

ROYAL BANK OF CANADA  
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Product Prospectus Supplement No. CCBN-2  
To the Prospectus dated September 7, 2018 and the  
Prospectus Supplement dated September 7, 2018  
Senior Global Medium-Term Notes, Series H

#### Contingent Coupon Barrier Notes Linked to an Index

Royal Bank of Canada may offer and sell contingent coupon barrier notes linked to an index (a “Reference Index”). Each Reference Index will be either an equity index or a commodity index, or any other type of index that we may describe in the relevant pricing supplement. We refer to these securities as the “notes.”

The prospectus dated September 7, 2018, the prospectus supplement dated September 7, 2018 and this product prospectus supplement describe the terms that will apply generally to the notes. A separate term sheet, free writing prospectus or pricing supplement, as the case may be, will describe the terms that apply specifically to the notes, including any changes to the terms specified below. We refer to such term sheets, free writing prospectuses and pricing supplements generally as pricing supplements. If the terms described in the relevant pricing supplement are inconsistent with those described in this product prospectus supplement, the accompanying prospectus supplement or prospectus, the terms described in the relevant pricing supplement will control.

The notes are senior unsecured debt obligations of Royal Bank of Canada. All payments on the notes are subject to our credit risk.

We will pay a contingent coupon during the term of the notes, periodically in arrears on each Coupon Payment Date, if the closing level of the Reference Index is equal to or greater than the applicable coupon barrier on the applicable Observation Date (including the final Observation Date). However, if the closing level of the Reference Index is less than the coupon barrier on the applicable Observation Date, we will not pay you the contingent coupon applicable to that Observation Date.

The notes will be automatically called if the closing level of the Reference Index on any Observation Date is equal to or greater than the Initial Index Level. In this case, you will receive a cash payment equal to your principal amount plus the contingent coupon otherwise due on the applicable Call Settlement Date under the contingent coupon feature.

The notes do not guarantee any return of principal at maturity. If the notes have not been called, and the Reference Index closes below the applicable Trigger Level on the final Observation Date, you will receive an amount in cash with a value that reflects a loss of 1% of the principal amount for every 1% decrease in the level of the Reference Index below the Initial Index Level. In this case, the cash amount you will receive at maturity will be less than the principal amount of your notes and may be zero.

Subject to our creditworthiness, if you hold the notes to maturity, and the closing level of the Reference Index is above or equal to the Trigger Level on the final Observation Date, we will pay you an amount in cash equal to the principal amount of your notes.

The notes will be offered in minimum denominations that will be set forth in the relevant pricing supplement.

Investing in the notes is not equivalent to investing in the Reference Index, or any of the equity securities included in the Reference Index.

The notes will not be listed on any securities exchange.

Your investment in the notes involves certain risks. The notes differ from ordinary debt securities in that the repayment of principal is not guaranteed. If the notes are not called on any Observation Date, you may lose some or all of your investment. Specifically, if the notes are not called and the Final Index Level is less than the Trigger Level, you will lose 1% of your principal amount for each 1% that the underlying return is less than zero. Any payment on

the notes, including any repayment of principal, is subject to our creditworthiness. See “Risk Factors” beginning on page PS-4 to read about investment risks relating to the notes.

The price at which you purchase the notes includes hedging costs and profits that Royal Bank of Canada or its affiliates expect to incur or realize. These costs and profits will reduce the secondary market price, if any secondary market develops, for the notes. As a result, you will experience an immediate and substantial decline in the value of your notes on the applicable issue date.

None of the Securities and Exchange Commission (the “SEC”), any state securities commission or any other regulatory body has approved or disapproved of the notes or passed upon the accuracy of this product prospectus supplement or the accompanying prospectus and prospectus supplement. Any representation to the contrary is a criminal offense.

We may use this product prospectus supplement in the initial sale of a note. In addition, RBC Capital Markets, LLC or one of our other affiliates may use this product prospectus supplement in a market-making transaction in a note after its initial sale. Unless we or our agent informs the purchaser otherwise in the confirmation of sale, this product prospectus supplement is being used in a market-making transaction.

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. governmental agency or instrumentality.

RBC Capital Markets, LLC

Product Prospectus Supplement dated September 10, 2018

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In this product prospectus supplement, references to the “accompanying prospectus” mean the accompanying prospectus, dated September 7, 2018, as supplemented by the accompanying prospectus supplement, dated September 7, 2018, of Royal Bank of Canada. References to the “relevant pricing supplement” mean the pricing supplement that describes the specific terms of your notes.

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SUMMARY

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

Key Terms

Underlying Index:	<p>The Reference Index specified in the relevant pricing supplement. Each Reference Index will be an equity index or a commodity index, or any other type of index that we may describe in the relevant pricing supplement.</p> <p>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:</p> <ul style="list-style-type: none"> <li>· If the closing level of the Reference Index is equal to or greater than the coupon barrier on the applicable Observation Date, we will pay the contingent coupon applicable to that Observation Date.</li> <li>· If the closing level of the Reference Index is less than the coupon barrier on the applicable Observation Date, we will not pay you the contingent coupon applicable to that Observation Date.</li> </ul>
Contingent Coupon:	<p>The contingent coupon payments on the notes are not guaranteed. Royal Bank of Canada will not pay you the contingent coupon for any Observation Date on which the closing level of the Reference Index is less than the coupon barrier.</p> <p>The “contingent coupon” applicable to each Observation Date will be a fixed amount specified in the applicable pricing supplement and will be calculated based upon a rate per annum (the “contingent coupon rate”) specified in the applicable pricing supplement.</p>
Coupon Barrier:	<p>A specified level of the Reference Index that is below the Initial Index Level, as set forth in the applicable pricing supplement.</p>
Coupon Payment Dates:	<p>Each Coupon Payment Date will generally be two to five business days following the applicable Observation Date. The final Coupon Payment Date will be the maturity date. As described under “General Terms of the Notes—Observation Dates” below, the calculation agent may postpone any Observation Date, and therefore a Coupon Payment Date, if a market disruption event occurs or is continuing on a day that would otherwise be an Observation Date. We describe market disruption events under “General Terms of the Notes—Market Disruption Events” below.</p>
Call Feature:	<p>The notes will be called automatically if the closing level of the Reference Index on any Observation Date is at or above the Initial Index Level. If the notes are called on any Observation Date, we will pay on the applicable Call Settlement Date a cash payment per note equal to your principal amount plus the contingent coupon otherwise due on that Call Settlement Date under the contingent coupon feature. Following an automatic call, no further amounts will be owed to you under the notes.</p>
Call Settlement Dates:	<p>If the notes are called on any Observation Date, the Call Settlement Date will be the Coupon Payment Date corresponding to that Observation Date. As described under “General Terms of the Notes—Observation Dates” below, the calculation agent may postpone any Observation Date, and therefore a Call Settlement Date, if a market disruption event occurs or is continuing on a day that would otherwise be an Observation Date. We describe market disruption events under “General Terms of the Notes—Market Disruption Events” below.</p>

Unless otherwise specified in the relevant pricing supplement, if the notes are not called, we will pay you at maturity a cash payment based on the Final Index Level, calculated as described below:

- If the Final Index Level is above or equal to the Trigger Level (which, unless otherwise specified in the relevant pricing supplement, will equal the coupon barrier) on the final Observation Date, we will pay you a cash payment equal to the principal amount plus the contingent coupon otherwise due on the maturity date under the contingent coupon feature.

Payment at Maturity: · If the Final Index Level is below the Trigger Level on the final Observation Date, we will deliver to you an amount in cash that will be less than your principal amount, if anything, resulting in a loss that is proportionate to the decline of the Reference Index from the trade date to the final Observation Date, for a return equal to: principal amount x (1 + Underlying Return).

The repayment of your principal amount is not guaranteed. If the value of the Reference Index decreases, you may lose some or all of your investment. Specifically, if the notes are not called and the Final Index Level is below the Trigger Level on the final Observation Date, you will lose 1% of your principal amount for each 1% decrease in the level of the Reference Index below the Initial Index Level.

Accordingly, if the Final Index Level is below the Trigger Level on the final Observation Date, you may lose up to 100% of your principal amount.

Underlying Return: Unless otherwise specified in the relevant pricing supplement:

$$\frac{\text{Final Index Level} - \text{Initial Index Level}}{\text{Initial Index Level}}$$

Initial Index Level: Unless otherwise specified in the relevant pricing supplement, the closing level of the Reference Index on the trade date, or such other date as specified in the relevant pricing supplement.

Final Index Level: Unless otherwise specified in the relevant pricing supplement, the closing level of the Reference Index on the final Observation Date, subject to extension for market disruption events as described below under “General Terms of the Notes—Market Disruption Events.”

Trigger Level: A specified price of the Reference Index that is below the Initial Index Level, as set forth in the applicable pricing supplement. Unless otherwise specified in the relevant pricing supplement, the Trigger Level will equal the coupon barrier.

Observation Date(s): One or more dates as specified in the relevant pricing supplement, subject to postponement in the event of certain market disruption events.

Issue Price: Unless otherwise specified in the relevant pricing supplement, \$1,000 per \$1,000 in principal amount of the notes.

Trade Date: As specified in the relevant pricing supplement.

Settlement Date: As specified in the relevant pricing supplement.

Maturity Date: As specified in the relevant pricing supplement. If not previously called, the notes will mature on the maturity date. The maturity date is subject to postponement in the event of certain market disruption events and as described under “General Terms of the Notes—Payment at Maturity.”

## RISK FACTORS

An investment in your notes is subject to the risks described below, as well as the risks described under “Risk Factors” in the prospectus and the prospectus supplement. Your notes are not secured debt and are riskier than ordinary unsecured debt securities. Also, investing in your notes is not equivalent to investing directly in the applicable Reference Index or its components. You should carefully consider whether the notes are suited to your particular circumstances. This product prospectus supplement should be read together with the prospectus, the prospectus supplement and the relevant pricing supplement. The information in the prospectus and prospectus supplement is supplemented by, and to the extent inconsistent therewith replaced and superseded by, the information in this product prospectus supplement and the relevant pricing supplement. This section describes the most significant risks relating to the terms of the notes. We urge you to read the following information about these risks, together with the other information in this product prospectus supplement and the prospectus, the prospectus supplement and the relevant pricing supplement, before investing in the notes.

### Risks Relating to the Notes Generally

Your investment in the notes may result in a loss.

The notes do not guarantee any return of principal. The amount payable to you at maturity, if any, will be determined as described in this product prospectus supplement and the relevant pricing supplement. The return on the notes at maturity will depend on whether the notes are called on any Observation Date, or if the notes are not called, the extent to which the Final Index Level is less than the applicable Trigger Level. If the notes are not called and the Final Index Level is below the Trigger Level on the final Observation Date, you will lose 1% of the principal amount for every 1% decrease in the level of the Reference Index below the Initial Index Level. Accordingly, you may lose the entire principal amount of your notes.

You may not receive any contingent coupons with respect to your notes.

Royal Bank of Canada will not necessarily make periodic coupon payments on the notes. If the closing level of the Reference Index on an Observation Date is less than the coupon barrier, we will not pay you the contingent coupon applicable to that Observation Date. If the closing level of the Reference Index is less than the coupon barrier on each of the Observation Dates, 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 on the final Observation Date will coincide with a greater risk of principal loss on your notes. Accordingly, if we do not pay the contingent coupon on the maturity date, you will incur a loss of principal, because the Final Index Level will be less than the applicable Trigger Level.

