

ROYAL BANK OF CANADA  
Form 424B2  
December 26, 2018

RBC Capital Markets® Filed Pursuant to Rule 424(b)(2)  
Registration Statement No. 333-227001

## Pricing Supplement

Dated December 21,  
2018 \$5,500,000  
To the Product Issuer Callable Contingent Coupon Barrier Notes  
Prospectus Supplement Linked to the Lesser Performing of Two Equity Indices  
No. CCBN-1 Dated and One Exchange Traded Fund, due December 27, 2019  
September 10, 2018, and Royal Bank of Canada  
the Prospectus  
Supplement and  
Prospectus, Each  
Dated September 7, 2018

Royal Bank of Canada is offering Issuer Callable Contingent Coupon Barrier Notes (the “Notes”) linked to the lesser performing of two equity indices and one exchange traded fund (each, a “Reference Asset” and collectively, the “Reference Assets”). The Notes offered are senior unsecured obligations of Royal Bank of Canada, will pay a quarterly Contingent Coupon at the rate and under the circumstances specified below, and will have the terms described in the documents described above, as supplemented or modified by this pricing supplement.

| Reference Assets                                  | Initial Levels | Coupon Barriers and Trigger Levels*         |
|---|----------------|---|
| S&P 500® Index (“SPX”)                            | 2,416.62       | 1,691.63, which is 70% of its Initial Level |
| Russell 2000® Index (“RTY”)                       | 1,292.086      | 904.460, which is 70% of its Initial Level  |
| Consumer Staples Select Sector SPDR® Fund (“XLP”) | \$50.18        | \$35.13, which is 70% of its Initial Level  |

\* Rounded to two decimal places in the case of the SPX and XLP, and three decimal places in the case of the RTY.  
The Notes do not guarantee any return of principal at maturity. Any payments on the Notes are subject to our credit risk.

Investing in the Notes involves a number of risks. See “Risk Factors” beginning on page PS-5 of the product prospectus supplement dated September 10, 2018, on page S-1 of the prospectus supplement dated September 7, 2018, and “Selected Risk Considerations” beginning on page P-8 of this pricing supplement.

The Notes will not constitute deposits insured by the Canada Deposit Insurance Corporation, the U.S. Federal Deposit Insurance Corporation or any other Canadian or U.S. government agency or instrumentality. The Notes are not subject to conversion into our common shares under subsection 39.2(2.3) of the Canada Deposit Insurance Corporation Act. Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of the Notes or determined that this pricing supplement is truthful or complete. Any representation to the contrary is a criminal offense.

|                    |                                |                         |                                |
|--------------------|--------------------------------|-------------------------|--------------------------------|
| Issuer:            | Royal Bank of Canada           | Stock Exchange Listing: | None                           |
| Trade Date:        | December 21, 2018              | Principal Amount:       | \$1,000 per Note               |
| Issue Date:        | December 27, 2018              | Maturity Date:          | December 27, 2019              |
| Observation Dates: | Quarterly, as set forth below. | Coupon Payment Dates:   | Quarterly, as set forth below. |
| Valuation Date:    | December 23, 2019              | Contingent Coupon Rate: | 10% per annum                  |
| Contingent Coupon: |                                |                         |                                |

If the Notes have not been previously called and the Observation Level of each Reference Asset is greater than or equal to its Coupon Barrier on the applicable Observation Date, we will pay the Contingent Coupon applicable to the corresponding Observation Date. You may not receive any Contingent Coupons during the term of the Notes.

If the Notes are not previously called, we will pay you at maturity an amount based on the Final Level of the Lesser Performing Reference Asset:

For each \$1,000 in principal amount, \$1,000 plus the Contingent Coupon at maturity, unless the Final Level of the Lesser Performing Reference Asset is less than its Trigger Level.

Payment at Maturity (if held to maturity):

If the Final Level of the Lesser Performing Reference Asset is less than its Trigger Level, then the investor will receive at maturity, for each \$1,000 in principal amount, a cash payment equal to:

$\$1,000 + (\$1,000 \times \text{Reference Asset Return of the Lesser Performing Reference Asset})$

Investors in the Notes could lose some or all of their principal amount if the Final Level of the Lesser Performing Reference Asset is below its Trigger Level.

Lesser Performing Reference Asset:

The Reference Asset with the lowest Reference Asset Return.

Call Feature:

The Notes may be called at our discretion starting on March 21, 2019 or on any Coupon Payment Date thereafter, if we send prior written notice, as described below.

Observation Level:

For the SPX and RTY, their respective closing levels, and for the XLP, its closing price, on any Observation Date.

Final Level:

For the SPX and RTY, their respective closing levels on the Valuation Date, and for the XLP, its closing price on the Valuation Date.

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|  | Per Note | Total       |
|--|----------|-------------|
| Price to public                        | 100.00%  | \$5,500,000 |
| Underwriting discounts and commissions | 1.25%    | \$68,750    |
| Proceeds to Royal Bank of Canada       | 98.75%   | \$5,431,250 |

The initial estimated value of the Notes as of the date of this pricing supplement is \$971.09 per \$1,000 in principal amount, which is less than the price to public. The actual value of the Notes at any time will reflect many factors, cannot be predicted with accuracy, and may be less than this amount. We describe our determination of the initial estimated value in more detail below.

RBC Capital Markets, LLC, which we refer to as RBCCM, acting as agent for Royal Bank of Canada, received a commission of \$12.50 per \$1,000 in principal amount of the Notes, and used a portion of that commission to allow selling concessions to other dealers of up to \$12.50 per \$1,000 in principal amount of the Notes. The other dealers may forgo, in their sole discretion, some or all of their selling concessions. See “Supplemental Plan of Distribution (Conflicts of Interest)” below.

RBC Capital Markets, LLC

Issuer Callable Contingent Coupon Barrier  
Notes Linked to the Lesser Performing of Two  
Equity Indices and One Exchange Traded Fund  
Royal Bank of Canada

SUMMARY

The information in this “Summary” section is qualified by the more detailed information set forth in this pricing supplement, the product prospectus supplement, the prospectus supplement, and the prospectus.

General: This pricing supplement relates to an offering of Issuer Callable Contingent Coupon Barrier Notes (the “Notes”) linked to the lesser performing of of the following (each, a “Reference Asset”, and collectively, the “Reference Assets”):  
(i) the S&P 500<sup>®</sup> Index (the “SPX”);  
(ii) the Russell 2000<sup>®</sup> Index (the “RTY,” and together with the SPX, the “Indices”); and  
(iii) the shares of the Consumer Staples Select Sector SPDR<sup>®</sup> Fund (the “XLP”).  
See “Additional Terms of your Notes Related to Indices” below, which relates to each of the SPX and the RTY.

Issuer: Royal Bank of Canada (“Royal Bank”)

Trade Date: December 21, 2018

Issue Date: December 27, 2018

Denominations: Minimum denomination of \$1,000, and integral multiples of \$1,000 thereafter.

Designated Currency: U.S. Dollars

Contingent Coupon: We will pay you a Contingent Coupon during the term of the Notes, periodically in arrears on each Coupon Payment Date, under the conditions described below:  
· If the Observation Level of each Reference Asset is greater than or equal to its Coupon Barrier on the applicable Observation Date, we will pay the Contingent Coupon applicable to that Observation Date.  
· If the Observation Level of any Reference Asset is less than its Coupon Barrier on the applicable Observation Date, we will not pay you the Contingent Coupon applicable to that Observation Date.  
You may not receive a Contingent Coupon for one or more quarterly periods during the term of the Notes.

Contingent Coupon Rate: 10% per annum (2.50% per quarter)

Observation Dates: March 21, 2019, June 21, 2019, September 23, 2019 and the Valuation Date.

Coupon Payment Dates: March 26, 2019, June 26, 2019, September 26, 2019 and the Maturity Date.

Record Dates: The record date for each Coupon Payment Date will be one business day prior to that scheduled Coupon Payment Date; provided, however, that any Contingent Coupon payable at maturity or upon a call will be payable to the person to whom the payment at maturity or upon the call, as the case may be, will be payable.

Call Feature: The Notes may be called at our discretion starting on March 21, 2019 or on any Coupon Payment Date thereafter, if we send written notice to the trustee at least three business days prior to that Coupon Payment Date.  
Payment if Called: If the Notes are called, then, on the applicable Coupon Payment Date, for each \$1,000 principal amount, you will receive \$1,000 plus the Contingent Coupon otherwise due on that Coupon Payment Date.

