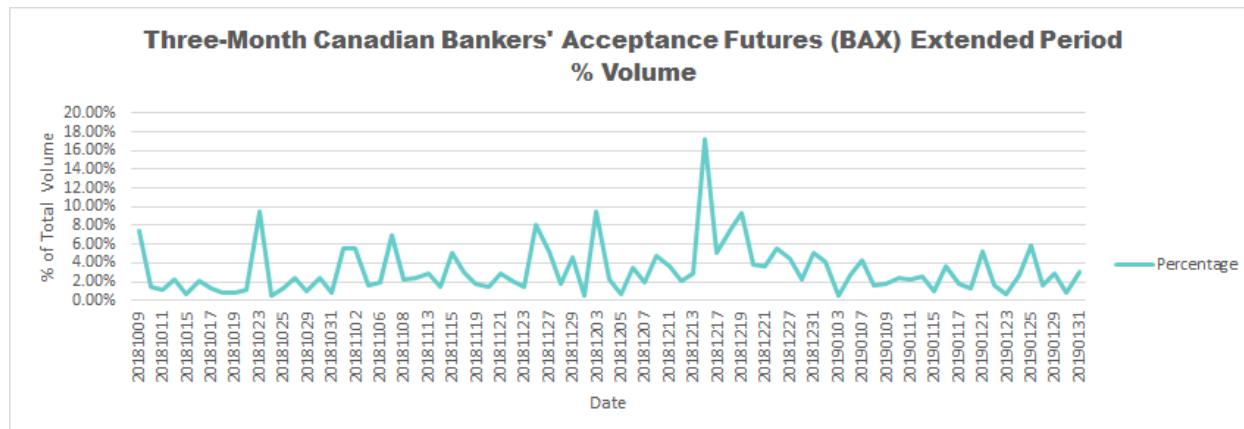
If adjustments are made to remove outliers for days with volumes greater than 15,000 contracts then the adjusted ADV is 3,164 contracts.

Graph C & D below represent the daily trading volume as well as the percentage of volume traded during the Early Trading Hours.

Graph C



Graph D



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## Remarks

To determine whether the volume traded during the Early Trading Hours was new volume or simply volume redistribution, the Division performed statistical analysis on the ratio of volume traded between 6:00 am and 8:00 am ET compared to the entire trading day, for a period of time before and after the extension of the trading hours. Although the results were insignificant, showing little to no indication of volume transfer from the Regular Trading Hours to the Early Trading Hours, the results were also statistically inconclusive due to the limited size of the data set.

## 2. Participation

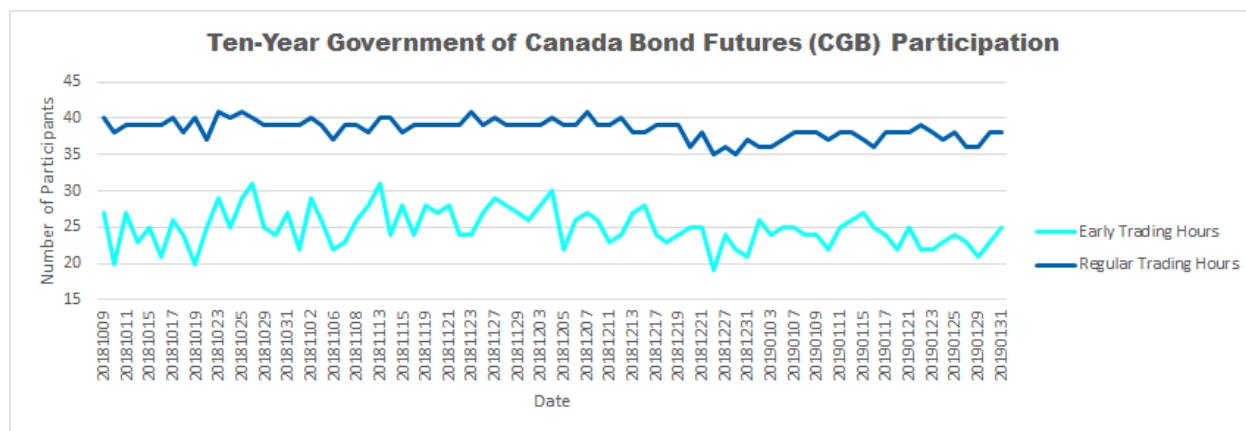
This section reviews participation during the Early Trading Hours compared to the Regular Trading Hours from October 9, 2018 to January 31, 2019 (the "Extended Period").