Your potential return on the notes is limited.

The return on the notes is limited to the pre-specified contingent coupon rate, regardless of the appreciation of the Reference Index. As a result, the return on an investment in the notes could be less than the return on a direct investment in the Reference Index. 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 automatic call. Further, if the notes are called due to the automatic call feature, you will not receive any contingent coupons or any other payment in respect of any Observation Dates after the applicable Call Settlement 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 will be subject to the Reference Index’s risk of decline.

The potential contingent repayment of principal represented by the Trigger Level applies only at maturity.

If your notes are not automatically called, you should be willing to hold your notes until maturity. If you are able to sell your notes in the secondary market prior to maturity, you may have to sell them for a loss relative to your principal amount, even if price of the Reference Level is at or above the Trigger Level.

The notes may be called early and are subject to reinvestment risk.

If your notes are called early, the term of the notes will be reduced and you will not receive any payment on the notes after the applicable Call Settlement Date. There is no guarantee that you would be able to reinvest the

proceeds from an automatic call of the notes at a comparable rate of return for a similar level of risk. To the extent you are able to reinvest such proceeds in an investment comparable to the notes, you may incur transaction costs such as dealer discounts and hedging costs built into the price of the new notes. Because the notes may be called as early as the first Observation Date after issuance, you should be prepared in the event the notes are called early.

The contingent coupon rate will reflect in part the volatility of the Reference Index and may not be sufficient to compensate you for the risk of loss at maturity.

“Volatility” refers to the frequency and magnitude of changes in the price of the Reference Index. The greater the volatility of the applicable Reference Index, the more likely it is that the Reference Index could close below the Trigger Level on the final Observation Date of the notes. This risk will generally be reflected in a higher contingent coupon rate for the notes than the interest rate payable on our conventional debt securities with a comparable term. However, while the contingent coupon rate is set on the trade date, the Reference Level’s volatility can change significantly over the term of the notes, and may increase. The level of the Reference Index could fall sharply as of the final Observation Date, which could result in a significant loss of your principal.

The notes are subject to the credit risk of Royal Bank of Canada.

The notes are subject to the credit risk of Royal Bank of Canada and our credit ratings and credit spreads may adversely affect the market value of the notes. Investors are dependent on Royal Bank of Canada’s ability to pay all amounts due on the notes on the applicable payment dates, and therefore investors are subject to our credit risk and to changes in the market’s view of our creditworthiness. Any decline in our credit ratings or increase in the credit spreads charged by the market for taking our credit risk is likely to adversely affect the value of the notes. Payment on the notes, including any repayment of principal, is subject to the creditworthiness of Royal Bank of Canada. If we were to default on our payment obligations, you may not receive any amounts owed to you under the notes and you could lose your entire investment.

Your return on the notes may be lower than the return on a conventional debt security of comparable maturity.

The return that you will receive on your notes, which could be negative, may be less than the return you could earn on other investments. Your investment may not reflect the full opportunity cost to you when you take into account factors that affect the time value of money, such as inflation.

Owning the notes is not the same as owning the components included in or represented by the Reference Index.

The return on your notes may not reflect the return you would realize if you actually owned the components included in or represented by the Reference Index. For instance, the level of the Reference Index or the components included in or represented by the Reference Index may appreciate substantially during the term of the notes, and you will not fully participate in that appreciation, because your positive return on the notes, if any, is limited to the contingent coupon.

The following factors, among others, may cause the financial return on your notes to differ from the financial return you would receive by investing directly in the Reference Index or its components:

- the return on a direct investment in the Reference Index would depend primarily upon the relative appreciation or depreciation of the Reference Index during the term of the notes, and not on whether the closing level of the Reference Index is equal to or greater than the Initial Index Level or the coupon barrier on any Observation Date or is less than the Trigger Level on the final Observation Date;

- in the case of a direct investment in the components included in a Reference Index, the return could include substantial dividend payments or other distributions, which you will not receive as an investor in the notes;

- in the case of a direct investment in the components included in a Reference Index, the return could include rights, such as voting rights, that you will not have as an investor in the notes; and

- a direct investment in the components included in the Reference Index is likely to have tax consequences that are different from an investment in the notes.

If the level of the Reference Index changes, the market value of your notes may not change in the same manner. Owning the notes is not the same as a direct investment in the Reference Index or the components of the Reference Index. Accordingly, changes in the level of the Reference Index may not result in a comparable change of the market value of the notes. If the level of the Reference Index on any trading day increases above the Initial Index Level, the value of the notes may not increase in a comparable manner, if at all. It is possible for the level of the Reference Index to increase while the value of the notes declines.

The determination of the payments on the notes, and whether they are subject to an automatic call, does not take into account all developments in the level of the Reference Index.

Changes in the level of the Reference Index during the periods between each Observation Date may not be reflected in the determination as to whether the contingent coupon is payable to you on any Coupon Payment Date or whether the notes are subject to an automatic call, or the calculation of the amount payable, if any, at maturity of the notes. The calculation agent will determine whether (i) the contingent coupon is payable to you on any Coupon Payment Date or (ii) the notes are subject to an automatic call by observing only the closing level of the Reference Index on each applicable Observation Date. The calculation agent will calculate the payment at maturity by comparing only the closing level of the Reference Index on the final Observation Date relative to the closing level of the Reference Index on the trade date (subject to the occurrence of certain events described in “General Terms of the Notes—Market Disruption Events”). No other prices or values will be taken into account. As a result, you may lose some or all of your principal amount even if the level of the Reference Index has risen at certain times during the term of the notes before falling to a closing level below the Trigger Level on the final Observation Date.

The notes are not designed to be short-term trading instruments.

The price at which you will be able to sell your notes to us or our affiliates prior to maturity, if at all, may be at a substantial discount from the principal amount of the notes, even in cases where the closing level of the Reference Index has appreciated since the trade date. In addition, you will not receive the benefit of any contingent repayment of principal represented by the Trigger Level if you sell your notes before the maturity date. The potential returns described in the relevant pricing supplement assume that your notes, which are not designed to be short-term trading instruments, are held to maturity.

You must rely on your own evaluation of the merits of an investment linked to the Reference Index.

In the ordinary course of their business, our affiliates may have expressed views on expected movement in any Reference Index, or the components included in any Reference Index, 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 Index may at any time have significantly different views from those of our affiliates. For these reasons, you are encouraged to derive information concerning the applicable Reference Index from multiple sources, and you should not rely solely on views expressed by our affiliates.

Certain Considerations for Insurance Companies and Employee Benefit Plans.

Any insurance company or fiduciary of a pension plan or other employee benefit plan that is subject to the prohibited transaction rules of the Employee Retirement Income Security Act of 1974, as amended, which we call “ERISA,” or the Internal Revenue Code of 1986, as amended, including an IRA or a Keogh plan (or a governmental plan to which similar prohibitions apply), and that is considering purchasing the notes with the assets of the insurance company or the assets of such a plan, should consult with its counsel regarding whether the purchase or holding of the notes could become a “prohibited transaction” under ERISA, the Internal Revenue Code or any substantially similar prohibition in light of the representations a purchaser or holder in any of the above categories is deemed to make by purchasing and holding the notes. For additional information, please see the discussion under “Employee Retirement Income Security Act” below.

### Risks Relating to Liquidity and Secondary Market Issues

Secondary trading in the notes may be limited.

Unless otherwise specified in the relevant pricing supplement, the notes will not be listed on a securities exchange.

There may be little or no secondary market for the notes. Even if there is a secondary market, it may not provide enough liquidity to allow you to trade or sell the notes easily.

RBC Capital Markets, LLC, or RBCCM, may act as a market maker for the notes, but is not required to do so.

Because we do not expect that other market makers will participate significantly in the secondary market for the notes, the price at which you may be able to trade the notes is likely to depend on the price, if any, at which RBCCM is willing to buy the notes. If at any time RBCCM or another entity does not act as a market maker, it is likely that there would be little or no secondary market for the notes. We expect that transaction costs in any secondary market would be high. As a result, the difference between the bid and asked prices for the notes in any secondary market could be substantial. If you sell the notes before maturity, you may have to do so at a substantial discount from the issue price, and as a result, you may suffer substantial losses.

The inclusion in the original issue price of each Agent's commission and the estimated cost of hedging our obligations under the notes through one or more of our affiliates is likely to adversely affect the value of the notes prior to maturity.

While the payment at maturity, if any, will be based on the principal amount of your notes as described in the relevant pricing supplement, the original issue price of the notes includes each Agent's commission and the estimated cost of hedging our obligations under the notes through one or more of our affiliates. Such estimated cost includes our affiliates' expected cost of providing such hedge, as well as the profit our affiliates expect to realize in consideration for assuming the risks inherent in providing such hedge. As a result, assuming no change in market conditions or any other relevant factors, the price, if any, at which RBCCM may be willing to purchase notes from you in secondary market transactions, if at all, will likely be lower than the original issue price. In addition, any such prices may differ from values determined by pricing models used by RBCCM, as a result of such compensation or other transaction costs.

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 closing level of the Reference Index 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 closing level of the Reference Index. The value of the notes will be affected by a number of other factors that may either offset or magnify each other, including:

- the level of the Reference Index;
- whether the closing level of the Reference Index is below the coupon barrier or the Trigger Level;
  - the expected volatility of the Reference Index;
- the time to maturity of the notes;
- the dividend rate on the components included in or represented by a Reference Index that is an equity index;
- interest and yield rates in the market generally,;
- economic, financial, political, regulatory or judicial events that affect the Reference Index or the components of a Reference Index or stock or commodities markets generally, and which may affect the closing level of the Reference Index on any Observation Date;
- if the Reference Index measures securities, commodities or other assets that have returns that are calculated based upon currencies other than the U.S. dollar or prices in one or more non-U.S. markets (a "non-U.S. Reference Index"), changes in, and the volatility of, the exchange rates between the U.S.

dollar and the relevant non-U.S. currency or currencies could have a negative impact on the payments due on your notes and their market value; and

· 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 level of the Reference Index is at, below or not sufficiently above the Initial Index Level, the coupon barrier or the Trigger Level.

#### Risks Relating to the Reference Index

You will not have any shareholder rights and will have no right to receive any shares of the stocks included in a Reference Index at maturity.

Investing in your notes will not make you a holder of any of the constituent stocks of any Reference Index. Neither you nor any other holder or owner of the notes will have any voting rights, any right to receive dividends or other distributions or any other rights with respect to any of these securities.

Changes that affect a Reference Index will affect the market value of the notes and the amount you will receive at maturity.

The policies of a sponsor of the Reference Index (the “Index Sponsor”) concerning the calculation of that index, additions, deletions or substitutions of the components of that index and the manner in which changes affecting those components (such as, in the case of equity indices, stock dividends, reorganizations or mergers), may be reflected in the index and, therefore, could affect the amount payable at the notes at maturity, and the market value of the notes prior at maturity. The amount payable on the notes and their market value could be affected if the Index Sponsor changes these policies, for example, by changing the manner in which it calculates the Reference Index, or if the Index Sponsor discontinues or suspends calculation or publication of the Reference Index, in which case it may become difficult to determine the market value of the notes. If events such as these occur, or if the level of the Reference Index is not available on any Observation Date because of a market disruption event or for any other reason and no successor index is selected, the calculation agent may determine the level of that index – and thus the amount payable at maturity – in a manner it considers appropriate, in its sole discretion.