Valuation Date: December 23, 2019

Maturity Date: December 27, 2019

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|  |   |
|--|---|
| Initial Level:   | For the SPX and the RTY, their closing levels, and for the XLP, its closing price, on the Trade Date, as set forth on the cover page of this pricing supplement.  |
| Final Level:   | For the SPX and the RTY, their respective closing levels, and for the XLP, its closing price, on the Valuation Date.  |
| Observation Level:   | For the SPX and the RTY, their respective closing levels, and for the XLP, its closing price, on any Observation Date.  |
| Trigger Level and Coupon Barrier:                                    | For each Reference Asset, 70% of its Initial Level, as set forth on the cover page of this pricing supplement.<br>If the Notes are not previously called, we will pay you at maturity an amount based on the Final Level of the Lesser Performing Reference Asset:<br>· If the Final Level of the Lesser Performing Reference Asset is greater than or equal to its Trigger Level, we will pay you a cash payment equal to the principal amount plus the Contingent Coupon otherwise due on the Maturity Date.  |
| Payment at Maturity (if not previously called and held to maturity): | · If the Final Level of the Lesser Performing Reference Asset is less than its Trigger Level, you will receive at maturity, for each \$1,000 in principal amount, a cash payment equal to:<br>\$1,000 + (\$1,000 x Reference Asset Return of the Lesser Performing Reference Asset)<br>The amount of cash that you receive will be less than your principal amount, if anything, resulting in a loss that is proportionate to the decline of the Lesser Performing Reference Asset from the Trade Date to the Valuation Date. Investors in the Notes could lose some or all of their principal amount if the Final Level of the Lesser Performing Reference Asset is below its Trigger Level.   |
| Stock Settlement:  | Not applicable. Payments on the Notes will be made solely in cash.  |
| Reference Asset Return:  | With respect to each Reference Asset:<br>$\frac{\text{Final Level} - \text{Initial Level}}{\text{Initial Level}}$   |
| Lesser Performing Reference Asset:                                   | The Reference Asset with the lowest Reference Asset Return.   |
| Market Disruption Events:  | The occurrence of a market disruption event (or a non-trading day) as to any of the Reference Assets will result in the postponement of an Observation Date or the Valuation Date as to that Reference Asset, as described in the product prospectus supplement, but not to any non-affected Reference Asset.   |
| Calculation Agent:   | RBC Capital Markets, LLC (“RBCCM”)<br>By purchasing a Note, each holder agrees (in the absence of a change in law, an administrative determination or a judicial ruling to the contrary) to treat the Note as a callable pre-paid cash-settled contingent income-bearing derivative contract linked to the Reference Assets for U.S. federal income tax purposes. However, the U.S. federal income tax consequences of your investment in the Notes are uncertain and the Internal Revenue Service could assert that the Notes should be taxed in a manner that is different from that described in the preceding sentence. Please see the section below, “Supplemental Discussion of U.S. Federal Income Tax Consequences,” and the discussion (including the opinion of our counsel Morrison & Foerster LLP) in the product prospectus supplement dated September 10, 2018 under “Supplemental Discussion of U.S. Federal Income Tax Consequences,” which apply to the Notes. |
| U.S. Tax Treatment:  |   |

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Secondary Market: RBCCM (or one of its affiliates), though not obligated to do so, may maintain a secondary market in the Notes after the Issue Date. The amount that you may receive upon sale of your Notes prior to maturity may be less than the principal amount.

Listing: The Notes will not be listed on any securities exchange.

Settlement: DTC global (including through its indirect participants Euroclear and Clearstream, Luxembourg as described under “Description of Debt Securities—Ownership and Book-Entry Issuance” in the prospectus dated September 7, 2018).

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All of the terms appearing above the item captioned “Secondary Market” on the cover page and Terms Incorporated in pages P-2 and P-3 of this pricing supplement and the terms appearing under the caption “General the Master Note: Terms of the Notes” in the product prospectus supplement dated September 10, 2018, as modified by this pricing supplement.

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#### ADDITIONAL TERMS OF YOUR NOTES

You should read this pricing supplement together with the prospectus dated September 7, 2018, as supplemented by the prospectus supplement dated September 7, 2018 and the product prospectus supplement dated September 10, 2018, relating to our Senior Global Medium Term Notes, Series H, of which these Notes are a part. Capitalized terms used but not defined in this pricing supplement will have the meanings given to them in the product prospectus supplement. In the event of any conflict, this pricing supplement will control. The Notes vary from the terms described in the product prospectus supplement in several important ways. You should read this pricing supplement carefully, including “—Additional Terms Relating to Indices” below, which relate to the SPX and the RTY.

This pricing supplement, together with the documents listed below, contains the terms of the Notes and supersedes all prior or contemporaneous oral statements as well as any other written materials including preliminary or indicative pricing terms, correspondence, trade ideas, structures for implementation, sample structures, brochures or other educational materials of ours. You should carefully consider, among other things, the matters set forth in “Risk Factors” in the prospectus supplement dated September 7, 2018 and in the product prospectus supplement dated September 10, 2018, as the Notes involve risks not associated with conventional debt securities. We urge you to consult your investment, legal, tax, accounting and other advisors before you invest in the Notes. You may access these documents on the Securities and Exchange Commission (the “SEC”) website at [www.sec.gov](http://www.sec.gov) as follows (or if that address has changed, by reviewing our filings for the relevant date on the SEC website):

Prospectus dated September 7, 2018:

<https://www.sec.gov/Archives/edgar/data/1000275/000121465918005973/196181424b3.htm>

Prospectus Supplement dated September 7, 2018:

<https://www.sec.gov/Archives/edgar/data/1000275/000121465918005975/f97180424b3.htm>

Product Prospectus Supplement dated September 10, 2018:

<https://www.sec.gov/Archives/edgar/data/1000275/000114036118038091/form424b5.htm>

Our Central Index Key, or CIK, on the SEC website is 1000275. As used in this pricing supplement, “we,” “us,” or “our” refers to Royal Bank of Canada.

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#### HYPOTHETICAL EXAMPLES

The table set out below is included for illustration purposes only. The table illustrates the Payment at Maturity of the Notes (including the final Contingent Coupon, if payable) for a hypothetical range of performance for the Lesser Performing Reference Asset, assuming the following terms and that the Notes are not called prior to maturity:

|  |  |
|--|--|
| Hypothetical Trigger Level and Coupon Barrier: | 70% of the hypothetical Initial Level of the Lesser Performing Reference Asset |
| Contingent Coupon Rate:                        | 10% per annum (or 2.50% per quarter)   |
| Contingent Coupon Amount:                      | \$25 per quarter   |
| Observation Dates:                             | Quarterly  |
| Principal Amount:                              | \$1,000 per Note   |

We make no representation or warranty as to which of the Reference Assets will be the Lesser Performing Reference Asset. It is possible that the Final Level of each Reference Asset will be less than its Initial Level.

Hypothetical Final Levels of the Lesser Performing Reference Asset, expressed as a percentage of its Initial Level, are shown in the first column on the left. The second column shows the Payment at Maturity for a range of Reference Asset Returns. The third column shows the amount of cash to be paid on the Notes per \$1,000 in principal amount. If the Notes are called prior to maturity, the hypothetical examples below will not be relevant, and you will receive on the applicable Coupon Payment Date, for each \$1,000 principal amount, \$1,000 plus the Contingent Coupon otherwise due on the Notes.

| Final Level of the Lesser Performing Reference Asset | Payment at Maturity as Percentage of Principal Amount | Cash Payment Amount per \$1,000 in Principal Amount |
|--|---|---|
| 130.00%  | 102.50%   | \$1,025.00*   |
| 120.00%  | 102.50%   | \$1,025.00*   |
| 110.00%  | 102.50%   | \$1,025.00*   |
| 100.00%  | 102.50%   | \$1,025.00*   |
| 90.00%   | 102.50%   | \$1,025.00*   |
| 80.00%   | 102.50%   | \$1,025.00*   |
| 70.00%   | 102.50%   | \$1,025.00*   |
| 69.99%   | 69.99%  | \$699.90  |
| 60.00%   | 60.00%  | \$600.00  |
| 50.00%   | 50.00%  | \$500.00  |
| 40.00%   | 40.00%  | \$400.00  |
| 25.00%   | 25.00%  | \$250.00  |
| 0.00%  | 0.00%   | \$0.00  |

\*Including the final Contingent Coupon, if payable.

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Hypothetical Examples of Amounts Payable at Maturity

The following hypothetical examples illustrate how the payments at maturity set forth in the table above are calculated, assuming the Notes have not been called.

Example 1: The Final Level of the Lesser Performing Reference Asset is 120%, an increase of 20% from its Initial Level. Because the Final Level of the Lesser Performing Reference Asset is greater than its Trigger Level and Coupon Barrier, the investor receives at maturity, in addition to the final Contingent Coupon otherwise due on the Notes, a cash payment of \$1,000 per Note, despite the 20% appreciation in the value of the Lesser Performing Reference Asset.

Example 2: The Final Level of the Lesser Performing Reference Asset is 90.00%, a decrease of 10% from its Initial Level. Because the Final Level of the Lesser Performing Reference Asset is greater than its Trigger Level and Coupon Barrier, the investor receives at maturity, in addition to the final Contingent Coupon otherwise due on the Notes, a cash payment of \$1,000 per Note, despite the 10% decline in the value of the Lesser Performing Reference Asset.

Example 3: The Final Level of the Lesser Performing Reference Asset is 50.00% on the Valuation Date, which is less than its Trigger Level. Because the Final Level of the Lesser Performing Reference Asset is less than its Trigger Level and Coupon Barrier, the final Contingent Coupon will not be payable on the Maturity Date, and we will pay only \$500.00 for each \$1,000 in the principal amount of the Notes, calculated as follows:

Principal Amount + (Principal Amount x Reference Asset Return of the Lesser Performing Reference Asset)  
= \$1,000 + (\$1,000 x -50.00%) = \$1,000 - \$500.00 = \$500.00

\* \* \*

The Payments at Maturity shown above are entirely hypothetical; they are based on values of the Reference Assets that may not be achieved on the Valuation Date and on assumptions that may prove to be erroneous. The actual market value of your Notes on the Maturity Date or at any other time, including any time you may wish to sell your Notes, may bear little relation to the hypothetical Payments at Maturity shown above, and those amounts should not be viewed as an indication of the financial return on an investment in the Notes or on an investment in any Reference Asset or the securities included in any of the Reference Assets.