### Ten-Year Government of Canada Bond Futures (CGB)

During the Extended Period, the number of participants who traded in the Early Trading Hours ranged from 19 (54.3%) to 31 (77.5%) for an average of 25 (65%) when compared to the Regular Trading Hours.

Graph E below represents the number of participants active in the Early Trading Hours and the Regular Trading Hours.

Graph E

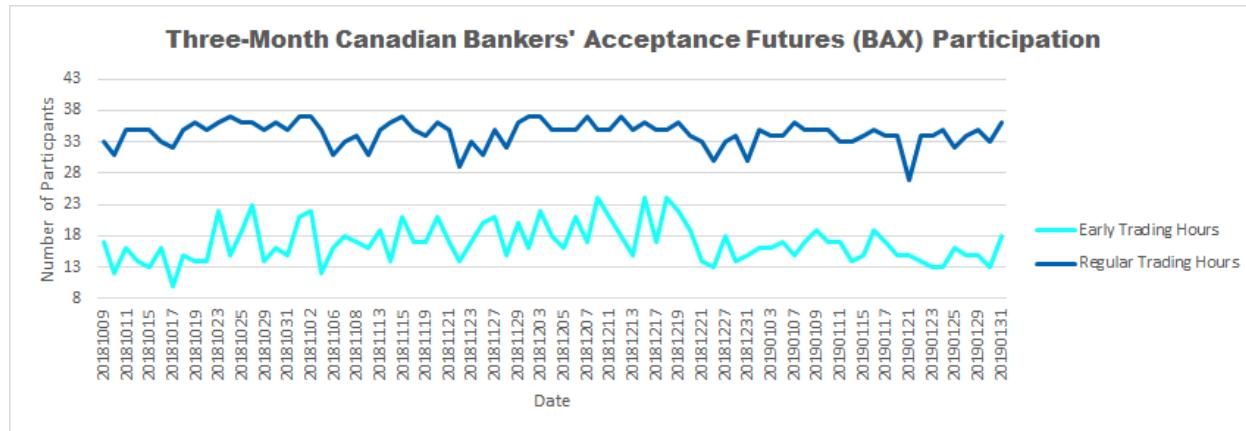


### Three-Month Canadian Bankers' Acceptance Futures (BAX)

During the Extended Period, the number of participants who traded in the Early Trading Hours ranged from 10 (31.3%) to 24 (68.6%) for an average of 17 (49.2%) when compared to the Regular Trading Hours.

Graph F below represents the number of participants active in the Early Trading Hours and the Regular Trading Hours.

## Graph F



## Remarks

Preliminary observations during the Extended Period, related to participation during the Early Trading Hours for both CGB and BAX indicate support for and interest in the Early Trading Hours.

## 3. Spreads

The Division reviewed the bid/offer spreads during the Early Trading Hours from October 9, 2018 to January 31, 2019 (the "Extended Period") compared to the spreads observed during the time from 6:00 am to 8:00 am ET from July 9, 2018 to October 5, 2018 (the "Pre-Extended Period").<sup>2</sup> The Division also compared the Early Trading Hours spreads to the market maker maximum average spread requirements.

