

ROYAL BANK OF CANADA  
Form 424B2  
December 01, 2017

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November 2017  
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Registration Statement No. 333-208507  
PRICING SUPPLEMENT  
Dated November 30, 2017  
Filed Pursuant to Rule 424(b)(2)

## STRUCTURED INVESTMENTS

Opportunities in U.S. Equities

\$9,394,960 Dual Directional Trigger Jump Securities Based on the Performance of the S&P 500<sup>®</sup> Index, due December 5, 2022

Principal at Risk Securities

The Dual Directional Trigger Jump Securities (the “securities”) are senior unsecured obligations of Royal Bank of Canada, do not pay interest, do not guarantee any return of principal at maturity and have the terms described in the accompanying prospectus supplement and prospectus, as supplemented or modified by this document. At maturity, if the level of the underlying index has not decreased, investors will receive the stated principal amount of their investment plus a positive return equal to the greater of (1) the digital return and (2) the underlying index return. If the level of the underlying index has decreased, but not by more than 20%, investors will receive the stated principal amount plus an unleveraged positive return equal to the absolute value of the percentage decrease, which will effectively be limited to a positive return of 20%. However, if the level of the underlying index has decreased by more than 20%, investors will lose 1% of the stated principal amount for every 1% decrease in the final index level from the initial index level. These securities are for investors who seek an equity index-based return and who are willing to risk their principal and forgo current income in exchange for the potential benefit of the digital return and the unleveraged absolute return feature, which applies to a limited range of negative performance of the underlying index. Investors may lose their entire initial investment in the securities. The securities are senior notes issued as part of Royal Bank of Canada’s Global Medium-Term Notes, Series G program. All payments on the securities are subject to the credit risk of Royal Bank of Canada.

## SUMMARY TERMS

Issuer:	Royal Bank of Canada
Underlying index:	S&P 500 <sup>®</sup> Index
Aggregate principal amount:	\$9,394,960
Stated principal amount:	\$10 per security
Issue price:	\$10 per security (see “Commissions and issue price” below)
Pricing date:	November 30, 2017
Issue date:	December 5, 2017
Maturity date:	December 5, 2022
Payment at maturity:	<ul style="list-style-type: none"> <li>· If the final index level is greater than or equal to the initial index level, \$10 + the product of (a) \$10 and (b) the greater of (1) the digital return and (2) the underlying index return</li> <li>· If the final index level is less than the initial index level but is greater than or equal to the trigger level, \$10 + (\$10 × absolute index return)</li> </ul>

In this scenario, you will receive a 1% positive return on the securities for each 1% decrease in the level of the underlying index. In no event will this amount exceed the stated principal amount plus \$2.00.

· If the final index level is less than the trigger level,  
 $\$10 + (\$10 \times \text{underlying index return})$

Under these circumstances, the payment at maturity will be less than \$8.00. You will lose at least 20% and possibly all of the stated principal amount if the final index level is less than the trigger level.

Digital return:	25.75%		
Underlying index return:	$(\text{final index level} - \text{initial index level}) / \text{initial index level}$		
Absolute index return:	The absolute value of the underlying index return. For example, a -5% underlying index return will result in a +5% absolute index return		
Trigger level:	2,118.06, which is 80% of the initial index level, rounded to two decimal places		
Initial index level:	2,647.58, which was the closing level of the underlying index on the pricing date		
Final index level:	The closing level of the underlying index on the valuation date		
Valuation date:	November 30, 2022, subject to adjustment for non-trading days and certain market disruption events		
CUSIP / ISIN:	78013F578 / US78013F5787		
Listing:	The securities will not be listed on any securities exchange.		
Agent:	RBC Capital Markets, LLC (“RBCCM”). See “Supplemental Information Regarding Plan of Distribution; Conflicts of Interest.”		
Commissions and issue price:	Price to public	Agent’s commissions	Proceeds to issuer
Per security	\$10.00	\$0.30 <sup>(1)</sup>	
		\$0.05 <sup>(2)</sup>	\$9.65
Total	\$9,394,960.00	\$281,848.80 \$46,974.80	\$9,066,136.40

RBCCM, acting as agent for Royal Bank of Canada, will receive a fee of \$0.35 per \$10 stated principal amount and <sup>(1)</sup>will pay to Morgan Stanley Wealth Management (“MSWM”) a fixed sales commission of \$0.30 for each security that MSWM sells. See “Supplemental Information Regarding Plan of Distribution; Conflicts of Interest.”