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**SELECTED RISK CONSIDERATIONS**

An investment in the Notes involves significant risks. Investing in the Notes is not equivalent to investing directly in the Reference Assets. These risks are explained in more detail in the section “Risk Factors” in the product prospectus supplement. In addition to the risks described in the prospectus supplement and the product prospectus supplement, you should consider the following:

**Principal at Risk** — Investors in the Notes could lose all or a substantial portion of their principal amount if there is a decline in the value of the Lesser Performing Reference Asset between the Trade Date and the Valuation Date. If the Notes are not called and the Final Level of the Lesser Performing Reference Asset is less than its Trigger Level, the amount of cash that you receive at maturity will represent a loss of your principal that is proportionate to the decline in the closing price or closing level, as applicable, of the Lesser Performing Reference Asset from the Trade Date to the Valuation Date. Any Contingent Coupons received on the Notes prior to the Maturity Date may not be sufficient to compensate for any such loss.

**The Notes Are Subject to an Issuer Call** — We may call the Notes at our discretion on any Coupon Payment Date beginning in March 2019. If the Notes are called, then, on the applicable Coupon Payment Date, for each \$1,000 in principal amount, you will receive \$1,000 plus the Contingent Coupon otherwise due on the applicable Coupon Payment Date. You will not receive any Contingent Coupons after that payment. You may be unable to reinvest your proceeds from the call in an investment with a return that is as high as the return on the Notes would have been if they had not been called. We are more likely to call the Notes if we anticipate that the yield on the Notes will exceed that payable on our conventional debt securities.

**You May Not Receive Any Contingent Coupons** — We will not necessarily make any coupon payments on the Notes. If the Observation Level of any of the Reference Assets on an Observation Date is less than its Coupon Barrier, we will not pay you the Contingent Coupon applicable to that Observation Date. If the Observation Level of any of the Reference Assets is less than its Coupon Barrier on each of the Observation Dates and on the Valuation Date, we will not pay you any Contingent Coupons during the term of, and you will not receive a positive return on your Notes. Generally, this non-payment of the Contingent Coupon coincides with a period of greater risk of principal loss on your Notes. Accordingly, if we do not pay the Contingent Coupon on the Maturity Date, you will also incur a loss of principal, because the Final Level of the Lesser Performing Reference Asset will be less than its Trigger Level.

**The Notes Are Linked to the Lesser Performing Reference Asset, Even if the Other Reference Assets Perform Better** — If any of the Reference Assets has a Final Level that is less than its Trigger Level, your return will be linked to the lesser performing of the three Reference Assets. Even if the Final Levels of the other Reference Assets have increased compared to their respective Initial Levels, or have experienced a decrease that is less than that of the Lesser Performing Reference Asset, your return will only be determined by reference to the performance of the Lesser Performing Reference Asset, regardless of the performance of the other Reference Assets.

**Your Payment on the Notes Will Be Determined by Reference to Each Reference Asset Individually, Not to a Basket, and the Payment at Maturity Will Be Based on the Performance of the Lesser Performing Reference Asset** — The Payment at Maturity will be determined only by reference to the performance of the Lesser Performing Reference Asset, regardless of the performance of the other Reference Assets. The Notes are not linked to a weighted basket, in which the risk may be mitigated and diversified among each of the basket components. For example, in the case of notes linked to a weighted basket, the return would depend on the weighted aggregate performance of the basket components reflected as the basket return. As a result, the depreciation of one basket component could be mitigated by the appreciation of the other basket components, as scaled by the weighting of that basket component. However, in the case of the Notes, the individual performance of each of the Reference Assets would not be combined, and the depreciation of one Reference Asset would not be mitigated by any appreciation of the other Reference Assets. Instead, your return will depend solely on the Final Level of the Lesser Performing Reference Asset. Because each

Reference Asset tracks a different segment of the U.S. equities market, they may each decrease in a comparable manner. In addition, each of the securities included in the underlying index for the XLP is also included in the SPX. The Call Feature and the Contingent Coupon Feature Limit Your Potential Return — The return potential of the Notes is limited to the pre-specified Contingent Coupon Rate, regardless of the appreciation of the Reference Assets. In addition, the total return on the Notes will vary based on the number of Observation Dates on which the Contingent Coupon becomes payable prior to maturity or an issuer call. Further, if the Notes are called due to the Call Feature, you will not receive any Contingent Coupons or any other payment in respect of any Observation Dates after the applicable payment date. Since the Notes could be called as early as the first Observation Date, the total return on the Notes could be minimal. If the Notes are not called, you may be subject to the full downside performance of the Lesser Performing Reference Asset even though your potential return is limited to the Contingent Coupon Rate. As a result, the return on an investment in the Notes could be less than the return on a direct investment in the Reference Assets.

Your Return May Be Lower than the Return on a Conventional Debt Security of Comparable Maturity — The return that you will receive on the Notes, which could be negative, may be less than the return you could earn on other investments. Even if

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your return is positive, your return may be less than the return you would earn if you bought a conventional senior interest bearing debt security of Royal Bank.

**Payments on the Notes Are Subject to Our Credit Risk, and Changes in Our Credit Ratings Are Expected to Affect the Market Value of the Notes** — The Notes are our senior unsecured debt securities. As a result, your receipt of any Contingent Coupons, if payable, and the amount due on any relevant payment date is dependent upon our ability to repay its obligations on the applicable payment dates. This will be the case even if the values of the Reference Assets increase after the Trade Date. No assurance can be given as to what our financial condition will be at any time during the term of the Notes.

**There May Not Be an Active Trading Market for the Notes-Sales in the Secondary Market May Result in Significant Losses** — There may be little or no secondary market for the Notes. The Notes will not be listed on any securities exchange. RBCCM and our other affiliates may make a market for the Notes; however, they are not required to do so. RBCCM or any other affiliate of ours may stop any market-making activities at any time. Even if a secondary market for the Notes develops, it may not provide significant liquidity or trade at prices advantageous to you. We expect that transaction costs in any secondary market would be high. As a result, the difference between bid and asked prices for your Notes in any secondary market could be substantial.

**The Initial Estimated Value of the Notes Is Less than the Price to the Public** — The initial estimated value set forth on the cover page of this pricing supplement does not represent a minimum price at which we, RBCCM or any of our affiliates would be willing to purchase the Notes in any secondary market (if any exists) at any time. If you attempt to sell the Notes prior to maturity, their market value may be lower than the price you paid for them and the initial estimated value. This is due to, among other things, changes in the prices or levels of the Reference Assets, the borrowing rate we pay to issue securities of this kind, and the inclusion in the price to the public of the underwriting discount and the estimated costs relating to our hedging of the Notes. These factors, together with various credit, market and economic factors over the term of the Notes, are expected to reduce the price at which you may be able to sell the Notes in any secondary market and will affect the value of the Notes in complex and unpredictable ways. Assuming no change in market conditions or any other relevant factors, the price, if any, at which you may be able to sell your Notes prior to maturity may be less than your original purchase price, as any such sale price would not be expected to include the underwriting discount and the hedging costs relating to the Notes. In addition to bid-ask spreads, the value of the Notes determined by RBCCM for any secondary market price is expected to be based on the secondary rate rather than the internal funding rate used to price the Notes and determine the initial estimated value. As a result, the secondary price will be less than if the internal funding rate was used. The Notes are not designed to be short-term trading instruments. Accordingly, you should be able and willing to hold your Notes to maturity.

**The Initial Estimated Value of the Notes on the Cover Page of this Pricing Supplement Is an Estimate Only, Calculated as of the Time the Terms of the Notes Were Set** — The initial estimated value of the Notes is based on the value of our obligation to make the payments on the Notes, together with the mid-market value of the derivative embedded in the terms of the Notes. See “Structuring the Notes” below. Our estimate is based on a variety of assumptions, including our credit spreads, expectations as to dividends, interest rates and volatility, and the expected term of the Notes. These assumptions are based on certain forecasts about future events, which may prove to be incorrect. Other entities may value the Notes or similar securities at a price that is significantly different than we do. The value of the Notes at any time after the Trade Date will vary based on many factors, including changes in market conditions, and cannot be predicted with accuracy. As a result, the actual value you would receive if you sold the Notes in any secondary market, if any, should be expected to differ materially from the initial estimated value of your Notes.

**Owning the Notes Is Not the Same as Owning the XLP or the Securities Represented by the Indices** — The return on your Notes is unlikely to reflect the return you would realize if you actually owned shares of the XLP or the securities

represented by the Indices. For instance, you will not receive or be entitled to receive any dividend payments or other distributions on these securities during the term of your Notes. As an owner of the Notes, you will not have voting rights or any other rights that holders of these securities may have. Furthermore, the Reference Assets may appreciate substantially during the term of the Notes, while your potential return will be limited to the applicable Contingent Coupon payments.

Prior to Maturity, the Value of the Notes Will Be Influenced by Many Unpredictable Factors — Many economic and market factors will influence the value of the Notes. We expect that, generally, the price or level of each Reference Asset on any day will affect the value of the Notes more than any other single factor. However, you should not expect the value of the Notes in the secondary market to vary in proportion to changes in the value of the Reference Assets. The value of the Notes will be affected by a number of other factors that may either offset or magnify each other, including:

Ø the market value of the Reference Assets;

Ø whether the market value of one or more of the Reference Assets is below the Coupon Barrier or the Trigger Level;

Ø the expected volatility of the Reference Assets;

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- Ø the time to maturity of the Notes;
- Ø the dividend rate on the Reference Assets or on the equity securities represented by the Reference Assets;
- Ø interest and yield rates in the market generally, as well as in the markets of the equity securities represented by the Reference Assets;
- Ø the occurrence of certain events relating to a Reference Asset that may or may not require an adjustment to the Initial Level, the Coupon Barrier and the Trigger Level;
- Ø economic, financial, political, regulatory or judicial events that affect the Reference Assets or the equity securities represented by the Reference Assets or stock markets generally, and which may affect the market value of the Reference Assets on any Observation Date; and
- Ø our creditworthiness, including actual or anticipated downgrades in our credit ratings.