## Ten-Year Government of Canada Bond Futures (CGB)

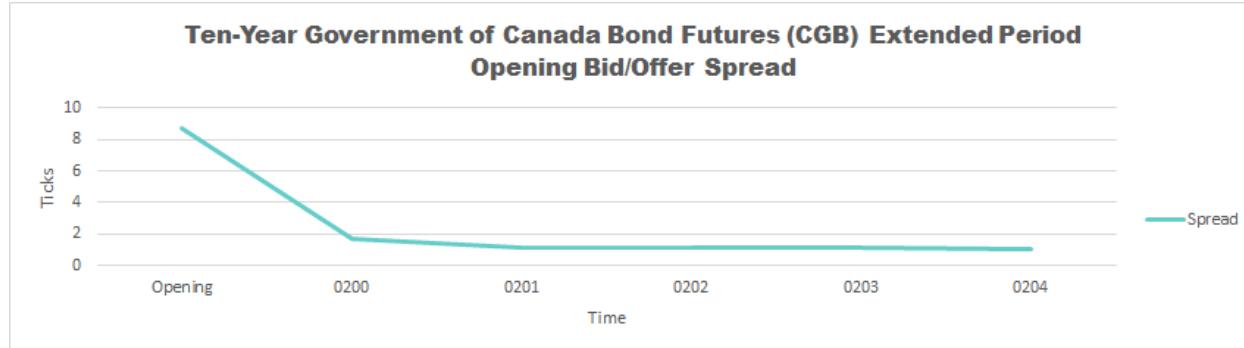
During the Extended Period, the opening bid/offer spreads averaged 8.72 ticks<sup>3</sup>. The average bid/offer spreads quickly tightened to 1.10 ticks within 5 minutes of the open. By comparison, the average opening bid/offer spreads observed during the Pre-Extended Period was 3.89 ticks and quickly tightened 1.03 ticks within the first 5 minutes of the open.

Graphs G and H below provide an illustration of the observations.

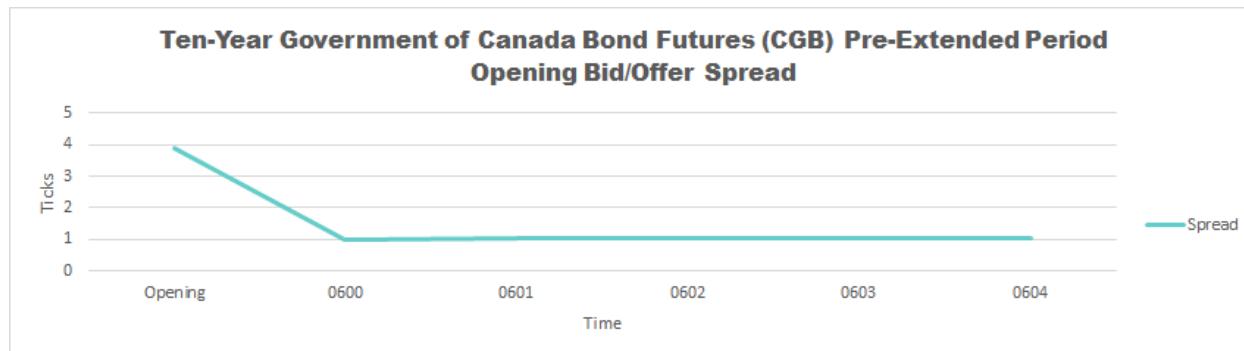
<sup>2</sup> The spreads were calculated using the last quote for every trading minute. For the Extended Period, the data related to the CGBZ18 and BAXZ18 contracts was used from October 9, 2018 to November 28, 2018 and the data related to the CGBH19 and BAXH19 contracts were used from November 29, 2018 to January 31, 2019, for consistency reasons.

<sup>3</sup> For the Ten-Year Government of Canada Bond Futures (CGB), 1 tick represents 0.01. For the Three-Month Canadian Bankers' Acceptance Futures (BAX), 1 tick represents 0.005.