The return on the notes will be exposed to fluctuations in exchange rates that might affect the level of the Reference Index and the payment at maturity.

Because the securities, commodities or other assets included in the Reference Index may be traded in currencies other than U.S. dollars, and the notes are denominated in U.S. dollars, the amount payable on the notes at maturity may be exposed to fluctuations in the exchange rate between the U.S. dollar and each of the currencies in which those assets are denominated. These changes in exchange rates may reflect changes in various non-U.S. economies that in turn may affect the payment on the notes at maturity. An investor’s net exposure will depend on the extent to which the currencies in which the relevant assets are denominated either strengthen or weaken against the U.S. dollar and the relative weight of each asset. If, taking into account such weighting, the U.S. dollar strengthens against the currencies in which the relevant assets are denominated, the value of those assets may be adversely affected and the level of the Reference Index may be adversely affected as well. In turn, the payment at maturity may be adversely affected.

We and our affiliates have no affiliation with the Index Sponsor and are not responsible for its public disclosure of information or that of any other company.

Unless otherwise specified in the applicable pricing supplement, we and our affiliates are not affiliated with any Index Sponsor in any way and have no ability to control or predict its actions, including any corporate actions of the type that would require the calculation agent to adjust the determinations of the payments on the notes, and have no ability to control the public disclosure of these corporate actions or any events or circumstances affecting the Index Sponsor, unless (and only to the extent that) our securities or the securities of our affiliates are included in the components of the Reference Index. The Index Sponsor will not be involved in the offering of the notes in any way and has no obligation to consider your interests as owner of the notes in taking any corporate actions that might

affect the market value of your notes or the payment at maturity. An Index Sponsor issuer may take actions that could adversely affect the market value of the notes.

The notes are unsecured debt obligations of Royal Bank of Canada only and are not obligations of Index Sponsor or any other third party. No portion of the Issue Price you pay for the notes will be paid to the Index Sponsor or any other third party, except to the extent that we are required to pay an Index Sponsor licensing fees with respect to the Reference Index.

Unless otherwise specified in the applicable pricing supplement, we will have derived the information about the Reference Index from publicly available information, without independent verification. Neither we nor any of our affiliates assume any responsibility for the adequacy or accuracy of the information about the respective the Reference Index. You, as an investor in the notes, should make your own investigation into the respective Reference Index for your notes.

This product prospectus supplement and each pricing supplement relates only to the notes and does not relate to the Reference Index or an Index Sponsor.

The historical performance of the Reference Index or its components should not be taken as an indication of their future performance.

The level of the Reference Index will determine the amount to be paid on the notes at maturity. The historical performance of the Reference Index or its components does not give an indication of their future performance. As a result, it is impossible to predict whether the level of the Reference Index will rise or fall during the term of the notes. The level of the Reference Index will be influenced by complex and interrelated political, economic, financial and other factors. The level of the Reference Index may decrease such that you may not receive any return of your investment or any contingent coupon payments. There can be no assurance that the level of the Reference Index will not decrease so that at maturity you will not lose some or all of your investment.

For notes linked to a non-U.S. Reference Index, an investment in the notes is subject to risks associated with non-U.S. securities markets.

The Reference Index to which the notes are linked, or its components, may have been issued by one or more non-U.S. companies. An investment in notes linked to the value of an Index with components comprised of non-U.S. equity securities involves particular risks. Non-U.S. securities markets may be more volatile than U.S. securities markets, and market developments may affect non-U.S. securities markets differently from the U.S. securities markets. Direct or indirect government intervention to stabilize these non-U.S. securities markets, as well as cross shareholdings among non-U.S. companies, may affect trading prices and volumes in those markets. Also, there is generally less publicly available information in the U.S. about non-U.S. companies than about those U.S. companies that are subject to the reporting requirements of the SEC, and non-U.S. companies are subject to accounting, disclosure, auditing and financial reporting standards and requirements that differ from those applicable to U.S. reporting companies.

Prices of securities in non-U.S. countries are subject to political, economic, financial and social factors that may be unique to the particular country. These factors, which could negatively affect the non-U.S. securities markets, include the possibility of recent or future changes in the economic and fiscal policies of non-U.S. governments, the possible imposition of, or changes in, currency exchange laws or other non-U.S. laws or restrictions applicable to non-U.S. companies or investments in non-U.S. equity securities, the possibility of fluctuations in the rate of exchange between currencies, the possibility of outbreaks of hostility and political instability and the possibility of natural disaster or adverse public health developments in the region. Moreover, the economies of certain foreign countries may differ favorably or unfavorably from the U.S. economy in important respects, such as growth of gross national product, rate of inflation, trade surpluses or deficits, capital reinvestment, resources and self-sufficiency.

Fluctuations relating to exchange rates may affect the value of your investment.

Because the securities, commodities or other assets included in a Reference Index may be traded in currencies other than U.S. dollars, and the notes are denominated in U.S. dollars, the amount payable on the notes at maturity may be exposed to fluctuations in the exchange rate between the U.S. dollar and each of the currencies in

which those assets are denominated. These changes in exchange rates may reflect changes in various non-U.S. economies that in turn may affect the payment on the notes at maturity. An investor's net exposure will depend on the extent to which the currencies in which the relevant assets are denominated either strengthen or weaken against the U.S. dollar and the relative weight of each asset. If, taking into account such weighting, the U.S. dollar strengthens against the currencies in which the relevant assets are denominated, the value of those assets may be adversely affected and the level of the Reference Index may be adversely affected as well. In turn, the payment at maturity may be adversely affected.

In recent years, the exchange rates between the U.S. dollar and some other currencies have been highly volatile, and this volatility may continue in the future. Risks relating to exchange rate fluctuations generally depend on economic and political events over which we have no control. However, fluctuations in any particular exchange rate that have occurred in the past are not necessarily indicative of fluctuations that may occur during the term of the notes. Changes in the exchange rate between the U.S. dollar and a foreign currency may affect the U.S. dollar equivalent of the price of any relevant security, futures contract or commodity on non-U.S. markets and, as a result, may affect the value of the notes. In addition, foreign exchange rates can either be floating or fixed by sovereign governments. Exchange rates of the currencies used by most economically developed nations are permitted to fluctuate in value relative to the U.S. dollar and to each other. However, from time to time governments and, in the case of countries using the euro, the European Central Bank, may use a variety of techniques, such as intervention by a central bank in foreign exchange, money markets, sovereign debt or other financial markets, the imposition of regulatory controls or taxes or changes in interest rates to influence the exchange rates of their currencies. Governments may also issue a new currency to replace an existing currency or alter the exchange rate or relative exchange characteristics by a devaluation or revaluation of a currency. These governmental actions could change or interfere with currency valuations and currency fluctuations that would otherwise occur in response to economic forces, as well as in response to the movement of currencies across borders. As a consequence, these government actions could adversely affect the value of the notes.

We will not make any adjustment or change in the terms of the notes in the event that applicable exchange rates should become fixed, or in the event of any devaluation or revaluation or imposition of exchange or other regulatory controls or taxes, or in the event of other developments affecting the U.S. dollar or any relevant foreign currency.

**Risks Relating to Reference Indices that are Commodity Indices**

You will not own the underlying commodities.

Investing in the notes not the same as owning the commodities or futures contracts relating to those commodities included in or represented by the Reference Index. You will not have a right to receive delivery of any of the commodities or futures contracts relating to those commodities included in or represented by the Reference Index.

We will not invest in any of these commodities or futures contracts relating to these commodities on behalf or for the benefit of holders of the notes.

The Reference Index may include indices that track commodity futures contracts and do not track the spot prices for the underlying commodities.

The Reference Index may include indices comprised of exchange-traded futures contracts on physical commodities. Unlike equities, which typically entitle the holder to a continuing stake in a corporation, a commodity futures contract is typically an agreement to buy a set amount of an underlying physical commodity at a predetermined price during a stated delivery period. A futures contract reflects the expected value of the underlying physical commodity upon delivery in the future. In contrast, the underlying physical commodity's current or "spot" price reflects the immediate delivery value of that commodity.

The notes are linked to the Reference Index and not to the spot prices of the commodities underlying those indices and an investment in the notes is not the same as buying and holding the underlying commodities. While price movements in the exchange-traded futures contracts comprising the Reference Index may correlate with changes in the underlying commodities' spot prices, the correlation will not be perfect and price movements in the spot markets for the underlying commodities may not be reflected in the futures market (and vice versa). Accordingly, an increase in the spot prices of the underlying commodities may not result in an increase in the level

of the Reference Index. The level of the Reference Index may decrease while the spot prices of the underlying commodities remain stable or increase, or do not decrease to the same extent.

Higher future prices of futures contracts included in a Reference Index relative to their current prices may decrease the payment at maturity and the value of the notes.

In the case of a Reference Index comprised of futures contracts, as these contracts approach expiration, they are replaced by similar contracts that have a later expiration. This process is referred to as “rolling.” Specifically, during the specified “roll period,” the level of the Reference Index is calculated as if the near-dated futures contracts are sold and the proceeds from those sales are used to purchase longer-dated futures contracts of equivalent value. Differences in the prices of the contracts that are sold and the new contracts for more distant delivery that are purchased are called “roll yield.”

If the market for these futures contracts is (putting aside other considerations) in “backwardation,” where the prices for the exchange-traded futures contracts are lower in the distant delivery months than in the nearer delivery months, the sale of the near-dated contracts would take place at prices that are higher than the purchase prices of the longer-dated contracts, creating positive “roll yield.” This would result in a greater quantity of longer-dated futures contracts being purchased for the same value. There is no indication that the markets for the commodities underlying the Reference Index will consistently be in backwardation or that there will be positive roll yield in the future performance of the Reference Index. Instead, the markets for the underlying commodities may trade in “contango.” Contango markets are those in which the prices for the futures contracts are higher in the distant delivery months than in the nearer delivery months. In this case, the sale of the near-dated contracts would take place at prices that are lower than the purchase prices of the longer-dated contracts, creating negative roll yield and resulting in a smaller quantity of longer-dated futures contracts being purchased for the same value. The commodities underlying the Reference Index may have historically traded in contango markets. Holding other factors constant, the presence of contango in the markets for the underlying commodities could result in negative roll yield, which could decrease the levels of the Reference Index, the payment at maturity and the value of the notes.

Commodities prices are highly volatile due to unpredictable factors that affect supply and demand.

Several factors, many of which are beyond our control, may influence the market value of the notes. Factors that may affect supply and demand of the underlying commodities or futures contracts comprising the Reference Index and, thus, the market value of the notes include (but are not limited to):

- political events;
- weather;
- agriculture;
- disease;
- labor activity;
- technological developments;
- direct government activity (such as embargoes); and
- other supply disruptions in major producing or consuming regions of the applicable commodity.

These factors may adversely affect the performance of the Reference Index or its underlying commodities or futures contracts and the market value of the notes. The market value of the notes will also be affected by, among other things:

- the trading prices of the applicable commodities;
- the trading prices of the applicable commodities futures; and
- the volatility of the applicable commodities and commodities futures (including the frequency and magnitude of price increases and decreases in those commodities or commodities futures).

Suspension or disruptions of market trading in the commodity and related futures markets may adversely affect the value of the notes.