Some or all of these factors will influence the price you will receive if you choose to sell your Notes prior to maturity. The impact of any of the factors set forth above may enhance or offset some or all of any change resulting from another factor or factors. You may have to sell your Notes at a substantial discount from the principal amount if the market value of the Reference Assets is at, below or not sufficiently above their Initial Levels, Coupon Barriers or Trigger Levels.

**Our Business Activities May Create Conflicts of Interest** — We and our affiliates expect to engage in trading activities related to the securities included in or represented by the Reference Assets that are not for the account of holders of the Notes or on their behalf. These trading activities may present a conflict between the holders' interests in the Notes and the interests we and our affiliates will have in their proprietary accounts, in facilitating transactions, including options and other derivatives transactions, for their customers and in accounts under their management. These trading activities, if they influence the prices or levels of the Reference Assets, could be adverse to the interests of the holders of the Notes. We and one or more of our affiliates may, at present or in the future, engage in business with the securities included in or represented by the Reference Assets, including making loans to or providing advisory services. These services could include investment banking and merger and acquisition advisory services. These activities may present a conflict between our or one or more of our affiliates' obligations and your interests as a holder of the Notes. Moreover, we, and our affiliates may have published, and in the future expect to publish, research reports with respect to the Reference Assets or securities included in or represented by the Reference Assets. This research is modified from time to time without notice and may express opinions or provide recommendations that are inconsistent with purchasing or holding the Notes. Any of these activities by us or one or more of our affiliates may affect the prices or levels of the Reference Assets and, therefore, the market value of the Notes.

**Market Disruption Events and Adjustments** — The Payment at Maturity, each Observation Date and the Valuation Date are subject to adjustment as to each Reference Asset as described in the product prospectus supplement. For a description of what constitutes a market disruption event as well as the consequences of that market disruption event, see "General Terms of the Notes—Market Disruption Events" in the product prospectus supplement and the section "Additional Terms of the Notes" below.

**You Must Rely on Your Own Evaluation of the Merits of an Investment Linked to the Reference Assets** — In the ordinary course of their business, our affiliates may have expressed views on expected movements in the Reference Assets or the equity securities that they represent, and may do so in the future. These views or reports may be communicated to our clients and clients of our affiliates. However, these views are subject to change from time to time. Moreover, other professionals who transact business in markets relating to any Reference Asset may at any time have significantly different views from those of our affiliates. For these reasons, you are encouraged to derive information concerning the Reference Assets from multiple sources, and you should not rely solely on views expressed by our affiliates.

The XLP and its Underlying Index Are Different — The performance of the XLP may not exactly replicate the performance of its underlying index, because the XLP will reflect transaction costs and fees that are not included in the calculation of its underlying index. It is also possible that the performance of the XLP may not fully replicate or may in certain circumstances diverge significantly from the performance of its underlying index due to the temporary unavailability of certain securities in the secondary market, the performance of any derivative instruments contained in the XLP or due to other circumstances. The XLP may use futures contracts, options, swap agreements, currency forwards and repurchase agreements in seeking performance that corresponds to its underlying index and in managing cash flows.

During periods of market volatility, securities underlying the XLP may be unavailable in the secondary market, market participants may be unable to calculate accurately the net asset value per share of the XLP and the liquidity of the XLP may be adversely affected. This kind of market volatility may also disrupt the ability of market participants to create and redeem shares of the XLP. Further, market volatility may adversely affect, sometimes materially, the prices at which market participants are willing to buy and sell shares of the XLP. As a result, under these circumstances, the market value of shares of the XLP may vary substantially from its net asset value per share. For all of the foregoing reasons, the performance of the XLP may not correlate with the

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performance of its underlying index as well as its net asset value per share, which could materially and adversely affect the value of the Notes in the secondary market and/or reduce your payment at maturity

**Management Risk** — The XLP is not managed according to traditional methods of “active” investment management, which involve the buying and selling of securities based on economic, financial and market analysis and investment judgment. Instead, the XLP, utilizing a “passive” or indexing investment approach, attempts to approximate the investment performance of its underlying index by investing in a portfolio of securities that generally replicate its underlying index. Therefore, unless a specific security is removed from its underlying index, the XLP generally would not sell a security because the security’s issuer was in financial trouble. In addition, the XLP is subject to the risk that the investment strategy of its investment advisor may not produce the intended results.

**The Policies of the XLP’s Investment Adviser Could Affect the Amount Payable on the Notes and Their Market Value** — The policies of the XLP’s investment adviser concerning the management of the XLP, additions, deletions or substitutions of the securities held by the XLP could affect the market price of shares of the XLP and, therefore, the amount payable on the Notes on the maturity date and the market value of the Notes before that date. The amount payable on the Notes and their market value could also be affected if the XLP’s investment adviser changes these policies, for example, by changing the manner in which it manages the XLP, or if the XLP’s investment adviser discontinues or suspends maintenance of the XLP, in which case it may become difficult to determine the market value of the Notes. The XLP’s investment adviser has no connection to the offering of the Notes and have no obligations to you as an investor in the Notes in making its decisions regarding the XLP.

**Changes that Affect an Index Will Affect the Market Value of the Notes and the Payments on the Notes** - The policies of the sponsor of each of the SPX and the RTY, or the Consumer Staples Select Sector Index (which underlies the XLP), concerning the calculation of the applicable index, additions, deletions or substitutions of the components of that index and the manner in which changes affecting those components, such as stock dividends, reorganizations or mergers, may be reflected in the index and, therefore, could affect the amounts payable on the Notes at maturity, and the market value of the Notes prior to maturity. The amounts payable on the Notes and their market value could also be affected if the index sponsor changes these policies, for example, by changing the manner in which it calculates the index, or if the index sponsor discontinues or suspends calculation or publication of the index, in which case it may become difficult to determine the market value of the Notes.

**We Have No Affiliation with any Index Sponsor and Will Not Be Responsible for any Actions Taken by an Index Sponsor** - No index sponsor is an affiliate of ours or will be involved in the offering of the Notes in any way. Consequently, we have no control of the actions of any index sponsor, including any actions of the type that might impact the value of the Notes. No index sponsor has any obligation of any sort with respect to the Notes. Thus, no index sponsor has any obligation to take your interests into consideration for any reason, including in taking any actions that might affect the value of the Notes. None of our proceeds from the issuance of the Notes will be delivered to any index sponsor.

**An Investment in the Notes Is Subject to Risks Associated in Investing in Stocks With a Small Market Capitalization** — The Russell 2000® Index consists of stocks issued by companies with relatively small market capitalizations. These companies often have greater stock price volatility, lower trading volume and less liquidity than large-capitalization companies. As a result, the level of the Russell 2000® Index may be more volatile than that of a market measure that does not track solely small-capitalization stocks. Stock prices of small-capitalization companies are also generally more vulnerable than those of large-capitalization companies to adverse business and economic developments, and the stocks of small-capitalization companies may be thinly traded, and be less attractive to many investors if they do not pay dividends. In addition, small capitalization companies are often less well-established and less stable financially than large-capitalization companies and may depend on a small number of key personnel, making them more vulnerable to loss of those individuals. Small capitalization companies tend to have lower revenues, less

diverse product lines, smaller shares of their target markets, fewer financial resources and fewer competitive strengths than large-capitalization companies. These companies may also be more susceptible to adverse developments related to their products or services.

**The Securities Composing the XLP Index Are Concentrated in One Sector** – All of the securities included in the XLP are issued by companies in the consumer staples sector. As a result, the securities that will determine the performance of the XLP are concentrated in one sector. Although an investment in the Notes will not give holders any ownership or other direct interests in the securities composing the XLP, the return on an investment in the Notes will be subject to certain risks associated with a direct equity investment in companies in this market sector. Accordingly, by investing in the Notes, you may not benefit from the diversification which could result from an investment linked to companies that operate in multiple sectors.

**Market Disruption Events and Adjustments** — The payment at maturity, each Observation Date and the Valuation Date are subject to adjustment as described in the product prospectus supplement and in the following section.

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#### ADDITIONAL TERMS OF YOUR NOTES RELATED TO THE INDICES

##### Closing Level

The closing level of each of the SPX and the RTY on any trading day will equal its closing level published following the regular official weekday close of trading on that trading day.

A “trading day” as to the each of the SPX and the RTY means a day on which the principal trading market for that index is open for trading.

##### Unavailability of the Level of an Index

If the sponsor of the SPX or the RTY discontinues publication of that index and its sponsor or another entity publishes a successor or substitute index that the calculation agent determines, in its sole discretion, to be comparable to the discontinued index (such successor or substitute index being referred to in this section as a “successor index”), then any subsequent index closing level will be determined by reference to the published level of that successor index at the regular weekday close of trading on the applicable trading day.

Upon any selection by the calculation agent of a successor index, the calculation agent will provide written notice to the trustee of the selection, and the trustee will furnish written notice thereof, to the extent the trustee is required to under the senior debt indenture, to each noteholder, or in the case of global notes, the depositary, as holder of the global notes.

If a successor index is selected by the calculation agent, that successor index will be used as a substitute for that index for all purposes, including for purposes of determining whether a market disruption event exists with respect to that index.