Graph G



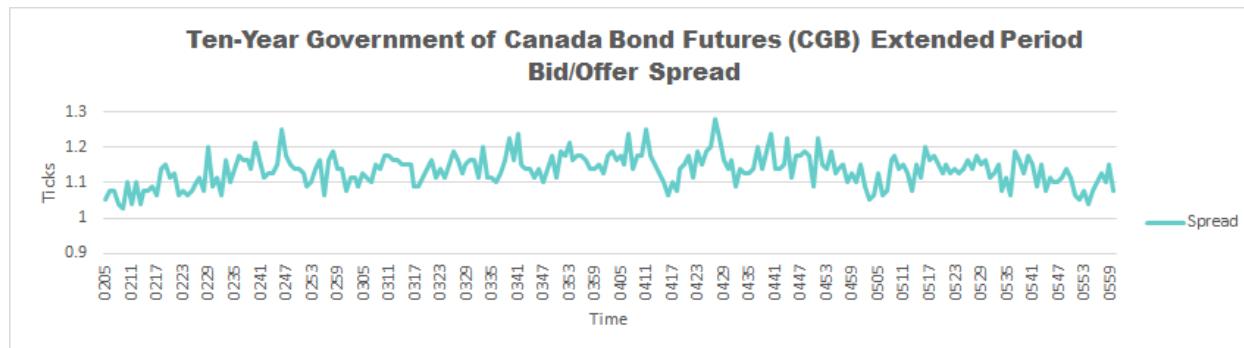
Graph H



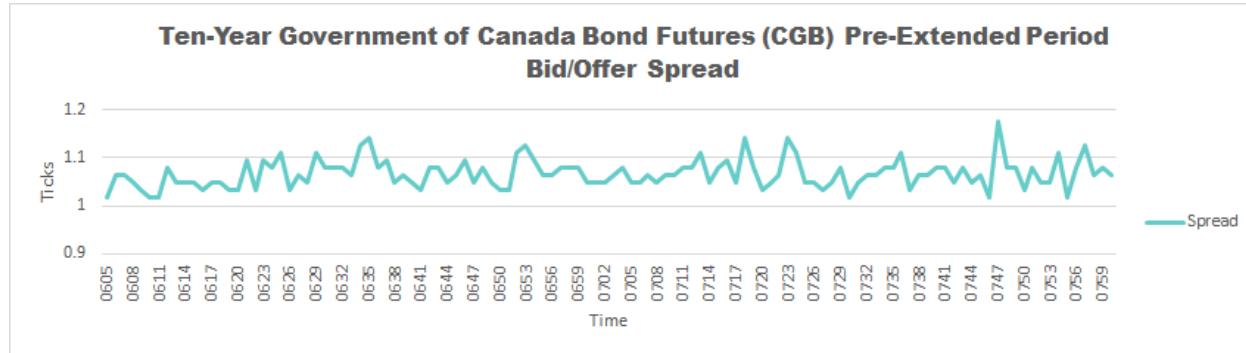
During the Extended Period, the average bid/offer spread for the remainder of the trading day ranged from 1.03 ticks to 1.28 ticks while, for the Pre-Extended Period the average bid/offer spread ranged from 1.02 ticks to 1.17 ticks.

Graphs I and J represent spreads after the open for both Extended Period and for the Pre-Extended Period.