The commodity markets are subject to temporary distortions or other disruptions due to various factors, including the lack of liquidity in the markets, the participation of speculators and government regulation and intervention. Certain exchanges have regulations which limit the amount of fluctuations in futures contracts that may occur during a single trading day. These limits are generally referred to as “daily price fluctuation limits,” and the maximum or minimum price of a futures contract on any given day as a result of these limits is referred to as a “limit price.” Once the limit price has been reached in a particular futures contract, no trades may be made at a different price. Limit prices may have the effect of precluding trading in a particular futures contract or forcing the liquidation of futures contracts at disadvantageous times or prices. These circumstances could affect the level or value of a Reference Index or its underlying commodities or futures contracts and could therefore adversely affect the market value of the notes. Indices Based in part on underlying commodities that trade on foreign exchanges may be subject to additional market risks.

The regulations of the U.S. Commodity Futures Trading Commission (the “CFTC”) do not apply to trading on foreign exchanges, and trading on foreign exchanges may involve different and greater risks than trading on U.S. exchanges. Certain foreign markets may be more susceptible to disruption than U.S. exchanges due to the lack of a government-regulated clearinghouse system. Trading on foreign exchanges also involves certain other risks that are not applicable to trading on U.S. exchanges. Those risks include (but are not limited to):

- varying exchange rates;
- varying quoting conventions or contract specifications on different exchanges;
- exchange controls;
- expropriation;
- burdensome or confiscatory taxation;
- moratoriums; and
- political or diplomatic events.

It may also be more costly and difficult for participants in those markets to enforce the laws or regulations of a foreign country or exchange, and it is possible that the foreign country or exchange may not have laws or regulations which adequately protect the rights and interests of investors in the applicable commodities.

The notes will not be regulated by the U.S. Commodity Futures Trading Commission.

Unlike a direct investment in futures contracts related to the applicable commodities, your investment in the notes does not afford you the benefits of the regulatory protections of the CFTC. Although RBC Capital Markets, LLC is registered with the CFTC as a futures merchant, you will not benefit from the CFTC’s or any other non-U.S. regulators’ regulatory protections that are afforded to persons who trade in futures contracts through a registered futures merchant or operator.

Unlike an investment in notes linked to the performance of one or more commodities, an investment in a collective investment vehicle that invests in futures contracts on behalf of its participants may be regulated as a commodity pool and its operator may be required to be registered with and regulated by the CFTC as a “commodity pool operator” (a “CPO”). Because the notes will not be interests in a commodity pool, they will not be regulated by the CFTC as a commodity pool, we will not be registered with the CFTC as a CPO and you will not benefit from the CFTC’s or any non-U.S. regulatory authority’s regulatory protections afforded to persons who trade in futures contracts or who invest in regulated commodity pools.

An investment in the notes may be subject to risks Associated with the London Bullion Market Association (the “LBMA”).

The closing prices of some commodities underlying the Reference Index, such as gold and silver, may be determined by reference to fixing prices reported by the LBMA. The LBMA is a self-regulatory association of bullion market participants. Although all market-making members of the LMBA are supervised by the Bank of England and are required to satisfy a capital adequacy test, the LBMA itself is not a regulated entity. If the LBMA

ceases operations, or if bullion trading becomes subject to a value-added tax or other tax or any other form of regulation currently not in place, the role of the LBMA price fixings as a global benchmark for the value of the relevant commodities may be adversely affected. The LBMA is a principals' market which operates in a manner more closely analogous to an over-the-counter physical commodity market than regulated futures markets, and certain features of U.S. futures contracts are not present in the context of LBMA trading. For example, there are no daily price limits on the LBMA which would otherwise restrict fluctuations in the prices of LBMA contracts. In a declining market, it is possible that prices would continue to decline without limitation within a trading day or over a period of trading days.

An investment in the notes may be subject to risks associated with the trading of commodities on the London Metals Exchange (the "LME").

The market prices of some commodities underlying the Reference Index may be determined by reference to the settlement prices of futures contracts traded on the LME. The LME is a principals' market which operates in a manner more closely analogous to the over-the-counter physical commodity markets than the futures markets, and certain features of U.S. futures markets are not present in the context of LME trading. For example, there are no daily price limits on the LME, which would otherwise restrict the extent of daily fluctuations in the prices of LME contracts. In a declining market, therefore, it is possible that prices would continue to decline without limitation within a trading day or over a period of trading days. In addition, a contract may be entered into on the LME calling for delivery on any day from one day to three months following the date of such contract and for monthly delivery in any of the next 16 to 24 months (depending on the commodity) following such third month, in contrast to trading on futures exchanges, which call for delivery in stated delivery months. As a result, there may be a greater risk of a concentration of positions in LME contracts on particular delivery dates, which in turn could cause temporary aberrations in the prices of LME contracts for certain delivery dates. If such aberrations are occurring on an Observation Date, the prices of the contracts used to determine the level or value of the Reference Index or its underlying commodities could be affected in a manner that adversely affects the payment at maturity.

#### Risks Relating to Hedging Activities and Conflicts of Interest

We or our affiliates may have adverse economic interests to the holders of the notes.

RBCCM and other affiliates of ours may engage in trading activities related to the Reference Index or its components on a regular basis, for their accounts and for other accounts under their management. RBCCM and these affiliates may also issue or underwrite or assist unaffiliated entities in the issuance or underwriting of other securities or financial instruments linked to the Reference Index or its components. To the extent that we or one of our affiliates serves as issuer, agent or underwriter for such securities or financial instruments, our or their interests with respect to such products may be adverse to those of the holders of the notes. Any of these trading activities could potentially affect the performance of the Reference Index and, accordingly, could affect the value of the notes and the amounts, if any, payable on the notes.

We and one or more of our affiliates may, at present or in the future, engage in business with the issuers of component stocks included in the Reference Index, including extending loans to, or making equity investments in, or providing advisory services to them, including merger and acquisition advisory services. In the course of this business, we or our affiliates may acquire non-public information about these companies, and we will not disclose any such information to you. We do not make any representation or warranty to any purchaser of a note with respect to any matters whatsoever relating to our business with the issuers of component stocks included in the Reference Index or future movements of the Reference Index or its components.

Additionally, we or one of our affiliates may serve as issuer, agent or underwriter for additional issuances of securities with returns linked or related to changes in the level of the Reference Index or the price of the equity securities or other assets included in a Reference Index. By introducing competing products into the marketplace in this manner, we or one or more of our affiliates could adversely affect the value of the notes.

We may hedge our obligations under the notes through certain affiliates, who would expect to make a profit on such hedge. We or our affiliates may adjust these hedges by, among other things, purchasing or selling those assets at any time, including around the time of each Observation Date, which could have an impact on the return of your notes.

Because hedging our obligations entails risk and may be influenced by market forces beyond our or our affiliates' control, such hedging may result in a profit that is more or less than expected, or it may result in a loss.



In the course of our or our affiliates' currency trading activities, we or our affiliates may acquire material nonpublic information with respect to currency exchange rates, and we will not disclose any such information to you. In addition, one or more of our affiliates may produce and/or publish research reports, or otherwise express views, with respect to expected movements in currency exchange rates. We do not make any representation or warranty to any purchaser of the notes with respect to any matters whatsoever relating to future currency exchange rate movements and, if the notes are linked to a Reference Index which invests in non-U.S. securities or other assets, any prospective purchaser of the notes should undertake an independent investigation of the currencies in which the assets held by that Reference Index are denominated and their related exchange rates as, in its judgment, is appropriate to make an informed decision with respect to an investment in the notes.

The calculation agent will have significant discretion with respect to the notes, which may be exercised in a manner that is adverse to your interests.

Our wholly-owned subsidiary, RBCCM, will act as the calculation agent. The calculation agent will determine, among other things, the closing level of the Reference Index on each Observation Date; whether the notes are subject to an automatic call; the Final Index Level; the coupon barrier; the underlying return; and the amount, if any, that we will pay to you at maturity. The calculation agent will also be responsible for determining whether a market disruption event has occurred. The calculation agent may exercise its discretion in a manner which reduces your return on the notes. Since these determinations by the calculation agent will affect the payments on the notes, the calculation agent may have a conflict of interest if it needs to make a determination of this kind. Since these determinations by the calculation agent will affect the payments on the notes, the calculation agent may have a conflict of interest if it needs to make a determination of this kind.

Market disruptions may adversely affect your return.

The calculation agent may, in its sole discretion, determine that the markets have been affected in a manner that prevents it from properly determining the closing level of the Reference Index on any Observation Date or calculating the underlying return and the amount, if any, that we are required to pay you at maturity. These events may include disruptions or suspensions of trading in the markets as a whole. If the calculation agent, in its sole discretion, determines that any of these events prevents us or any of our affiliates from properly hedging our obligations under the notes, it is possible that one or more of the Observation Dates and the maturity date will be postponed, and your return will be adversely affected. See "General Terms of the Notes—Market Disruption Events."

#### Risks Relating to Taxation Issues

Non-U.S. investors may be subject to certain additional risks.

This product prospectus supplement contains a general description of certain U.S. tax considerations relating to the notes. In the event you are a non-U.S. investor, you should consult your tax advisors as to the consequences, under the tax laws of the country where you are resident for tax purposes, of acquiring, holding and disposing of the notes and receiving the payments that might be due under the notes.

This product prospectus supplement also contains a general description of certain Canadian tax considerations relating to the notes. If you are not a Non-resident Holder (as that term is defined in "Tax Consequences—Canadian Taxation" in the accompanying prospectus) or if you acquire the notes in the secondary market, you should consult your tax advisors as to the consequences of acquiring, holding and disposing of the notes and receiving the payments that may be due under the notes.

Significant aspects of the income tax treatment of an investment in the notes may be uncertain.

The tax treatment of an investment in the notes is uncertain. We do not plan to request a ruling from the Internal Revenue Service or the Canada Revenue Agency regarding the tax treatment of an investment in the notes, and the Internal Revenue Service, the Canada Revenue Agency or a court may not agree with the tax treatment described in this product prospectus supplement.

The Internal Revenue Service has issued a notice indicating that it and the U.S. Treasury Department are actively considering whether, among other issues, a holder of an instrument similar to the notes should be required

to accrue ordinary income on a current basis irrespective of any contingent coupons. The outcome of this process is uncertain and could apply on a retroactive basis.

Please read carefully the sections entitled “Supplemental Discussion of U.S. Federal Income Tax Consequences” in this product prospectus supplement, the section “Tax Consequences” in the accompanying prospectus and the section entitled “Certain Income Tax Consequences” in the accompanying prospectus supplement. You should consult your tax advisor about your own tax situation.

For a more complete discussion of the Canadian federal income tax consequences of investing in the notes, please see “Tax Consequences—Canadian Taxation” in the accompanying prospectus. If you are not a Non-resident Holder (as that term is defined in “Tax Consequences—Canadian Taxation” in the accompanying prospectus) or if you acquire the notes in the secondary market, you should consult your tax advisors as to the consequences of acquiring, holding and disposing of the notes and receiving the payments that might be due under the notes.

A 30% U.S. federal withholding tax will be withheld on contingent coupons paid to non-U.S. holders.

While the U.S. federal income tax treatment of the notes (including proper characterization of the contingent coupons for U.S. federal income tax purposes) is uncertain, U.S. federal income tax at a 30% rate (or at a lower rate under an applicable income tax treaty) will be withheld in respect of the contingent coupons paid to a non-U.S. holder unless such payments are effectively connected with the conduct by the non-U.S. holder of a trade or business in the U.S. (in which case, to avoid withholding, the non-U.S. holder will be required to provide a Form W-8ECI). We will not pay any additional amounts in respect of such withholding.