If the sponsor of the SPX or the RTY discontinues publication of that index prior to, and that discontinuance is continuing on, any trading day on which the level of that index must be determined, and the calculation agent determines, in its sole discretion, that no successor index is available at that time, then the calculation agent will determine the level of that index for the relevant date in accordance with the formula for and method of calculating that index last in effect prior to the discontinuance, without rebalancing or substitution, using the closing level (or, if trading in the relevant underlying securities or components of that index have been materially suspended or materially limited, its good faith estimate of the closing level that would have prevailed but for that suspension or limitation) at the close of the principal trading session of the relevant exchange on that date of each security or component most recently comprising that index. Notwithstanding these alternative arrangements, discontinuance of the publication of the SPX or the RTY may adversely affect the value of your Notes.

If at any time the method of calculating a closing level for the SPX or the RTY or a successor index is changed in a material respect, or if the SPX or the RTY is in any other way modified so that it does not, in the opinion of the calculation agent, fairly represent the level of the SPX or the RTY had those changes or modifications not been made, then, from and after that time, the calculation agent will, at the close of business in New York City on the applicable trading day, make such calculations and adjustments as, in the good faith judgment of the calculation agent, may be necessary in order to arrive at a level of an index comparable to the SPX or the RTY as if those changes or modifications had not been made. Accordingly, if the method of calculating the SPX or the RTY is modified so that the value of the SPX or the RTY is a fraction of what it would have been if it had not been modified (e.g., due to a split in that index), then the calculation agent will adjust the level of the applicable index in order to arrive at a value as if it had not been modified (e.g., as if such split had not occurred).

##### Index Market Disruption Events

A “market disruption event” with respect to the SPX or the RTY means any event, circumstance or cause which we determine, and the calculation agent confirms, has or will have a material adverse effect on our ability to perform our obligations under the Notes or to hedge our position in respect of our obligations to make payment of amounts owing thereunder and more specifically includes the following events to the extent that they have such effect with respect to

the applicable index:

- a suspension, absence or limitation of trading in index components constituting 20% or more, by weight, of the SPX or the RTY;

- a suspension, absence or limitation of trading in futures or options contracts relating to an index on their respective markets;

- any event that disrupts or impairs, as determined by the calculation agent, the ability of market participants to (i) effect transactions in, or obtain market values for, index components constituting 20% or more, by weight, of the SPX or the RTY, or (ii) effect transactions in, or obtain market values for, futures or options contracts relating to the SPX or the RTY on their respective markets;

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the closure on any day of the primary market for futures or options contracts relating to the SPX or the RTY or index components constituting 20% or more, by weight, of the SPX or the RTY on a scheduled trading day prior to the scheduled weekday closing time of that market (without regard to after hours or any other trading outside of the regular trading session hours) unless such earlier closing time is announced by the primary market at least one hour prior to the earlier of (i) the actual closing time for the regular trading session on such primary market on such scheduled trading day for such primary market and (ii) the submission deadline for orders to be entered into the relevant exchange system for execution at the close of trading on such scheduled trading day for such primary market; any scheduled trading day on which (i) the primary markets for index components constituting 20% or more, by weight, of the SPX or the RTY or (ii) the exchanges or quotation systems, if any, on which futures or options contracts on the SPX or the RTY are traded, fails to open for trading during its regular trading session; or any other event, if the calculation agent determines in its sole discretion that the event interferes with our ability or the ability of any of our affiliates to unwind all or a portion of a hedge with respect to the Notes that we or our affiliates have effected or may effect.

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#### INFORMATION REGARDING THE REFERENCE ASSETS

Information regarding each of the Reference Assets may be obtained from a variety of sources including, but not limited to, press releases, newspaper articles and other publicly disseminated documents. We have not participated in the preparation of, or verified, such publicly available information. None of the forgoing documents are incorporated by reference in, and should not be considered part of, this document.

The following information regarding each of the Reference Assets is derived from publicly available information. We have not independently verified the accuracy or completeness of reports filed by the XLP with the SEC, information published by on any website or in any other format, information about it obtained from any other source or the information provided below.

The Notes are not sponsored, endorsed, sold or promoted by the investment adviser. The investment adviser makes no representations or warranties to the owners of the Notes or any member of the public regarding the advisability of investing in the Notes. The investment adviser has no obligation or liability in connection with the operation, marketing, trading or sale of the Notes.

We obtained the information regarding the historical performance of each of the Reference Assets set forth below from Bloomberg Financial Markets. We have not independently verified the accuracy or completeness of the information obtained from Bloomberg Financial Markets. The historical performance of each of the Reference Assets should not be taken as an indication of its future performance, and no assurance can be given as to the value of the Reference Assets at any time. We cannot give you assurance that the performance of the Reference Assets will not result in the loss of all or part of your investment.

#### The S&P 500<sup>®</sup> Index (“SPX”)

The S&P 500<sup>®</sup> Index (the “SPX”) is intended to provide an indication of the pattern of common stock price movement. The calculation of the level of the SPX is based on the relative value of the aggregate market value of the common stocks of 500 companies as of a particular time compared to the aggregate average market value of the common stocks of 500 similar companies during the base period of the years 1941 through 1943.

S&P calculates the SPX by reference to the prices of the constituent stocks of the SPX without taking account of the value of dividends paid on those stocks. Effective with the September 2015 rebalance, consolidated share class lines will no longer be included in the SPX. Each share class line will be subject to public float and liquidity criteria individually, but the company’s total market capitalization will be used to evaluate each share class line. This may result in one listed share class line of a company being included in the SPX while a second listed share class line of the same company is excluded.

#### Computation of the SPX

While S&P currently employs the following methodology to calculate the SPX, no assurance can be given that S&P will not modify or change this methodology in a manner that may affect the Payment at Maturity.

Historically, the market value of any component stock of the SPX was calculated as the product of the market price per share and the number of then outstanding shares of such component stock. In March 2005, S&P began shifting the SPX halfway from a market capitalization weighted formula to a float-adjusted formula, before moving the SPX to full float adjustment on September 16, 2005. S&P’s criteria for selecting stocks for the SPX did not change with the shift to float adjustment. However, the adjustment affects each company’s weight in the SPX.

Under float adjustment, the share counts used in calculating the SPX reflect only those shares that are available to investors, not all of a company’s outstanding shares. Float adjustment excludes shares that are closely held by control groups, other publicly traded companies or government agencies.

In September 2012, all shareholdings representing more than 5% of a stock’s outstanding shares, other than holdings by “block owners,” were removed from the float for purposes of calculating the SPX. Generally, these “control holders”

will include officers and directors, private equity, venture capital and special equity firms, other publicly traded companies that hold shares for control, strategic partners, holders of restricted shares, ESOPs, employee and family trusts, foundations associated with the company, holders of unlisted share classes of stock, government entities at all levels (other than government retirement/pension funds) and any individual person who controls a 5% or greater stake in a company as reported in regulatory filings. However, holdings by block owners, such as depository banks, pension funds, mutual funds and ETF providers, 401(k) plans of the company, government retirement/pension funds, investment funds of insurance companies, asset managers and investment funds, independent foundations and savings and investment plans, will ordinarily be considered part of the float.

Treasury stock, stock options, equity participation units, warrants, preferred stock, convertible stock, and rights are not part of the float. Shares held in a trust to allow investors in countries outside the country of domicile, such as depository shares and Canadian exchangeable shares are normally part of the float unless those shares form a control block.

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For each stock, an investable weight factor (“IWF”) is calculated by dividing the available float shares by the total shares outstanding. Available float shares are defined as the total shares outstanding less shares held by control holders. This calculation is subject to a 5% minimum threshold for control blocks. For example, if a company’s officers and directors hold 3% of the company’s shares, and no other control group holds 5% of the company’s shares, S&P would assign that company an IWF of 1.00, as no control group meets the 5% threshold. However, if a company’s officers and directors hold 3% of the company’s shares and another control group holds 20% of the company’s shares, S&P would assign an IWF of 0.77, reflecting the fact that 23% of the company’s outstanding shares are considered to be held for control. As of July 31, 2017, companies with multiple share class lines are no longer eligible for inclusion in the SPX. Constituents of the SPX prior to July 31, 2017 with multiple share class lines will be grandfathered in and continue to be included in the SPX. If a constituent company of the SPX reorganizes into a multiple share class line structure, that company will remain in the SPX at the discretion of the S&P Index Committee in order to minimize turnover.

The SPX is calculated using a base-weighted aggregate methodology. The level of the SPX reflects the total market value of all 500 component stocks relative to the base period of the years 1941 through 1943. An indexed number is used to represent the results of this calculation in order to make the level easier to use and track over time. The actual total market value of the component stocks during the base period of the years 1941 through 1943 has been set to an indexed level of 10. This is often indicated by the notation 1941-43 = 10. In practice, the daily calculation of the SPX is computed by dividing the total market value of the component stocks by the “index divisor.” By itself, the index divisor is an arbitrary number. However, in the context of the calculation of the SPX, it serves as a link to the original base period level of the SPX. The index divisor keeps the SPX comparable over time and is the manipulation point for all adjustments to the SPX, which is index maintenance.

#### Index Maintenance

Index maintenance includes monitoring and completing the adjustments for company additions and deletions, share changes, stock splits, stock dividends, and stock price adjustments due to company restructuring or spinoffs. Some corporate actions, such as stock splits and stock dividends, require changes in the common shares outstanding and the stock prices of the companies in the SPX, and do not require index divisor adjustments.