Graph I



### Graph J

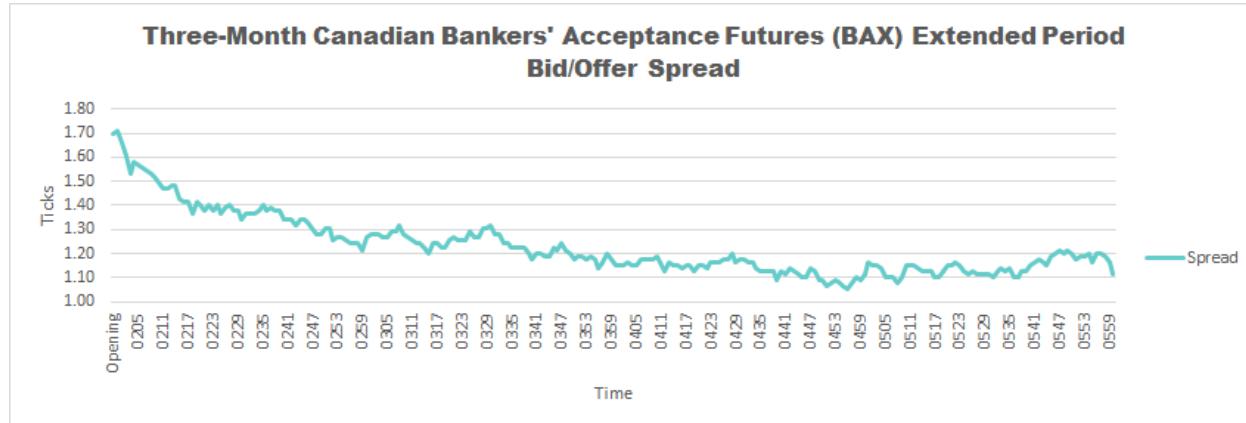


### Three-Month Canadian Bankers' Acceptance Futures (BAX)

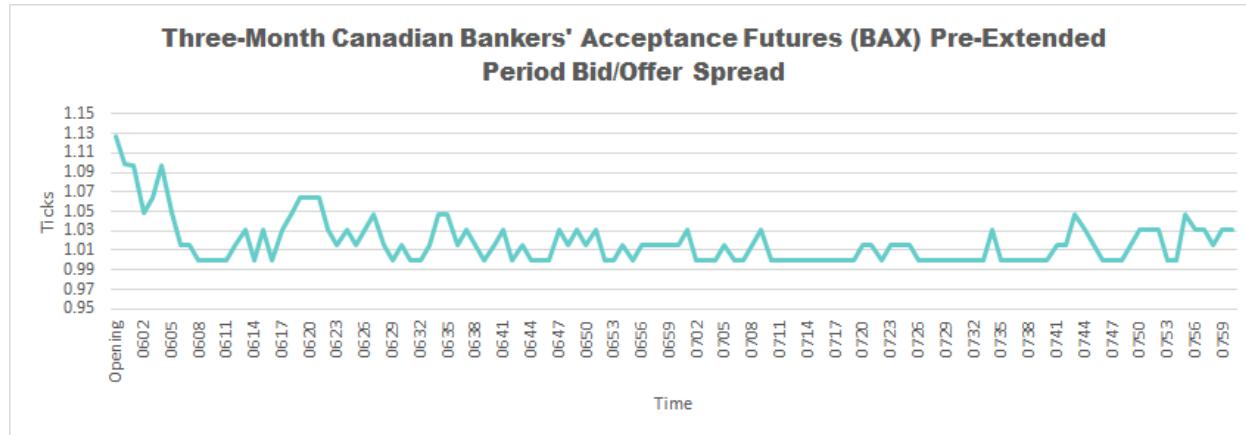
During the Extended Period, the average bid/offer spreads ranged from 1.05 ticks to 1.71 ticks and, during the Pre-Extended Period, the average bid/offer spreads ranged from 1.00 tick to 1.13 ticks.

Graphs K and L below represent the averaged bid/offer spreads for both the Extended Period and the Pre-Extended Period reviewed.

### Graph K



## Graph L



## Remarks

The average bid/offer spreads for both CGB and BAX are well below the market maker maximum average spread requirements from the Bourse. In the Division's view, the bid/offer spreads observed during the Extended Period, specifically during the Early Trading Hours, reflect reasonable liquidity.