Please read carefully the sections entitled “Supplemental Discussion of U.S. Federal Income Tax Consequences” in this product prospectus supplement, the section “Tax Consequences” in the accompanying prospectus and the section entitled “Certain Income Tax Consequences” in the accompanying prospectus supplement. You should consult your tax advisor about your own tax situation.

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#### USE OF PROCEEDS AND HEDGING

Unless otherwise specified in the relevant pricing supplement, the net proceeds we receive from the sale of the notes will be used for general corporate purposes and, in part, by us or by one or more of our affiliates in connection with hedging our obligations under the notes. The original issue price of the notes includes each Agent's commissions (as shown on the cover page of the relevant pricing supplement) paid with respect to the notes and the estimated cost of hedging our obligations under the notes.

Unless otherwise specified in the relevant pricing supplement, the original issue price of the notes will include the reimbursement of certain issuance costs and the estimated cost of hedging our obligations under the notes. The estimated cost of hedging includes the projected profit that our affiliates expect to realize in consideration for assuming the risks inherent in hedging our obligations under the notes. Because hedging our obligations entails risk and may be influenced by market forces beyond our or our affiliates' control, the actual cost of such hedging may result in a profit that is more or less than expected, or could result in a loss. See also "Use of Proceeds" in the accompanying prospectus.

In anticipation of the sale of the notes, we expect to enter into hedging transactions with one or more of our affiliates, or with one or more of the Agents or their affiliates, involving purchases of components of the Reference Index, the equity securities or other assets held by the Reference Index and/or listed and/or over-the-counter derivative instruments linked to any of those securities or components prior to or on the trade date. From time to time, including around the time of each Observation Date and the maturity date, we, the Agents, and our other affiliates may enter into additional hedging transactions or unwind those that we or they have entered into. In this regard, we, the Agents, and our affiliates may:

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

We, the Agents, and our respective 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, the Agents, and our respective affiliates may close out our or their hedges on or before any Observation Date. That step may involve sales or purchases of components of any Reference Index or over-the-counter derivative instruments linked to the Reference Index or its components.

## GENERAL TERMS OF THE NOTES

Please note that in this section entitled “General Terms of the Notes,” references to “holders” mean those who own notes registered in their own names, on the books that we or the trustee maintain for this purpose, and not those who own beneficial interests in notes registered in street name or in notes issued in book-entry form through The Depository Trust Company (“DTC”) or another depository. Owners of beneficial interests in the notes should read the section entitled “Description of the Notes We May Offer—Legal Ownership” in the prospectus supplement and “Description of Debt Securities—Ownership and Book-Entry Issuance” in the prospectus.

### General

The contingent coupon barrier notes are senior unsecured obligations of Royal Bank of Canada that are linked to an equity index or a commodity index, or any other type of index that we may describe in the relevant pricing supplement. The notes are a series of debt securities referred to in the accompanying prospectus supplement, prospectus and the relevant pricing supplement. The notes will be issued by Royal Bank of Canada under a senior debt indenture dated as of October 23, 2003, as amended, and as it may be further amended or supplemented from time to time, between Royal Bank of Canada and The Bank of New York Mellon, as trustee.

The notes are not insured or guaranteed by the Canada Deposit Insurance Corporation, the U.S. Federal Deposit Insurance Corporation, or any other governmental agency of Canada or the United States.

The notes are our unsecured and unsubordinated debt obligations and will rank pari passu with all of our other unsecured and unsubordinated obligations.

The notes will be issued in denominations of \$1,000 and integral multiples thereof, unless otherwise specified in the relevant pricing supplement. We refer to a note in the minimum denomination of the notes as “one note.” The notes will be represented by one or more permanent global notes registered in the name of The Depository Trust Company, or DTC, or its nominee, as described under “Description of Debt Securities—Ownership and Book-Entry Issuance” and “—Considerations Relating to DTC” in the prospectus.

The specific terms of the notes will be described in the relevant pricing supplement accompanying this product prospectus supplement. The terms described in that document supplement those described in this product prospectus supplement, the accompanying prospectus and prospectus supplement. If the terms described in the relevant pricing supplement are inconsistent with those described in this product prospectus supplement, the accompanying prospectus or prospectus supplement, the terms described in the relevant pricing supplement will control.

The Coupon Payment Dates and the maturity date for the notes will be set forth in the relevant pricing supplement. If a scheduled Coupon Payment Date or the maturity date is not a business day, then such date will be postponed to the next succeeding business day following the scheduled Coupon Payment Date or maturity date, without any extra payment on account of the postponement.

### Contingent Coupon

The notes will pay a contingent coupon during the term of the notes, periodically in arrears on each Coupon Payment Date if the closing level of the Reference Index is equal to or greater than the coupon barrier on the applicable Observation Date. However, if the closing level of the Reference Index is less than the coupon barrier on the applicable Observation Date, we will not pay you the contingent coupon applicable to that Observation Date. Contingent coupon payments on the notes are not guaranteed. We will not pay you the contingent coupon for any Observation Date on which the closing level of the Reference Index is less than the coupon barrier.

Unless otherwise specified in the applicable pricing supplement, each contingent coupon will be paid to the holders of record of the notes at the close of business on the date that is one business day prior to the applicable Contingent Coupon Payment Date.

#### Payment Upon Automatic Call

The notes will be automatically called if the closing level of the Reference Index on any Observation Date is equal to or greater than the Initial Index Level. In this case, we will pay you a cash payment per note equal to your principal amount plus the contingent coupon otherwise due on the applicable Call Settlement Date under the contingent coupon feature. Following an automatic call, no further amounts will be owed to you under the notes.

#### Payment at Maturity

Unless otherwise specified in the relevant pricing supplement, if the notes are not called, we will pay you at maturity a cash payment per \$1,000 principal amount of the notes based on the Final Index Level, calculated as described below:

If the Final Index Level is above or equal to the Trigger Level (which unless otherwise specified in the relevant pricing supplement will equal the coupon barrier) on the final Observation Date, we will pay you a cash payment per note equal to the principal amount plus the contingent coupon otherwise due on the maturity date under the contingent coupon feature.

If the Final Index Level is below the Trigger Level on the final Observation Date, we will deliver to you an amount in cash that will be less than your principal amount, if anything, resulting in a loss that is proportionate to the decline of the Reference Index from the trade date to the final Observation Date, for a return equal to: principal amount x (1 + underlying return).

The repayment of your principal amount is not guaranteed. If the level of the Reference Index decreases, you may lose some or all of your investment. Specifically, if the notes are not called and the Final Index Level is below the Trigger Level on the final Observation Date, you will lose 1% (or a fraction thereof) of your principal amount for each 1% (or a fraction thereof) decrease in the level of the Reference Index below the Initial Index Level. Accordingly, if the Final Index Level is below the Trigger Level on the final Observation Date, you may lose up to 100% of your principal amount.

#### Terms Applicable to the Notes Generally

The “contingent coupon” is a fixed amount specified in the applicable pricing supplement which is applicable to each Observation Date and calculated based upon a rate per annum (the “contingent coupon rate”) specified in the applicable pricing supplement.

The “coupon barrier” is a specified level of the Reference Index that is below the Initial Index Level as set forth in the applicable pricing supplement.

The “trade date” is the day on which we price the notes for initial sale to the public and will be specified in the relevant pricing supplement.

The “settlement date” is the day on which we issue the notes for initial delivery to investors and will be specified in the relevant pricing supplement.

Unless otherwise set forth in the applicable pricing supplement, the closing level for any Reference Index on any trading day will equal the closing level of the Reference Index or any successor index thereto published following the regular official weekday close of trading on that trading day.

Unless otherwise specified in the relevant pricing supplement, a “trading day” is a day, on which the principal trading market for the Reference Index to which your notes are lined is open for trading.

Unless otherwise specified in the relevant pricing supplement, the “underlying return,” as calculated by the calculation agent, is the percentage change in the closing level of the Reference Index calculated by comparing the Final Index Level to the Initial Index Level. The relevant pricing supplement will specify the manner in which the Initial Index Level and the Final Index Level are determined. The underlying return, unless otherwise specified in the relevant pricing supplement, is calculated as follows:

$$\text{Underlying Return} = \frac{\text{Final Index Level} - \text{Initial Index Level}}{\text{Initial Index Level}}$$

Unless otherwise specified in the relevant pricing supplement, the “Initial Index Level” means the closing level of the Reference Index on the trade date or such other date as specified in the relevant pricing supplement.

Unless otherwise specified in the relevant pricing supplement, “Final Index Level” means the closing level of the Reference Index on the final Observation Date.

The “Trigger Level” is a specified price of the Reference Index that is below the Initial Index Level as set forth in the applicable pricing supplement. Unless otherwise specified in the relevant pricing supplement, the Trigger Level will equal the coupon barrier.

The Observation Date(s) will be specified in the relevant pricing supplement, and each such date is subject to adjustment as described below. If an Observation Date is not a trading day or if there is a market disruption event on that day, the applicable Observation Date will be postponed to the immediately succeeding trading day during which no market disruption event shall have occurred or be continuing. In no event, however, will any Observation Date be postponed more than ten business days following the date originally scheduled to be that Observation Date. If the tenth business day following the date originally scheduled to be the applicable Observation Date is not a trading day, or if there is a market disruption event on that date, the calculation agent will determine the closing price for that Observation Date on such date in accordance with the calculation agent’s good faith estimate of the closing price that would have prevailed but for such suspension or limitation or non-trading day.

The maturity date will be specified in the relevant pricing supplement and is subject to adjustment as described below. If not previously called, the notes will mature on the maturity date. If the scheduled maturity date (as specified in the relevant pricing supplement) is not a business day, then the maturity date will be the next succeeding business day following the scheduled maturity date, without any extra payment on account of the postponement. If, due to a market disruption event or otherwise, the final Observation Date is postponed so that it falls less than three business days prior to the scheduled maturity date, the maturity date will be the third business day following the final Observation Date, as postponed, unless otherwise specified in the relevant pricing supplement. We describe market disruption events under “—Market Disruption Events” below.

Unless otherwise specified in the relevant pricing supplement, if the notes are called on any Observation Date (other than the final Observation Date), the Call Settlement Date will be three business days following such Observation Date, unless that day is not a business day, in which case the Call Settlement Date will be the next following business day. If the notes are called on the final Observation Date, the Call Settlement Date will be the maturity date. As described above, the calculation agent may postpone any Observation Date, and therefore a Call Settlement Date (by the same number of business days), if a market disruption event occurs or is continuing on a day that would otherwise be an Observation Date. We describe market disruption events under “—Market Disruption Events” below.

We will irrevocably deposit with DTC no later than the opening of business on the applicable date funds sufficient to make payments of the amount payable, if any, with respect to the notes on such date. We will give DTC irrevocable instructions and authority to pay such amount to the holders of the notes entitled thereto.

A “business day” is, unless otherwise specified in the relevant pricing supplement, any day other than a day on which banking institutions in The City of New York are authorized or required by law, regulation or executive order to close or a day on which transactions in dollars are not conducted.

Subject to the foregoing and to applicable law (including, without limitation, U.S. federal laws), we or our affiliates may, at any time and from time to time, purchase outstanding notes by tender, in the open market or by private agreement.