To prevent the level of the SPX from changing due to corporate actions, corporate actions which affect the total market value of the SPX require an index divisor adjustment. By adjusting the index divisor for the change in market value, the level of the SPX remains constant and does not reflect the corporate actions of individual companies in the SPX. Index divisor adjustments are made after the close of trading and after the calculation of the SPX’s closing level. Changes in a company’s total shares outstanding of 5% or more due to public offerings are made as soon as reasonably possible. Other changes of 5% or more (for example, due to tender offers, Dutch auctions, voluntary exchange offers, company stock repurchases, private placements, acquisitions of private companies or non-index companies that do not trade on a major exchange, redemptions, exercise of options, warrants, conversion of preferred stock, notes, debt, equity participations, at-the-market stock offerings or other recapitalizations) are made weekly, and are generally announced on Fridays for implementation after the close of trading the following Friday (one week later). If a 5% or more share change causes a company’s IWF to change by five percentage points or more, the IWF is updated at the same time as the share change. IWF changes resulting from partial tender offers are considered on a case-by-case basis.

#### License Agreement

S&P® is a registered trademark of Standard & Poor’s Financial Services LLC and Dow Jones® is a registered trademark of Dow Jones Trademark Holdings LLC (“Dow Jones”). These trademarks have been licensed for use by S&P. “Standard & Poor’s”, “S&P 500” and “S&P” are trademarks of Standard & Poor’s Financial Services LLC. These



trademarks have been sublicensed for certain purposes by us. The SPX is a product of S&P and/or its affiliates and has been licensed for use by us. The Notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones Indices LLC, Standard & Poor's Financial Services LLC or any of their respective affiliates (collectively, "S&P Dow Jones Indices"). S&P Dow Jones Indices make no representation or warranty, express or implied, to the holders of the Notes or any member of the public regarding the advisability of investing in securities generally or in the Notes particularly or the ability of the SPX to track general market performance. S&P Dow Jones Indices' only relationship to us with respect to the SPX is the licensing of the SPX and certain trademarks, service marks and/or trade names of S&P Dow Jones Indices and/or its third party licensors. The SPX is determined, composed and calculated by S&P Dow Jones Indices without regard to us or the Notes. S&P Dow Jones Indices have no obligation to take our needs or the needs of holders of the Notes into consideration in determining, composing or calculating the SPX. S&P Dow Jones Indices are not responsible for and have not participated in the determination of the prices, and amount of the Notes or the timing of the issuance or sale of the Notes or in the determination or calculation of the equation by which the Notes are to be converted into cash. S&P Dow Jones Indices have no obligation or liability in connection with the administration, marketing or trading of the Notes. There is no assurance that investment products based on the SPX will accurately track index performance or provide positive investment returns. S&P Dow Jones Indices LLC and its subsidiaries are not investment advisors. Inclusion of a security or futures contract within an index is not a recommendation by S&P Dow Jones Indices to buy, sell, or hold such security or futures contract, nor is it considered to be investment advice. Notwithstanding the foregoing, CME Group Inc. and its affiliates may independently issue and/or sponsor financial products unrelated to the Notes currently being issued by us, but which may be similar to and competitive with the

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Notes. In addition, CME Group Inc. and its affiliates may trade financial products which are linked to the performance of the SPX. It is possible that this trading activity will affect the value of the Notes.

S&P DOW JONES INDICES DO NOT GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS AND/OR THE COMPLETENESS OF THE SPX OR ANY DATA RELATED THERETO OR ANY COMMUNICATION, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATION (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES INDICES SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS, OR DELAYS THEREIN. S&P DOW JONES INDICES MAKE NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE OR AS TO RESULTS TO BE OBTAINED BY US, HOLDERS OF THE NOTES, OR ANY OTHER PERSON OR ENTITY FROM THE USE OF THE SPX OR WITH RESPECT TO ANY DATA RELATED THERETO. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES INDICES BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY, OR OTHERWISE. THERE ARE NO THIRD PARTY BENEFICIARIES OF ANY AGREEMENTS OR ARRANGEMENTS BETWEEN S&P DOW JONES INDICES AND US, OTHER THAN THE LICENSORS OF S&P DOW JONES INDICES.

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Russell 2000<sup>®</sup> Index (“RTY”)

The RTY was developed by Russell Investments (“Russell”) before FTSE International Limited and Russell combined in 2015 to create FTSE Russell, which is wholly owned by London Stock Exchange Group. Russell began dissemination of the RTY (Bloomberg L.P. index symbol “RTY”) on January 1, 1984. FTSE Russell calculates and publishes the RTY. The RTY was set to 135 as of the close of business on December 31, 1986. The RTY is designed to track the performance of the small capitalization segment of the U.S. equity market. As a subset of the Russell 3000<sup>®</sup> Index, the RTY consists of the smallest 2,000 companies included in the Russell 3000<sup>®</sup> Index. The Russell 3000<sup>®</sup> Index measures the performance of the largest 3,000 U.S. companies, representing approximately 98% of the investable U.S. equity market. The RTY is determined, comprised, and calculated by FTSE Russell without regard to the Notes.

Selection of Stocks Underlying the RTY

All companies eligible for inclusion in the RTY must be classified as a U.S. company under FTSE Russell’s country-assignment methodology. If a company is incorporated, has a stated headquarters location, and trades on a standard exchange in the same country (American Depositary Receipts and American Depositary Shares are not eligible), then the company is assigned to its country of incorporation. If any of the three factors are not the same, FTSE Russell defines three Home Country Indicators (“HCIs”): country of incorporation, country of headquarters, and country of the most liquid exchange (as defined by a two-year average daily dollar trading volume) (“ADDTV”) from all exchanges within a country. Using the HCIs, FTSE Russell compares the primary location of the company’s assets with the three HCIs. If the primary location of its assets matches any of the HCIs, then the company is assigned to the primary location of its assets. If there is insufficient information to determine the country in which the company’s assets are primarily located, FTSE Russell will use the primary location of the company’s revenue for the same cross-comparison and assigns the company to the appropriate country in a similar fashion. FTSE Russell uses the average of two years of assets or revenues data to reduce potential turnover. If conclusive country details cannot be derived from assets or revenues data, FTSE Russell will assign the company to the country in which its headquarters are located unless the country is a Benefit Driven Incorporation “BDI” country. If the country in which its headquarters is located is a BDI, it will be assigned to the country of its most liquid stock exchange. BDI countries include: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bonaire, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Curacao, Faroe Islands, Gibraltar, Guernsey, Isle of Man, Jersey, Liberia, Marshall Islands, Panama, Saba, Sint Eustatius, Sint Maarten, and Turks and Caicos Islands. For any companies incorporated or headquartered in a U.S. territory, including countries such as Puerto Rico, Guam, and U.S. Virgin Islands, a U.S. HCI is assigned.

All securities eligible for inclusion in the RTY must trade on a major U.S. exchange. Stocks must have a closing price at or above \$1.00 on their primary exchange on the “rank day” in May of each year (timetable is announced each spring) to be eligible for inclusion during annual reconstitution. However, in order to reduce unnecessary turnover, if an existing member’s closing price is less than \$1.00 on the last day of May, it will be considered eligible if the average of the daily closing prices (from its primary exchange) during the month of May is equal to or greater than \$1.00. FTSE Russell adds initial public offerings (IPOs) each quarter to ensure that new additions to the institutional investing opportunity set are reflected in representative indexes. A stock added during the quarterly IPO process is considered a new index addition, and therefore must have a closing price on its primary exchange at or above \$1.00 on the last day of the eligibility period in order to qualify for index inclusion. If an existing index member does not trade on the rank day, it must price at \$1.00 or above on another eligible U.S. exchange to remain eligible.

An important criterion used to determine the list of securities eligible for the RTY is total market capitalization, which is defined as the market price as of the rank day in May for those securities being considered at annual reconstitution times the total number of shares outstanding. Where applicable, common stock, non-restricted exchangeable shares

and partnership units/membership interests are used to determine market capitalization. Any other form of shares such as preferred stock, convertible preferred stock, redeemable shares, participating preferred stock, warrants, rights, installment receipts or trust receipts, are excluded from the calculation. If multiple share classes of common stock exist, they are combined to determine total shares outstanding. In cases where the common stock share classes act independently of each other (e.g., tracking stocks), each class is considered for inclusion separately. If multiple share classes exist, the pricing vehicle will be designated as the share class with the highest two-year trading volume as of the rank day in May.

Companies with a total market capitalization of less than \$30 million are not eligible for the RTY. Similarly, companies with only 5% or less of their shares available in the marketplace are not eligible for the RTY. Royalty trusts, limited liability companies, closed-end investment companies (companies that are required to report Acquired Fund Fees and Expenses, as defined by the SEC, including business development companies), blank check companies, special purpose acquisition companies, and limited partnerships are also ineligible for inclusion. Exchange traded funds and mutual funds are also excluded. Bulletin board, pink sheets, and over-the-counter (“OTC”) traded securities are not eligible for inclusion.

Annual reconstitution is a process by which the RTY is completely rebuilt. Based on closing levels of the company’s common stock on its primary exchange on the rank day of May of each year, FTSE Russell reconstitutes the composition of the RTY using the then existing market capitalizations of eligible companies. Reconstitution of the RTY occurs on the last Friday in June or, when the last Friday in June is the 29<sup>th</sup> or 30<sup>th</sup>, reconstitution occurs on the prior Friday. In addition, FTSE Russell adds initial public offerings to the RTY on a quarterly basis based on total market capitalization ranking within the market-adjusted capitalization breaks established during the most recent reconstitution.

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After membership is determined, a security's shares are adjusted to include only those shares available to the public. This is often referred to as "free float." The purpose of the adjustment is to exclude from market calculations the capitalization that is not available for purchase and is not part of the investable opportunity set.

License Agreement

FTSE Russell and Royal Bank have entered into a non-exclusive license agreement providing for the license to Royal Bank, and certain of its affiliates, in exchange for a fee, of the right to use indices owned and published by FTSE Russell in connection with some securities, including the Notes.