## 4. Market Impact

The Division simulated the market impact of various order sizes during the Early Trading Hours from October 9, 2018 to January 31, 2019 (the "Extended Period") and compared the simulated impact of these same order sizes during the time period from 6:00 AM to 8:00 AM EST from July 9, 2018 to October 5, 2018 (the "Pre-Extended Period").<sup>4</sup>

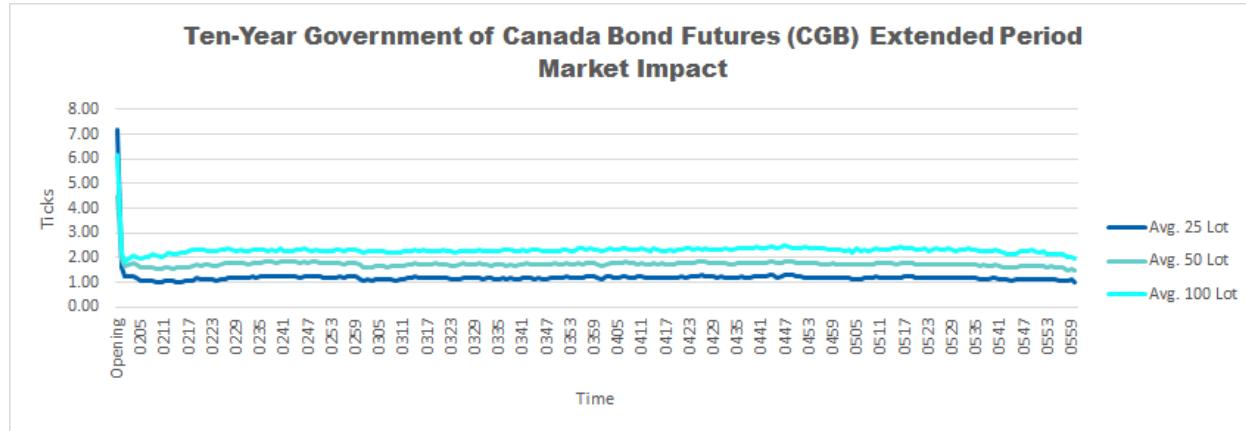
### Ten-Year Government of Canada Bond Futures (CGB)

The market impact for lots of 25, 50 and 100 was simulated for CGB contracts. During the Extended Period, the average market impact ranged from 7.719 ticks at the open, to a low of 1.006 ticks, while it ranged from 3.623 ticks at the open to 0.585 ticks during the Pre-Extended Period.

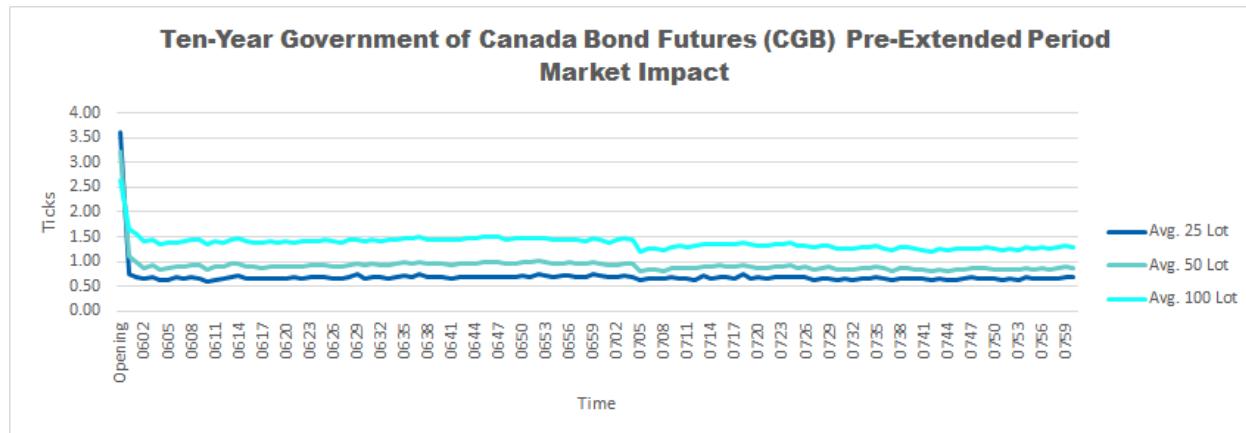
Graphs M and N display the average market impact for each order size for both the Extended and Pre-Extended Periods.