<sup>(2)</sup>Of the amount per \$10 stated principal amount received by RBCCM, acting as agent for Royal Bank of Canada, RBCCM will pay MSWM a structuring fee of \$0.05 for each security.

The initial estimated value of the securities as of the pricing date is \$9.5112 per \$10.00 security, which is less than the price to public. The market value of the securities at any time will reflect many factors, cannot be predicted with accuracy, and may be less than this amount.

An investment in the securities involves certain risks. See “Risk Factors” beginning on page 6 of this document, page S-1 of the accompanying prospectus supplement and page 1 of the prospectus.

You should read this document together with the related prospectus supplement and prospectus, each of which can be accessed via the hyperlinks below, before you decide to invest.

Please also see “Additional Terms of the Securities” in this document.

Prospectus Supplement dated January 8, 2016

Prospectus dated January 8, 2016

None of the Securities and Exchange Commission, any state securities commission or any other regulatory body has approved or disapproved of the securities or passed upon the adequacy or accuracy of this document. Any representation to the contrary is a criminal offense. The securities will not constitute deposits insured by the Canada Deposit Insurance Corporation, the U.S. Federal Deposit Insurance Corporation or any other Canadian or U.S. government agency or instrumentality.

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Dual Directional Trigger Jump Securities Based on the Performance of the S&P 500<sup>®</sup> Index, due December 5, 2022  
Principal at Risk Securities

Investment Summary

Dual Directional Trigger Jump Securities

Principal at Risk Securities

The Dual Directional Trigger Jump Securities Based on the Performance of the S&P 500<sup>®</sup> Index, due December 5, 2022 (the “securities”) can be used:

As an alternative to direct exposure to the underlying index that provides a minimum positive return of 25.75% if the § underlying index has not decreased from the pricing date to the valuation date, and offers an uncapped 1-to-1 participation in any increase in the level of the underlying index if its level has increased by more than 25.75%.

§ To obtain an unleveraged positive return for a limited range of negative performance of the underlying index.

§ To enhance returns and potentially outperform the underlying index in a moderately bullish or moderately bearish § scenario.

The securities are exposed on a 1:1 basis to the full negative performance of the underlying index if the final index level is less than the trigger level.

Maturity: Approximately five years

Digital return: 25.75%

Trigger level: 80% of the initial index level

Minimum payment at maturity: None. Investors may lose their entire initial investment in the securities.

Coupon: None

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Dual Directional Trigger Jump Securities Based on the Performance of the S&P 500® Index, due December 5, 2022  
Principal at Risk Securities

Key Investment Rationale

The securities offer the potential for a positive return equal to the greater of (1) the digital return and (2) the underlying index return if the level of the underlying index does not decrease, and an unleveraged positive return equal to the absolute value of a limited range of negative performance of the underlying index. At maturity, if the level of the underlying index has not decreased, investors will receive the stated principal amount plus a positive return equal to the greater of (1) the digital return and (2) the underlying index return. If the level of the underlying index has decreased, but by no more than 20%, investors will receive the stated principal amount plus an unleveraged positive return equal to the absolute value of the percentage decrease, which will effectively be limited to a positive return of 20%. However, if the level of the underlying index has decreased by more than 20%, investors will lose 1% of the principal amount for every 1% decrease in the final index level from the initial index level. Investors may lose their entire initial investment in the securities.

Upside

Scenario Above the Digital Return  
The final index level is greater than the initial index level by more than 25.75%. In this case, the securities offer 1-to-1 uncapped participation in the increase in the level of the underlying index.

Scenario Digital Return  
The final index level is equal to the initial index level or is greater than the initial index level by up to 25.75%. In this case, the securities offer the digital return of 25.75%.

Scenario Absolute Return  
The final index level is less than the initial index level but is greater than or equal to the trigger level, which is 80% of the initial index level. In this case, you receive a 1% positive return on the securities for each 1% decrease in the level of the underlying index. For example, if the final index level is 10% less than the initial index level, the securities will provide a total positive return of 10% at maturity. The maximum return you may receive in this scenario is a positive 20% return at maturity.