#### Calculation Agent

RBC Capital Markets, LLC will act as the calculation agent. The calculation agent will determine, among other things, the closing level of the Reference Index on each Observation Date; whether the contingent coupon is payable; whether the notes are called; the Final Index Level, the underlying return, and the amount, if any, that we will pay you at maturity. In addition, the calculation agent will determine whether there has been a market disruption event as to the Reference Index. All determinations made by the calculation agent will be at the sole discretion of the calculation agent and will, in the absence of manifest error, be conclusive for all purposes and binding on you and on us. We may appoint a different calculation agent from time to time after the date of the relevant pricing supplement without your consent and without notifying you.

All calculations with respect to the closing level of the Reference Index, the Final Index Level, or the underlying return will be rounded to the nearest one ten-thousandth, with five one-hundred-thousandth rounded upward (e.g., .87645 would be rounded to .8765); all dollar amounts related to determination of the payment per \$1,000 in principal amount of the notes on any Observation Date or at maturity, if any, will be rounded to the nearest one ten-thousandth, with five one hundred-thousandths rounded upward (e.g., .76545 would be rounded up to .7655); and all dollar amounts paid, if any, on the aggregate principal amount of notes per holder will be rounded to the nearest cent, with one-half cent rounded upward.

#### Unavailability of the Level of a Reference Index

If the Index Sponsor discontinues publication of an index comprising part of the Reference Asset and the Index 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 the Reference Asset for all purposes, including for purposes of determining whether a market disruption event exists with respect to that index.

If any Index Sponsor discontinues publication of an index comprising a part of the Reference Asset 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 the Reference Asset for the relevant date in accordance with the formula for and method of calculating the 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 the 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 the index. Notwithstanding these alternative arrangements, discontinuance of the publication of an index comprising a part of the Reference Asset may adversely affect the value of your notes.

If at any time the method of calculating a closing level for an index comprising a part of the Reference Asset or a successor index is changed in a material respect, or if the index is in any other way modified so that the index does not, in the opinion of the calculation agent, fairly represent the level of the index 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 that index as if those changes or modifications had not been made. Accordingly, if the method of calculating the index is modified so that the value of that index is a fraction of what it would have been if it had not been modified (e.g., due to a split

in the index), then the calculation agent will adjust the index in order to arrive at a value of that index as if it had not been modified (e.g., as if such split had not occurred).

Notwithstanding these alternative arrangements, discontinuance of the publication of an index comprising part of the Reference Asset may adversely affect the value of your notes.

#### Adjustments Relating to Notes Linked to a Basket

If the calculation agent substitutes a successor index, or otherwise affects or modifies a Basket Component, then the calculation agent will make those calculations and adjustments as, in judgment of the calculation agent, may be necessary in order to arrive at a basket comparable to the original Basket (including without limitation changing the percentage weights of the Basket Components), as if those changes or modifications had not been made, and will calculate the payments on the notes with reference to that basket or the successor basket (as described below), as adjusted.

In this event, the calculation agent will provide written notice to the trustee of these calculations and adjustments, 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.

In the event of the adjustment described above, the newly composed basket is referred to in this section as the “successor basket” and will be used as a substitute for the original Basket for all purposes.

If the calculation agent determines that the available successor basket or basket components as described above do not fairly represent the value of the original Basket or Basket Components, as the case may be, then the calculation agent will determine the level of the applicable Basket Components or the Basket level for any applicable trading day as described above.

Notwithstanding these alternative arrangements, discontinuance of trading on the applicable exchanges or markets in any Basket Component may adversely affect the market value of the notes.

#### Market Disruption Events

Certain events may prevent the calculation agent from calculating the closing level of the Reference Index on any Observation Date, and consequently, determining whether the contingent coupon will be paid, or whether the notes are subject to an automatic call, or determining the underlying return, or calculating the amount, if any, that we will pay to you at maturity. These events may include disruptions or suspensions of trading on the markets as a whole. We refer to each of these events individually as a “market disruption event.”

#### Reference Indices that Are Equity Indices

A “market disruption event” with respect to a Reference Index that measures the performance of equity securities means any event, circumstance or cause which Royal Bank of Canada determines, and the calculation agent confirms, has or will have a material adverse effect on the ability of Royal Bank of Canada to perform its obligations under the notes or to hedge its position in respect of its 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 Reference Index:

- a suspension, absence or limitation of trading in index components constituting 20% or more, by weight, of that index;
- a suspension, absence or limitation of trading in futures or options contracts relating to that 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 that index, or (ii) effect transactions in, or obtain market values for, futures or options contracts relating to that index on their respective markets;

the closure on any day of the primary market for futures or options contracts relating to that index or index components constituting 20% or more, by weight, of that index 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 that index or (ii) the exchanges or quotation systems, if any, on which futures or options contracts on that index 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 as described above under “Use of Proceeds and Hedging” in this product prospectus supplement.

#### Reference Indices that Are Commodity Indices

A “market disruption event” with respect to a Reference Index that measures the performance of commodities means any event, circumstance or cause which Royal Bank of Canada determines, and the calculation agent confirms, has or will have a material adverse effect on the ability of Royal Bank to perform its obligations under the notes or to hedge its position in respect of its 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 any Reference Index:

a suspension, absence or material limitation of trading in a material number of the commodities underlying the index for more than two hours or during the one-half hour before the close of trading in that market, as determined by the calculation agent in its sole discretion;

a suspension, absence or material limitation of trading in option or futures contracts relating to the commodities underlying the index, or a material number of the commodities underlying the index, in the primary market for those contracts for more than two hours of trading or during the one-half hour before the close of trading in that market, as determined by the calculation agent in its sole discretion;

one or more of the commodities indices is not published, as determined by the calculation agent in its sole discretion;

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 as described below under “Use of Proceeds and Hedging” in this product prospectus supplement.

#### Payment of Additional Amounts

We will pay any amounts to be paid by us on the notes without deduction or withholding for, or on account of, any and all present or future income, stamp and other taxes, levies, imposts, duties, charges, fees, deductions, or withholdings (“taxes”) now or hereafter imposed, levied, collected, withheld, or assessed by or on behalf of Canada or any Canadian political subdivision or authority that has the power to tax, unless the deduction or withholding is required by law or by the interpretation or administration thereof by the relevant governmental authority. At any time a Canadian taxing jurisdiction requires us to deduct or withhold for or on account of taxes from any payment made under or in respect of the notes, we will pay such additional amounts (“Additional Amounts”) as may be necessary so that the net amounts received by each holder (including Additional Amounts), after such deduction or withholding, shall not be less than the amount the holder would have received had no such deduction or withholding been required.

However, no Additional Amounts will be payable with respect to a payment made to a holder of a note or of a right to receive payments in respect thereto (a "Payment Recipient"), which we refer to as an "Excluded Holder," in respect of a beneficial owner or Payment Recipient:

- (i) with whom we do not deal at arm's length (within the meaning of the Income Tax Act (Canada)) at the time of making such payment;
  - who is subject to such taxes by reason of the holder being connected presently or formerly with Canada or any
- (ii) province or territory thereof otherwise than by reason of the holder's activity in connection with purchasing the notes, the holding of the notes or the receipt of payments thereunder;
  - who is, or who does not deal at arm's length with a person who is, a "specified shareholder" (within the meaning of subsection 18(5) of the Income Tax Act (Canada)) of Royal Bank of Canada (generally a person will be a
- (iii) "specified shareholder" for this purpose if that person, either alone or together with persons with whom the person does not deal at arm's length, owns 25% or more of (a) our voting shares, or (b) the fair market value of all of our issued and outstanding shares);
  - who presents such note for payment (where presentation is required, such as if a note is issued in definitive form)
- (iv) more than 30 days after the relevant date; for this purpose, the "relevant date" in relation to any payments on any note means:
  - (a) the due date for payment thereof (whether at maturity or upon an earlier acceleration), or
  - if the full amount of the monies payable on such date has not been received by the Trustee on or prior to such due
  - (b) date, the date on which the full amount of such monies has been received and notice to that effect is given to holders of the notes in accordance with the Indenture;
    - who could lawfully avoid (but has not so avoided) such withholding or deduction by complying, or procuring that any third party comply, with any statutory requirements necessary to establish qualification for an exemption from
  - (v) withholding or by making, or procuring that any third party make, a declaration of non-residence or other similar claim for exemption to any relevant tax authority; or
    - who is subject to deduction or withholding on account of any tax, assessment, or other governmental charge that is imposed or withheld by reason of the application of Section 1471 through 1474 of the United States Internal
  - (vi) Revenue Code of 1986, as amended (the "Code") (or any successor provisions), any regulation, pronouncement, or agreement thereunder, official interpretations thereof, or any law implementing an intergovernmental approach thereto, whether currently in effect or as published and amended from time to time.

For purposes of clause (iii) above, if a note is presented for payment more than 30 days after the relevant date, we shall only be required to pay such Additional Amounts as shall have accrued as of such 30th day, and no further Additional Amounts shall accrue or become payable after such date.

For the avoidance of doubt, we will not have any obligation to pay any holders Additional Amounts on any tax which is payable otherwise than by deduction or withholding from payments made under or in respect of the notes.

We will also make such withholding or deduction and remit the full amount deducted or withheld to the relevant authority in accordance with applicable law. We will furnish to the trustee, within 30 days after the date the payment of any taxes is due pursuant to applicable law, certified copies of tax receipts evidencing that such payment has been made or other evidence of such payment satisfactory to the trustee. We will indemnify and hold harmless each holder of the notes (other than an Excluded Holder) and upon written request reimburse each such holder for the amount of (x) any taxes so levied or imposed and paid by such holder as a result of payments made under or with respect to the notes and (y) any taxes levied or imposed and paid by such holder with respect to any reimbursement under (x) above, but excluding any such taxes on such holder's net income or capital.

For additional information, see the section entitled "Supplemental Discussion of Canadian Tax Consequences."

#### Events of Default

Under the heading “Description of Debt Securities—Events of Default” in the accompanying prospectus is a description of events of default relating to debt securities including the notes.

#### Payment upon an Event of Default

Unless otherwise specified in the relevant pricing supplement, in case an event of default with respect to the notes shall have occurred and be continuing, the amount declared due and payable per \$1,000 in principal amount of the notes upon any acceleration of the notes will be determined by the calculation agent and will be an amount in cash equal to the amount payable at maturity per \$1,000 in principal amount of the notes as described under the caption “—Payment at Maturity,” calculated as if the date of acceleration were the final Observation Date.

If the maturity of the notes is accelerated because of an event of default as described above, we will, or will cause the calculation agent to, provide written notice to the trustee at its New York office, on which notice the trustee may conclusively rely, and to DTC of the cash amount due with respect to the notes as promptly as possible and in no event later than two business days after the date of acceleration.

#### Modification

Under the heading “Description of Debt Securities—Modification and Waiver of the Debt notes” in the accompanying prospectus is a description of when the consent of each affected holder of debt securities is required to modify the senior indenture.

#### Modified Business Day

As described in the accompanying prospectus, any payments on your notes that would otherwise be due on a day that is not a business day may instead be paid on the next day that is a business day, with the same effect as if paid on the original due date. For your notes, however, the term business day may have a different meaning than it does for other Series H medium-term notes. We discuss this term under “—Terms Applicable to the Notes Generally” above.

#### Defeasance

The provisions described in the accompanying prospectus under the heading “Description of Debt Securities—Defeasance” are not applicable to the notes.

#### Listing

The notes will not be listed on any securities exchange, unless otherwise specified in the relevant pricing supplement.