<sup>4</sup> Market impact was calculated using the midpoint of the last quote for every trading minute. For the Extended Period, the data related to the CGBZ18 and BAXZ18 contracts was used from October 9, 2018 to November 28, 2018 and the data related to the CGBH19 and BAXH19 contracts were used from November 29, 2018 to January 31, 2019, for consistency reasons.

Graph M



Graph N



## Remarks

During both, the Extended Period and the Pre-Extended Period, market impact at the open was affected by the large bid/offer spread. Overall, the market impact observed in the Extended Period across all lot sizes for the CGB averaged approximately 1.75 times that of the Pre-Extended Period<sup>5</sup>.

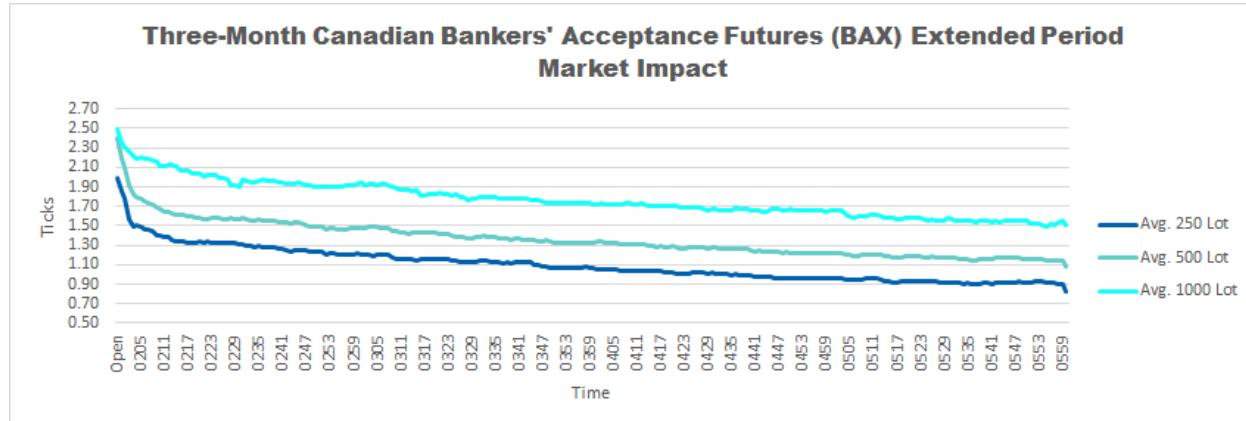
## Three-Month Canadian Bankers' Acceptance Futures (BAX)

The market impact for lots of 250, 500 and 1000 was simulated for BAX contracts. During the Extended Period, the average market impact ranged from 2.499 ticks at the open, to a low of 0.823 ticks, while it ranged from 1.522 ticks to 0.546 ticks during the Pre-Extended Period.

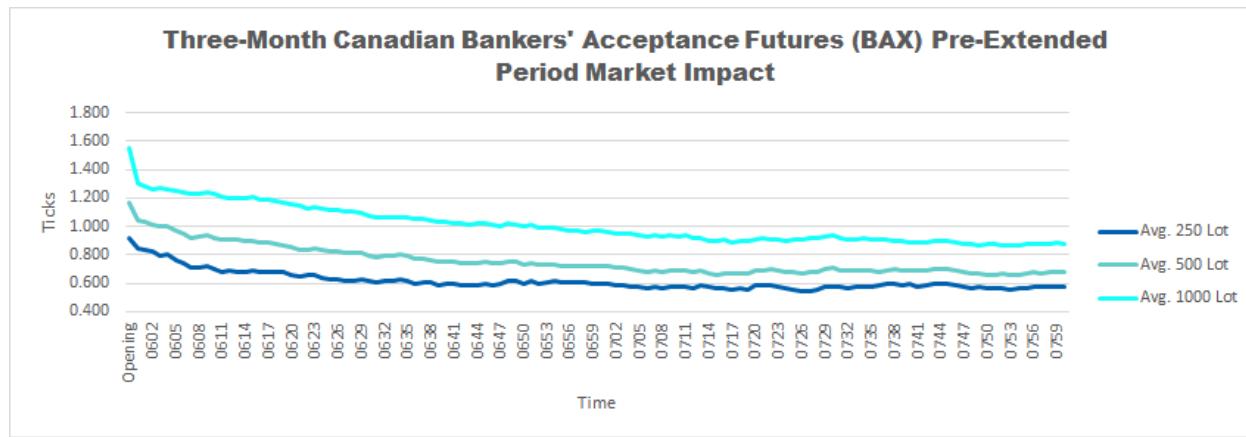
<sup>5</sup> Less than 2% of data points were excluded for both 25 and 50 lots due to insufficient market depth for both periods, Extended and Pre-Extended. For 100 lots however, approximately 35 % of data points were excluded from the Extended Period versus 1.2 % for the Pre-Extended Period.