FTSE Russell does not guarantee the accuracy and/or the completeness of the RTY or any data included in the RTY and has no liability for any errors, omissions, or interruptions in the RTY. FTSE Russell makes no warranty, express or implied, as to results to be obtained by the calculation agent, holders of the Notes, or any other person or entity from the use of the RTY or any data included in the RTY in connection with the rights licensed under the license agreement described in this document or for any other use. FTSE Russell makes no express or implied warranties, and hereby expressly disclaims all warranties of merchantability or fitness for a particular purpose with respect to the RTY or any data included in the RTY. Without limiting any of the above information, in no event will FTSE Russell have any liability for any special, punitive, indirect or consequential damages, including lost profits, even if notified of the possibility of these damages.

The Notes are not sponsored, endorsed, sold or promoted by FTSE Russell. FTSE Russell makes no representation or warranty, express or implied, to the owners of the Notes or any member of the public regarding the advisability of investing in securities generally or in the Notes particularly or the ability of the RTY to track general stock market performance or a segment of the same. FTSE Russell's publication of the RTY in no way suggests or implies an opinion by FTSE Russell as to the advisability of investment in any or all of the stocks upon which the RTY is based. FTSE Russell's only relationship to Royal Bank is the licensing of certain trademarks and trade names of FTSE Russell and of the RTY, which is determined, composed and calculated by FTSE Russell without regard to Royal Bank or the Notes. FTSE Russell is not responsible for and has not reviewed the Notes nor any associated literature or publications and FTSE Russell makes no representation or warranty express or implied as to their accuracy or completeness, or otherwise. FTSE Russell reserves the right, at any time and without notice, to alter, amend, terminate or in any way change the RTY. FTSE Russell has no obligation or liability in connection with the administration, marketing or trading of the Notes.

"Russell 2000" and "Russell 3000" are registered trademarks of FTSE Russell in the U.S. and other countries.

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Issuer Callable Contingent Coupon Barrier  
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Equity Indices and One Exchange Traded Fund  
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The Consumer Staples Select Sector SPDR<sup>®</sup> Fund (“XLP”)

The XLP seeks to provide investment results that correspond generally to the price and yield performance, before fees and expenses, of the Consumer Staples Select Sector Index. The Consumer Staples Select Sector Index measures the performance of the consumer staples sector of the U.S. equity market. The XLP is composed of companies whose primary line of business is directly associated with the consumer staples sector. The XLP trades on the NYSE Arca under the ticker symbol “XLP.”

The Consumer Staples Select Sector Index

The index is a modified market capitalization-based index. The index is intended to track the movements of companies that are components of the S&P 500<sup>®</sup> Index and are involved in the development and production of consumer products that cover food and drug retailing, beverages, food products, tobacco, household products and personal products.

The index is one of the Select Sector Indices. The Select Sector Indices are sub-indices of the S&P 500<sup>®</sup> Index. Each stock in the S&P 500<sup>®</sup> Index is allocated to at least one Select Sector Index, and the combined companies of the ten Select Sector Indices represent all of the companies in the S&P 500<sup>®</sup> Index. The industry indices are sub-categories within each Select Sector Index and represent a specific industry segment of the overall Select Sector Index. The ten Select Sector Indices seek to represent the eleven S&P 500<sup>®</sup> Index sectors.

Each Select Sector Index was developed and is maintained in accordance with the following criteria:

Each of the component stocks in a Select Sector Index (the “Component Stocks”) is a constituent company of the S&P 500<sup>®</sup> Index.

The ten Select Sector Indices together will include all of the companies represented in the S&P 500<sup>®</sup> Index and each of the stocks in the S&P 500<sup>®</sup> Index will be allocated to at least one of the Select Sector Indices.

The Index Compilation Agent assigns each constituent stock of the S&P 500<sup>®</sup> Index to a Select Sector Index. The Index Compilation Agent assigns a company’s stock to a particular Select Sector Index based on S&P Dow Jones Indices’ sector classification methodology as set forth in its Global Industry Classification Standard.

Each Select Sector Index is calculated by S&P Dow Jones Indices using a modified “market capitalization” methodology. This design ensures that each of the component stocks within a Select Sector Index is represented in a proportion consistent with its percentage with respect to the total market capitalization of that Select Sector Index. For reweighting purposes, each Select Sector Index is rebalanced quarterly after the close of business on the second to last calculation day of March, June, September and December using the following procedures: (1) The rebalancing reference date is two business days prior to the last calculation day of each quarter; (2) With prices reflected on the rebalancing reference date, and membership, shares outstanding, additional weight factor (capping factor) and investable weight factors (as described in the section “Computation of the S&P 500 Index<sup>®</sup>” below) as of the rebalancing effective date, each company is weighted using the modified market capitalization methodology. Modifications are made as defined below.

(i) The indices are first evaluated to ensure none of the indices breach the maximum allowable limits defined in rules (ii) and (v) below. If any of the allowable limits are breached, the component stocks are reweighted based on their float-adjusted market capitalization weights.

(ii) If any component stock has a weight greater than 24%, that component stock has its float-adjusted market capitalization weight capped at 23%. The 23% weight cap creates a 2% buffer to ensure that no component stock exceeds 25% as of the quarter-end diversification requirement date.

(iii) All excess weight is equally redistributed to all uncapped component stocks within the relevant Select Sector Index.

(iv) After this redistribution, if the float-adjusted market capitalization weight of any other component stock(s) then breaches 23%, the process is repeated iteratively until no component stock s breaches the 23% weight cap.

(v) The sum of the component stocks with weight greater than 4.8% cannot exceed 50% of the total index weight. These caps are set to allow for a buffer below the 5% limit.

(vi) If the rule in step (v) is breached, all the component stocks are ranked in descending order of their float-adjusted market capitalization weights and the first component stock that causes the 50% limit to be breached has its weight reduced to 4.6%.

(vii) This excess weight is equally redistributed to all component stocks with weights below 4.6%. This process is repeated iteratively until step (v) is satisfied.

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(viii) Index share amounts are assigned to each component stock to arrive at the weights calculated above. Since index shares are assigned based on prices one business day prior to rebalancing, the actual weight of each component stock at the rebalancing differs somewhat from these weights due to market movements.

(ix) If necessary, the reweighting process may take place more than once prior to the close on the last business day of March, June, September or December to ensure conformity with all diversification requirements.

Each Select Sector Index is calculated using the same methodology utilized by S&P Dow Jones Indices in calculating the S&P 500<sup>®</sup> Index, using a base-weighted aggregate methodology. The daily calculation of each Select Sector Index is computed by dividing the total market value of the companies in the Select Sector Index by a number called the index divisor.

The Index Compilation Agent at any time may determine that a Component Stock which has been assigned to one Select Sector Index has undergone such a transformation in the composition of its business, and should be removed from that Select Sector Index and assigned to a different Select Sector Index. In the event that the Index Compilation Agent notifies S&P Dow Jones Indices that a Component Stock's Select Sector Index assignment should be changed, S&P Dow Jones Indices will disseminate notice of the change following its standard procedure for announcing index changes and will implement the change in the affected Select Sector Indices on a date no less than one week after the initial dissemination of information on the sector change to the maximum extent practicable. It is not anticipated that Component Stocks will change sectors frequently.

Component Stocks removed from and added to the S&P 500<sup>®</sup> Index will be deleted from and added to the appropriate Select Sector Index on the same schedule used by S&P Dow Jones Indices for additions and deletions from the S&P 500<sup>®</sup> Index insofar as practicable.

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Issuer Callable Contingent Coupon Barrier  
Notes Linked to the Lesser Performing of Two  
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Royal Bank of Canada

#### HISTORICAL INFORMATION

The graphs below set forth the information relating to the historical performance of the Reference Assets the period from January 1, 2008 through December 21, 2018.

We obtained the information regarding the historical performance of the Reference Assets in the graphs below from Bloomberg Financial Markets.

We have not independently verified the accuracy or completeness of the information obtained from Bloomberg Financial Markets. The historical performance of any Reference Asset should not be taken as an indication of its future performance, and no assurance can be given as to the prices or levels of the Reference Assets at any time. We cannot give you assurance that the performance of the Reference Assets will not result in the loss of all or part of your investment.

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Issuer Callable Contingent Coupon Barrier  
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Royal Bank of Canada

Historical Information for the S&P 500<sup>®</sup> Index (“SPX”)

The graph below illustrates the performance of this Reference Asset from January 1, 2008 to December 21, 2018, reflecting its Initial Level of 2,416.62. The red line represents its Trigger Level and Coupon Barrier of 1,691.63, which is equal to 70% of its Initial Level, rounded to two decimal places.

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Historical Information for the Russell 2000® Index (“RTY”)

The graph below illustrates the performance of this Reference Asset from January 1, 2008 to December 21, 2018, reflecting its Initial Level of 1,292.086. The red line represents its Trigger Level and Coupon Barrier of 904.460, which is equal to 70% of its Initial Level, rounded to three decimal places.

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Issuer Callable Contingent Coupon Barrier  
Notes Linked to the Lesser Performing of Two  
Equity Indices and One Exchange Traded Fund  
Royal Bank of Canada

Historical Information for the Consumer Staples Select Sector SPDR<sup>®</sup> Fund (“XLP”)  
The graph below illustrates the performance of this Reference Asset from January 1, 2008 to December 21, 2018, reflecting its Initial Stock Price of \$50.18. The red line represents its Trigger Level and Coupon Barrier of \$35.13, which is equal to 70% of its Initial Stock Price, rounded to two decimal places.