#### Book-Entry Only Issuance — The Depository Trust Company

DTC will act as securities depository for the notes. The notes will be issued only as fully-registered securities registered in the name of Cede & Co. (DTC’s nominee). One or more fully-registered global note certificates, representing the total aggregate principal amount of the notes, will be issued and will be deposited with DTC. See the descriptions contained in the accompanying prospectus under the headings “Description of Debt Securities—Ownership and Book-Entry Issuance” and “—Considerations Relating to DTC.”

#### Registrar, Transfer Agent and Paying Agent

Payment of amounts due at maturity or upon automatic call on the notes will be payable and the transfer of the notes will be registrable at the principal corporate trust office of The Bank of New York Mellon in The City of New York. The Bank of New York Mellon or one of its affiliates will act as registrar and transfer agent for the notes. The Bank of New York Mellon will also act as paying agent and may designate additional paying agents.

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Registration of transfers of the notes will be effected without charge by or on behalf of The Bank of New York Mellon, but upon payment (with the giving of such indemnity as The Bank of New York Mellon may require) in respect of any tax or other governmental charges that may be imposed in relation to it.

Governing Law

The notes will be governed by and interpreted in accordance with the laws of the State of New York.

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**HISTORICAL REFERENCE INDEX LEVEL INFORMATION**

We will provide historical level information on the Reference Index in the relevant pricing supplement. You should not take any of those historical levels as an indication of their future performance. We cannot give you any assurance that the levels of the Reference Index will not decrease, thus causing you to receive an amount of cash that is less than the principal amount of your notes at maturity.

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**SUPPLEMENTAL DISCUSSION OF CANADIAN FEDERAL INCOME TAX CONSEQUENCES**

An investor should read carefully the description of material Canadian federal income tax considerations relevant to a Non-resident Holder owning debt securities under “Tax Consequences—Canadian Taxation” in the accompanying prospectus.

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

The following is a general description of the material U.S. tax considerations relating to the notes. It does not purport to be a complete analysis of all tax considerations relating to the notes. Prospective purchasers of the notes should consult their tax advisors as to the consequences under the tax laws of the country of which they are resident for tax purposes and the tax laws of Canada and the U.S. of acquiring, holding and disposing of the notes and receiving payments under the notes. This summary is based upon the law as in effect on the date of this product prospectus supplement and is subject to any change in law that may take effect after such date.

### Supplemental U.S. Tax Considerations

The following disclosure—including the opinion of Morrison & Foerster LLP—has been prepared without regard to any particular note that you may purchase in the future and, therefore, is provided solely as a matter of general information. You should not rely upon the following disclosure (including the opinion of Morrison & Foerster LLP), or the disclosure under “Tax Consequences—United States Taxation” in the Prospectus or “Certain Income Tax Consequences—United States Taxation” in the prospectus supplement, with regard to an investment in any particular note because this disclosure (including the opinion of Morrison & Foerster LLP) does not take into account the terms of any particular note or the tax consequences of investing in or holding any particular note unless the pricing supplement applicable to your notes expressly indicates that you may rely on the following disclosure and expressly states that you may rely on the opinion of Morrison & Foerster LLP. Any note that you purchase may have terms that would result in a tax treatment that is significantly different from the treatment described below. For example, the discussion below assumes that an investor in the notes will be subject to a significant risk that it will lose a significant amount of its investment in the notes. If an investor in the notes is not subject to a significant risk that it will lose a significant amount of its investment in the notes, the tax treatment of that note may differ substantially from that described in the discussion below. There may be other features or terms of your notes that will cause this tax section to be inapplicable to your notes. Further, this discussion does not address the tax consequences applicable to any holders under Section 451(b) of the Code.

Consequently, any tax disclosure relevant to any note you may purchase will be set forth only in the pricing supplement relating to your note, and, unless the pricing supplement indicates otherwise, you should not rely on the tax disclosure below or in the prospectus supplement or prospectus in deciding whether to invest in any note. Moreover, in all cases, you should consult with your own tax advisor concerning the consequences of investing in and holding any particular note you propose to purchase.

The following section supplements the discussion of U.S. federal income taxation in the accompanying prospectus and prospectus supplement. It applies only to initial holders who are not excluded from the discussion of U.S. federal income taxation in the accompanying prospectus.

**NO STATUTORY, JUDICIAL OR ADMINISTRATIVE AUTHORITY DIRECTLY DISCUSSES HOW THE NOTES SHOULD BE TREATED FOR U.S. FEDERAL INCOME TAX PURPOSES. AS A RESULT, THE U.S. FEDERAL INCOME TAX CONSEQUENCES OF AN INVESTMENT IN THE NOTES ARE UNCERTAIN. BECAUSE OF THE UNCERTAINTY, YOU SHOULD CONSULT YOUR TAX ADVISOR IN DETERMINING THE U.S. FEDERAL INCOME TAX AND OTHER TAX CONSEQUENCES OF YOUR INVESTMENT IN THE NOTES, INCLUDING THE APPLICATION OF STATE, LOCAL OR OTHER TAX LAWS AND THE POSSIBLE EFFECTS OF CHANGES IN FEDERAL OR OTHER TAX LAWS.**

We will not attempt to ascertain whether any of the entities whose stock is included in the Reference Index would be treated as a “passive foreign investment company” within the meaning of Section 1297 of the Code or a “U.S. real property holding corporation” within the meaning of Section 897 of the Code. If any of the entities whose stock is included in the Reference Index were so treated, certain adverse U.S. federal income tax consequences could possibly apply to a holder. You should refer to any available information filed with the SEC and other authorities by the entities whose stock is included in the Reference Index and consult your tax advisor regarding the possible consequences to you in this regard, if any.

In the opinion of our counsel, Morrison & Foerster LLP, it would generally be reasonable to treat a note with terms described in this product prospectus supplement as a callable pre-paid cash-settled contingent income-

bearing derivative contract linked to the Reference Index for U.S. federal income tax purposes, and the terms of the notes require a holder and us (in the absence of a change in law or an administrative or judicial ruling to the contrary) to treat the notes for all tax purposes in accordance with such characterization. In addition, we intend to treat the contingent coupons as U.S. source income for U.S. federal income tax purposes. The following discussion assumes that the treatment described in this paragraph is proper and will be respected.

Although the U.S. federal income tax treatment of the contingent coupons is uncertain, we intend to take the position, and the following discussion assumes, that such contingent coupons (including any coupon paid on or with respect to the call or maturity date) constitute taxable ordinary income to a U.S. holder at the time received or accrued in accordance with the holder's regular method of accounting. If the notes are treated as described above, a U.S. holder should generally recognize capital gain or loss upon the call, sale or maturity of the notes in an amount equal to the difference between the cash amount a holder receives at such time (other than amounts properly attributable to any contingent coupon, which would be taxed, as described above, as ordinary income) and the holder's tax basis in the notes. In general, a U.S. holder's tax basis in the notes will be equal to the price the holder paid for the notes. Capital gain recognized by an individual U.S. holder is generally taxed at preferential rates where the property is held for more than one year and is generally taxed at ordinary income rates where the property is held for one year or less. The ordinary income treatment of the contingent coupons, in conjunction with the capital loss treatment of any loss recognized upon the sale or maturity of the notes, could result in adverse tax consequences to a holder because the deductibility of capital losses is subject to limitations. The holding period for notes of a U.S. holder who acquires the notes upon issuance will generally begin on the date after the issue date (i.e., the settlement date) of the notes. If the notes are held by the same U.S. holder until maturity, that holder's holding period will generally include the maturity date. It is possible that the Internal Revenue Service could assert that a U.S. holder's holding period in respect of the notes should end on the date on which the amount the holder is entitled to receive upon the call or maturity of the notes is determined, even though the holder will not receive any amounts from the issuer in respect of the notes prior to the call or maturity of the notes. In such case, if that date is not in excess of one year from the issue date, a U.S. holder may be treated as having a holding period in respect of the notes that is one year or less even if the holder receives cash upon the call or maturity of the notes at a time that is more than one year after the beginning of its holding period.

**Alternative Treatments.** Alternative tax treatments of the notes are also possible and the Internal Revenue Service might assert that a treatment other than that described above is more appropriate. For example, it is possible to treat the notes, and the Internal Revenue Service might assert that the notes should be treated, as a single debt instrument. If the notes have a term that exceeds one year, such a debt instrument would be subject to the special tax rules governing contingent payment debt instruments. If the notes are so treated, a holder would generally be required to accrue interest currently over the term of the notes irrespective of the amount of contingent coupons, if any, made on the notes. In addition, any gain a holder might recognize upon the call, sale or maturity of the notes would generally be ordinary income and any loss recognized by a holder at such time would be ordinary loss to the extent of interest that same holder included in income in the current or previous taxable years in respect of the notes, and thereafter, would be capital loss. If the notes are treated as a single debt instrument that has a term of no more than one year, the notes would be treated as a single contingent short-term debt instrument, which would also result in tax consequences that are different from those described above.

If the applicable Reference Index includes a commodity futures contract or an index that tracks the value of commodity futures contracts, it is possible that the Internal Revenue Service could assert that Section 1256 of the Code should apply to your notes or a portion of your notes. If Section 1256 of the Internal Revenue Code were to apply to your notes, gain or loss recognized with respect to your notes (or the relevant portion of your notes) would be treated as 60% long-term capital gain or loss and 40% short-term capital gain or loss, without regard to your holding period in the notes. You would also be required to mark your notes (or a portion of your notes) to market at the end of each year (i.e., recognize gain or loss as if the notes or the relevant portion of the notes had been sold for fair market value).

Because of the absence of authority regarding the appropriate tax characterization of the notes, it is also possible that the Internal Revenue Service could seek to characterize the notes in a manner that results in other tax consequences that are different from those described above. For example, the Internal Revenue Service could possibly assert that any gain or loss that a holder may recognize upon the call, sale or maturity of the notes should be treated as ordinary

gain or loss.

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The Internal Revenue Service has released a notice that may affect the taxation of holders of the notes. According to the notice, the Internal Revenue Service and the U.S. Treasury Department are actively considering whether the holder of an instrument similar to the notes should be required to accrue ordinary income on a current basis irrespective of any contingent coupons. It is not possible to determine what guidance they will ultimately issue, if any. It is possible, however, that under such guidance, holders of the notes will ultimately be required to accrue income currently and this could be applied on a retroactive basis. The Internal Revenue Service and the U.S. Treasury Department are also considering other relevant issues, including whether additional gain or loss from such instruments should be treated as ordinary or capital and whether the special “constructive ownership rules” of Section 1260 of the Code, which generally operate to recharacterize certain long-term capital gains as ordinary income and impose an interest charge, might be applied to such instruments. Holders are urged to consult their tax advisors concerning the significance, and the potential impact, of the above considerations. Unless stated otherwise in the applicable pricing supplement, we intend to treat the notes for U.S. federal income tax purposes in accordance with the treatment described in this product prospectus supplement unless and until such time as the U.S. Treasury Department and Internal Revenue Service determine that some other treatment is more appropriate.

**Backup Withholding and Information Reporting.** Payments made with respect to the notes and proceeds from the sale or maturity of the notes may be subject to a backup withholding tax unless, in general, the holder complies with certain procedures or is an exempt recipient. Any amounts so withheld generally will be refunded by the Internal Revenue Service or allowed as a credit against the holder's U.S. federal income tax liability, provided the holder makes a timely filing of an appropriate tax return or refund claim to the Internal Revenue Service.

Reports will be made to the Internal Revenue Service and to holders that are not exempted from the reporting requirements.