Graphs O and P display the average market impact for each order size for both the Extended and Pre-Extended Periods<sup>6</sup>.

### Graph O



### Graph P



### Remarks

During both, the Extended Period and the Pre-Extended Period, market impact during the open was affected by the large bid/offer spread. Overall, the market impact observed in the Extended Period across all lot sizes for the BAX was about 1.78 times that of the Pre-Extended Period.

<sup>6</sup> Less than 2% of data points were excluded for both 250 and 500 lots due to insufficient market depth for both periods, Extended and Pre-Extended. For 1000 lots however, approximately 19 % of data points were excluded from the Extended Period versus 1.2 % for the Pre-Extended Period.

## 5. Market Integrity

### Complaints, market analysis and investigations related to the Early Trading Hours

For the Extended Period examined, the Division did not receive any complaints related to trading activity during the Early Trading Hours. Similarly, the Division has not identified any trading activity that lead to the opening of a market analysis or investigation file.

### Special terms transaction

No special terms transactions were executed during the Early Trading Hours of the Extended Period examined.

### Pricing

For the CGB, the Division analyzed the correlations on quoted prices of front month contracts against the following contracts: 1) the 10-Year T-Note Futures (CME), 2) the Euro-Bund Futures (Eurex) and 3) the 10 Year Treasury Bonds Futures (ASX). The Division found all three comparables having a strong correlation of over 92% with no outliers. The correlations observed during Regular Trading Session varied depending on the referenced time period, but as expected, were lower than the Early Trading Hours.

For the purposes of this report, the Division did not deem it necessary to analyze the correlations on quoted prices for the BAX due to the low spreads, market impact and low price variability observed.

### Trade cancellations and price readjustments

During the Extended Period, two trades on CGB contracts were cancelled and prices were adjusted by the Bourse's Market Operations Department. In comparison during the Pre-Extended period a total of 2 trades on BAX were cancelled and prices adjusted.

### Conclusion

Despite the lower liquidity observed in both CGB and BAX contracts during Early Trading Hours, the observed spreads were tighter than those required from market makers for the same time period. Market participation appears to be healthy and well diversified during the Early Trading Hours, promoting fair and transparent pricing. Moreover, the fact that the Division received no complaints, and that no market analysis nor investigation file were opened by the Division during the Extended Period related to the Early Trading Hours is noteworthy.

The Division continues to closely monitor the trading activities as more products of the Bourse may become available during the Early Trading Hours. Beyond the usual concerns that come with lower liquidity market, the Division believes it has the ability and tools to monitor the activities during the Early Trading Hours helping to maintain market integrity and promote price transparency.



The Division welcomes any comments that participants and stakeholders may have. Please contact Marc Stephens, Director, Market Analysis and Investigations, Regulatory Division, at (514) 787-6478, or by e-mail at [marc.stephens@tmx.com](mailto:marc.stephens@tmx.com) or Vincent Pivin-Dans, CFA, Senior Market Analyst, Regulatory Division at (514) 787-6646 or by e-mail at [vincent.pivin-dans@tmx.com](mailto:vincent.pivin-dans@tmx.com).

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