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Issuer Callable Contingent Coupon Barrier  
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#### USE OF PROCEEDS AND HEDGING

In anticipation of the sale of the Notes, we expect to enter into hedging transactions with one or more of our affiliates, involving purchases of the securities represented by the Reference Assets, shares of the XLP and/or listed and/or over-the-counter derivative instruments related to any of those securities or the Reference Assets prior to or on the Trade Date. From time to time, including around the time of each Observation Date and the Maturity Date, we, RBCCM, and our other affiliates may enter into additional hedging transactions or unwind those that we or they have entered into. In this regard, we, RBCCM, and our other affiliates may:

- acquire or dispose of investments relating to the Reference Assets;
- acquire or dispose of long or short positions in listed or over-the-counter derivative instruments based on the Reference Assets; or
- any combination of the above two.

We, RBCCM and our other affiliates may acquire a long or short position in securities similar to the Notes from time to time and may, in our or their sole discretion, hold or resell those similar securities.

We, RBCCM and our other affiliates may close out our or their hedges on or before any Observation Date. That step may involve sales or purchases of the securities represented by the Reference Assets, shares of the XLP, or over-the-counter derivative instruments linked to the Reference Assets.

#### SUPPLEMENTAL DISCUSSION OF U.S. FEDERAL INCOME TAX CONSEQUENCES

The following disclosure supplements, and to the extent inconsistent supersedes, the discussion in the product prospectus supplement dated September 10, 2018 under “Supplemental Discussion of U.S. Federal Income Tax Consequences.”

Under Section 871(m) of the Code, a “dividend equivalent” payment is treated as a dividend from sources within the United States. Such payments generally would be subject to a 30% U.S. withholding tax if paid to a non-U.S. holder. Under U.S. Treasury Department regulations, payments (including deemed payments) with respect to equity-linked instruments (“ELIs”) that are “specified ELIs” may be treated as dividend equivalents if such specified ELIs reference an interest in an “underlying security,” which is generally any interest in an entity taxable as a corporation for U.S. federal income tax purposes if a payment with respect to such interest could give rise to a U.S. source dividend. However, the IRS has issued guidance that states that the U.S. Treasury Department and the IRS intend to amend the effective dates of the U.S. Treasury Department regulations to provide that withholding on dividend equivalent payments will not apply to specified ELIs that are not delta-one instruments and that are issued before January 1, 2021. Based on our determination that the Notes are not delta-one instruments, non-U.S. holders should not be subject to withholding on dividend equivalent payments, if any, under the Notes. However, it is possible that the Notes could be treated as deemed reissued for U.S. federal income tax purposes upon the occurrence of certain events affecting the Reference Assets or the Notes (for example, upon an Underlying Asset rebalancing), and following such occurrence the Notes could be treated as subject to withholding on dividend equivalent payments. Non-U.S. holders that enter, or have entered, into other transactions in respect of the Reference Assets or the Notes should consult their tax advisors as to the application of the dividend equivalent withholding tax in the context of the Notes and their other transactions. If any payments are treated as dividend equivalents subject to withholding, we (or the applicable withholding agent) would be entitled to withhold taxes without being required to pay any additional amounts with respect to amounts so withheld.

The accompanying product prospectus supplement notes that FACTA withholding on payments of gross proceeds from a sale or Redemption of Notes will only apply to payments made after December 31, 2018. That discussion is modified to reflect regulations proposed by the U.S. Treasury Department indicating an intent to eliminate the requirement under FACTA of withholding on gross proceeds of the disposition of financial instruments. The U.S.

Treasury Department has indicated that taxpayers may rely on these proposed regulations pending their finalization. Prospective investors are urged to consult with their own tax advisors regarding the possible implications of FACTA on their investment in the Notes.

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Issuer Callable Contingent Coupon Barrier  
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#### SUPPLEMENTAL PLAN OF DISTRIBUTION (CONFLICTS OF INTEREST)

Delivery of the Notes will be made against payment for the Notes on December 27, 2018, which is the third (3rd) business day following the Trade Date (this settlement cycle being referred to as “T+3”). See “Plan of Distribution” in the prospectus dated September 7, 2018. For additional information as to the relationship between us and RBCCM, please see the section “Plan of Distribution—Conflicts of Interest” in the prospectus dated September 7, 2018.

We will deliver the Notes on a date that is greater than two business days following the Trade Date. Under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise. Accordingly, purchasers who wish to trade the Notes more than two business days prior to the original Issue Date will be required to specify alternative arrangements to prevent a failed settlement.

The value of the Notes shown on your account statement may be based on RBCCM’s estimate of the value of the Notes if RBCCM or another of our affiliates were to make a market in the Notes (which it is not obligated to do). That estimate will be based upon the price that RBCCM may pay for the Notes in light of then prevailing market conditions, our creditworthiness and transaction costs. For a period of approximately three months after the issue date of the Notes, the value of the Notes that may be shown on your account statement may be higher than RBCCM’s estimated value of the Notes at that time. This is because the estimated value of the Notes will not include the underwriting discount and our hedging costs and profits; however, the value of the Notes shown on your account statement during that period may initially be a higher amount, reflecting the addition of RBCCM’s underwriting discount and our estimated costs and profits from hedging the Notes. This excess is expected to decrease over time until the end of this period. After this period, if RBCCM repurchases your Notes, it expects to do so at prices that reflect their estimated value.

We may use this pricing supplement in the initial sale of the Notes. In addition, RBCCM or another of our affiliates may use this pricing supplement in a market-making transaction in the Notes after their initial sale. Unless we or our agent informs the purchaser otherwise in the confirmation of sale, this pricing supplement is being used in a market-making transaction.

#### STRUCTURING THE NOTES

The Notes are our debt securities, the return on which is linked to the performance of the Reference Assets. As is the case for all of our debt securities, including our structured notes, the economic terms of the Notes reflect our actual or perceived creditworthiness at the time of pricing. In addition, because structured notes result in increased operational, funding and liability management costs to us, we typically borrow the funds under these Notes at a rate that is more favorable to us than the rate that we might pay for a conventional fixed or floating rate debt security of comparable maturity. Using this relatively lower implied borrowing rate rather than the secondary market rate, is a factor that reduced the initial estimated value of the Notes at the time their terms were set. Unlike the estimated value included in this pricing supplement, any value of the Notes determined for purposes of a secondary market transaction may be based on a different funding rate, which may result in a lower value for the Notes than if our initial internal funding rate were used.

In order to satisfy our payment obligations under the Notes, we may choose to enter into certain hedging arrangements (which may include call options, put options or other derivatives) on the issue date with RBCCM or one of our other subsidiaries. The terms of these hedging arrangements take into account a number of factors, including our creditworthiness, interest rate movements, the volatility of the Reference Assets, and the tenor of the Notes. The economic terms of the Notes and their initial estimated value depend in part on the terms of these hedging arrangements.

The lower implied borrowing rate is a factor that reduced the economic terms of the Notes to you. The initial offering price of the Notes also reflects the underwriting commission and our estimated hedging costs. These factors resulted

in the initial estimated value for the Notes on the Trade Date being less than their public offering price. See “Selected Risk Considerations—The Initial Estimated Value of the Notes Is Less than the Price to the Public” above.

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Auto-Callable Contingent Coupon Barrier Notes  
Linked to the Lesser Performing of Three  
Exchange Traded Funds, Due March 21, 2019  
Royal Bank of Canada

#### VALIDITY OF THE NOTES

In the opinion of Norton Rose Fulbright Canada LLP, the issue and sale of the Notes has been duly authorized by all necessary corporate action of the Bank in conformity with the Indenture, and when the Notes have been duly executed, authenticated and issued in accordance with the Indenture and delivered against payment therefor, the Notes will be validly issued and, to the extent validity of the Notes is a matter governed by the laws of the Province of Ontario or Québec, or the laws of Canada applicable therein, and will be valid obligations of the Bank, subject to equitable remedies which may only be granted at the discretion of a court of competent authority, subject to applicable bankruptcy, to rights to indemnity and contribution under the Notes or the Indenture which may be limited by applicable law; to insolvency and other laws of general application affecting creditors' rights, to limitations under applicable limitations statutes, and to limitations as to the currency in which judgments in Canada may be rendered, as prescribed by the Currency Act (Canada). This opinion is given as of the date hereof and is limited to the laws of the Provinces of Ontario and Québec and the federal laws of Canada applicable thereto. In addition, this opinion is subject to customary assumptions about the Trustee's authorization, execution and delivery of the Indenture and the genuineness of signatures and certain factual matters, all as stated in the letter of such counsel dated September 7, 2018, which has been filed as Exhibit 5.1 to Royal Bank's Form 6-K filed with the SEC dated September 7, 2018. In the opinion of Morrison & Foerster LLP, when the Notes have been duly completed in accordance with the Indenture and issued and sold as contemplated by the prospectus supplement and the prospectus, the Notes will be valid, binding and enforceable obligations of Royal Bank, entitled to the benefits of the Indenture, subject to applicable bankruptcy, insolvency and similar laws affecting creditors' rights generally, concepts of reasonableness and equitable principles of general applicability (including, without limitation, concepts of good faith, fair dealing and the lack of bad faith). This opinion is given as of the date hereof and is limited to the laws of the State of New York. This opinion is subject to customary assumptions about the Trustee's authorization, execution and delivery of the Indenture and the genuineness of signatures and to such counsel's reliance on the Bank and other sources as to certain factual matters, all as stated in the legal opinion dated September 7, 2018, which has been filed as Exhibit 5.2 to the Bank's Form 6-K dated September 7, 2018.

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