**Non-U.S. Holders.** The following discussion applies to non-U.S. holders of the notes. A non-U.S. holder is a beneficial owner of a note that, for U.S. federal income tax purposes, is a non-resident alien individual, a foreign corporation, or a foreign estate or trust.

While the U.S. federal income tax treatment of the notes (including proper characterization of the contingent coupons for U.S. federal income tax purposes) is uncertain, U.S. federal income tax at a 30% rate (or at a lower rate under an applicable income tax treaty) will be withheld in respect of the contingent coupons paid to a non-U.S. holder unless such payments are effectively connected with the conduct by the non-U.S. holder of a trade or business in the U.S. (in which case, to avoid withholding, the non-U.S. holder will be required to provide a Form W-8ECI). We will not pay any additional amounts in respect of such withholding. To claim benefits under an income tax treaty, a non-U.S. holder must obtain a taxpayer identification number and certify as to its eligibility under the appropriate treaty's limitations on benefits article, if applicable (which certification may generally be made on a Form W-8BEN or W-8BEN-E, or a substitute or successor form). In addition, special rules may apply to claims for treaty benefits made by corporate non-U.S. holders. A non-U.S. holder that is eligible for a reduced rate of U.S. federal withholding tax pursuant to an income tax treaty may obtain a refund of any excess amounts withheld by filing an appropriate claim for refund with the Internal Revenue Service. The availability of a lower rate of withholding or an exemption from withholding under an applicable income tax treaty will depend on the proper characterization of the contingent coupons under U.S. federal income tax laws and whether such treaty rate or exemption applies to such contingent coupon payments. No assurance can be provided on the proper characterization of the contingent coupons for U.S. federal income tax purposes and, accordingly, no assurance can be provided on the availability of benefits under any income tax treaty. Non-U.S. holders should consult their tax advisors in this regard.

Except as discussed below, a non-U.S. holder will generally not be subject to U.S. federal income or withholding tax on any gain (not including for the avoidance of doubt any amounts properly attributable to any contingent coupon which would be subject to the rules discussed in the previous paragraph) upon the call, sale or maturity of the notes, provided that (i) the holder complies with any applicable certification requirements (which certification may generally be made on a Form W-8BEN or W-8BEN-E, or a substitute or successor form), (ii) the payment is not effectively connected with the conduct by the holder of a U.S. trade or business, and (iii) if the holder is a non-resident alien individual, such holder is not present in the U.S. for 183 days or more during the taxable year of the call, sale or maturity of the notes. In the case of (ii) above, the holder generally would be subject to U.S. federal income tax with respect to any income or gain in the same manner as if the holder were a U.S. holder and, in



the case of a holder that is a corporation, the holder may also be subject to a branch profits tax equal to 30% (or such lower rate provided by an applicable U.S. income tax treaty) of a portion of its earnings and profits for the taxable year that are effectively connected with its conduct of a trade or business in the U.S., subject to certain adjustments. Payments made to a non-U.S. holder may be subject to information reporting and to backup withholding unless the holder complies with applicable certification and identification requirements as to its foreign status.

A “dividend equivalent” payment is treated as a dividend from sources within the United States and 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, 2019. Accordingly, if the notes are not delta-one instruments and are issued before January 1, 2019, 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 Underlying or the notes (for example, upon a Reference Index 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 Underlying or the notes should consult their tax advisors as to the application of the dividend equivalent withholding tax in the context of the securities and their other transactions. If any payments are treated as dividend equivalents subject to withholding, we (or the applicable paying agent) would be entitled to withhold taxes without being required to pay any additional amounts with respect to amounts so withheld.

As discussed above, alternative characterizations of the notes for U.S. federal income tax purposes are possible. Should an alternative characterization, by reason of change or clarification of the law, by regulation or otherwise, cause payments as to the notes to become subject to withholding tax in addition to the withholding tax described above, we will withhold tax at the applicable statutory rate. The Internal Revenue Service has also indicated that it is considering whether income in respect of instruments such as the notes should be subject to withholding tax. We will not be required to pay any additional amounts in respect of such withholding. Prospective investors should consult their own tax advisors in this regard.

**Foreign Account Tax Compliance Act.** The Foreign Account Tax Compliance Act (“FATCA”) imposes a 30% U.S. withholding tax on certain U.S. source payments, including interest (and original issue discount), dividends, other fixed or determinable annual or periodical gain, profits, and income, and on the gross proceeds from a disposition of property of a type which can produce U.S. source interest or dividends (“Withholdable Payments”), if paid to a foreign financial institution (including amounts paid to a foreign financial institution on behalf of a holder), unless such institution enters into an agreement with the U.S. Treasury Department to collect and provide to the U.S. Treasury Department certain information regarding U.S. financial account holders, including certain account holders that are foreign entities with U.S. owners, with such institution or otherwise complies with FATCA. In addition, the notes may constitute a “financial account” for these purposes and thus, be subject to information reporting requirements pursuant to FATCA. FATCA also generally imposes a withholding tax of 30% on Withholdable Payments made to a non-financial foreign entity unless such entity provides the withholding agent with a certification that it does not have any substantial U.S. owners or a certification identifying the direct and indirect substantial U.S. owners of the entity. Under certain circumstances, a holder may be eligible for refunds or credits of such taxes.

The U.S. Treasury Department and the IRS have announced that withholding on payments of gross proceeds from a sale or redemption of the notes will only apply to payments made after December 31, 2018. If we determine withholding is appropriate with respect to the notes, we will withhold tax at the applicable statutory rate, and we will not pay any additional amounts in respect of such withholding. Foreign financial institutions and non-financial foreign entities located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules. Prospective investors are urged to consult with their own tax advisors regarding the possible implications of FATCA on their investment in the notes.



#### SUPPLEMENTAL PLAN OF DISTRIBUTION

With respect to each note to be issued, Royal Bank will agree to sell to RBC Capital Markets, LLC, and RBC Capital Markets, LLC will agree to purchase from Royal Bank, the principal amount of the note specified, at the price specified under “Net proceeds to the issuer,” in the relevant pricing supplement. RBC Capital Markets, LLC intends to resell each note it purchases at the original issue price specified in the relevant pricing supplement. In the future, RBC Capital Markets, LLC or one of our other affiliates may repurchase and resell the notes in market-making transactions, with resales being made at prices related to prevailing market prices at the time of resale or at negotiated prices. For more information about the plan of distribution, the distribution agreement and possible market-making activities, see “Supplemental Plan of Distribution” in the accompanying prospectus supplement.

No Prospectus (as defined in Directive 2003/71/EC (as amended, the “Prospectus Directive”)) will be prepared in connection with these notes. Accordingly, these notes may not be offered to the public in any member state of the European Economic Area (the “EEA”), and any purchaser of these notes who subsequently sells any of these notes in any EEA member state must do so only in accordance with the requirements of the Prospectus Directive, as implemented in that member state.

The notes are not intended to be offered, sold or otherwise made available to, and should not be offered, sold or otherwise made available to, any retail investor in the EEA. For these purposes, the expression “offer” includes the communication in any form and by any means of sufficient information on the terms of the offer and the notes to be offered so as to enable an investor to decide to purchase or subscribe the notes, and a “retail investor” means a person who is one (or more) of: (a) a retail client, as defined in point (11) of Article 4(1) of Directive 2014/65/EU (as amended, “MiFID II”); or (b) a customer, within the meaning of Insurance Distribution Directive 2016/97/EU, as amended, where that customer would not qualify as a professional client as defined in point (10) of Article 4(1) of MiFID II; or (c) not a qualified investor as defined in the Prospectus Directive. Consequently, no key information document required by Regulation (EU) No 1286/2014 (as amended, the “PRIIPs Regulation”) for offering or selling the notes or otherwise making them available to retail investors in the EEA has been prepared, and therefore, offering or selling the notes or otherwise making them available to any retail investor in the EEA may be unlawful under the PRIIPs Regulation.

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#### EMPLOYEE RETIREMENT INCOME SECURITY ACT

This section is only relevant to you if you are an insurance company or the fiduciary of a pension plan or an employee benefit plan (including a governmental plan, an IRA or a Keogh Plan) proposing to invest in the notes.

The Employee Retirement Income Security Act of 1974, as amended (“ERISA”), imposes certain requirements on “employee benefit plans” (as defined in Section 3(3) of ERISA) subject to ERISA, including entities such as collective investment funds and separate accounts whose underlying assets include the assets of such plans (collectively, “ERISA Plans”) and on those persons who are fiduciaries with respect to ERISA Plans. Each fiduciary of an ERISA Plan should consider the fiduciary standards of ERISA in the context of the ERISA Plan’s particular circumstances before authorizing an investment in the covered bonds. Accordingly, among other factors, the fiduciary should consider whether the investment would satisfy the prudence and diversification requirements of ERISA and would be consistent with the documents and instruments governing the ERISA Plan.

In addition, Section 406 of ERISA and Section 4975 of the Internal Revenue Code prohibit certain transactions involving the assets of an ERISA Plan, as well as those plans that are not subject to ERISA but which are subject to Section 4975 of the Internal Revenue Code, such as individual retirement accounts, including entities whose underlying assets include the assets of such plans (together with ERISA Plans, “Plans”) and certain persons (referred to as “parties in interest” or “disqualified persons”) having certain relationships to such Plans, unless a statutory or administrative exemption is applicable to the transaction. Governmental plans may be subject to similar prohibitions. Therefore, a plan fiduciary considering purchasing notes should consider whether the purchase or holding of such instruments might constitute a “prohibited transaction.”

Royal Bank and certain of its affiliates each may be considered a “party in interest” or a “disqualified person” with respect to many employee benefit plans by reason of, for example, Royal Bank (or its affiliate) providing services to such plans. Prohibited transactions within the meaning of ERISA or the Internal Revenue Code may arise, for example, if notes are acquired by or with the assets of a Plan, and with respect to which Royal Bank or any of its affiliates is a “party in interest” or a “disqualified person,” unless those notes are acquired under an exemption for transactions effected on behalf of that Plan by a “qualified professional asset manager” or an “in-house asset manager,” for transactions involving insurance company general accounts, for transactions involving insurance company pooled separate accounts, for transactions involving bank collective investment funds, or under another available exemption. Section 408(b)(17) provides an additional exemption for the purchase and sale of securities and related lending transactions where neither the issuer of the securities nor any of its affiliates have or exercise any discretionary authority or control or render any investment advice with respect to the assets of any Plan involved in the transaction and the Plan pays no more than “adequate consideration” in connection with the transaction. The person making the decision on behalf of a Plan or a governmental plan shall be deemed, on behalf of itself and any such plan, by purchasing and holding the notes, or exercising any rights related thereto, to represent that (a) such purchase, holding and exercise of the notes will not result in a non-exempt prohibited transaction under ERISA or the Internal Revenue Code (or, with respect to a governmental plan, under any similar applicable law or regulation) and (b) neither Royal Bank nor any of its affiliates is a “fiduciary” (within the meaning of Section 3(21) of ERISA) with respect to the purchaser or holder in connection with such person’s acquisition, disposition or holding of the notes, or any exercise related thereto or as a result of any exercise by Royal Bank or any of its affiliates of any rights in connection with the notes, and no advice provided by Royal Bank or any of its affiliates has formed a primary basis for any investment decision by or on behalf of such purchaser or holder in connection with the notes and the transactions contemplated with respect to the notes.

If you are an insurance company or the fiduciary of a pension plan or an employee benefit plan, and propose to invest in the notes, you should consult your legal counsel.