Scenario Downside  
The final index level is less than the trigger level, and, at maturity, we will pay less than the stated principal amount by an amount that is proportionate to the percentage decrease in the level of the underlying index from the initial index level. Under these circumstances, the payment at maturity will be less than \$8.00 per security. For example, if the final index level is 70% less than the initial index level, you will lose 70% of the principal amount and receive only \$3.00 per security at maturity. There is no minimum payment at maturity on the securities, and you could lose your entire investment.

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Principal at Risk Securities  
Additional Information

You should read this document together with the prospectus dated January 8, 2016, as supplemented by the prospectus supplement dated January 8, 2016, relating to our Senior Global Medium-Term Notes, Series G, of which the securities are a part. This document, together with these documents, contains the terms of the securities and supersedes all other prior or contemporaneous oral statements as well as any other written materials, including preliminary or indicative pricing terms, correspondence, trade ideas, structures for implementation, sample structures, brochures or other educational materials of ours.

You should rely only on the information provided or incorporated by reference in this document, the prospectus and the prospectus supplement. We have not authorized anyone else to provide you with different information, and we take no responsibility for any other information that others may give you. We and Morgan Stanley Wealth Management are offering to sell the securities and seeking offers to buy the securities only in jurisdictions where it is lawful to do so. The information contained in this document and the accompanying prospectus supplement and prospectus is current only as of their respective dates.

If the information in this document differs from the information contained in the prospectus supplement or the prospectus, you should rely on the information in this document.

You should carefully consider, among other things, the matters set forth in “Risk Factors” in this document and the accompanying prospectus supplement, as the securities involve risks not associated with conventional debt securities. We urge you to consult your investment, legal, tax, accounting and other advisers before you invest in the securities. You may access these documents on the SEC website at [www.sec.gov](http://www.sec.gov) as follows (or if such address has changed, by reviewing our filings for the relevant date on the SEC website):

·Prospectus dated January 8, 2016:

<http://www.sec.gov/Archives/edgar/data/1000275/000121465916008810/j18160424b3.htm>

·Prospectus Supplement dated January 8, 2016:

<http://www.sec.gov/Archives/edgar/data/1000275/000121465916008811/p14150424b3.htm>

Our Central Index Key, or CIK, on the SEC website is 1000275.

Please see the section “Documents Incorporated by Reference” on page i of the above prospectus for a description of our filings with the SEC that are incorporated by reference therein.

Dual Directional Trigger Jump Securities Based on the Performance of the S&P 500<sup>®</sup> Index, due December 5, 2022  
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How the Dual Directional Trigger Jump Securities Work

Payoff Diagram

The payoff diagram below illustrates the payment at maturity on the securities for a range of hypothetical percentage changes in the closing level of the underlying index. The graph is based on the following terms:

Stated principal amount:	\$10 per security
Digital return:	25.75%
Trigger level:	80% of the initial index level
Minimum payment at maturity:	None

Dual Directional Trigger Jump Securities Payoff Diagram

How it works

Upside Scenario. If the final index level is greater than or equal to the initial index level, then investors would receive the \$10 stated principal amount plus a return equal to the greater of (1) the digital return and (2) the underlying index return.

§ For example, if the level of the underlying index increases by 3%, the investor would receive a 25.75% return, or § \$12.575 per security.

§ For example, if the level of the underlying index increases by 40%, the investor would receive a 40% return, or § \$14.00 per security.

Absolute Return Scenario. If the final index level is less than the initial index level but is greater than or equal to the trigger level of 80% of the initial index level, the investor would receive a 1% positive return on the securities for each 1% decrease in the level of the underlying index.

§ For example, if the level of the underlying index decreases by 10%, the investor would receive a 10% return, or § \$11.00 per security. The maximum return you may receive in this scenario is a positive 20% return at maturity.

Downside Scenario. If the final index level is less than the trigger level, the investor would receive an amount less than the \$10 stated principal amount, based on a 1% loss of principal for each 1% decrease in the level of the § underlying index. Under these circumstances, the payment at maturity will be less than \$8.00 per security. There is no minimum payment at maturity on the securities.

§ For example, if the level of the underlying index decreases by 70%, the investor would lose 70% of the principal amount and receive only \$3.00 per security at maturity, or 30% of the stated principal amount.

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Risk Factors

An investment in the securities is subject to the risks described below, as well as the risks described under “Risk Factors” in the accompanying prospectus supplement and prospectus. Investors in the securities are also exposed to further risks related to the issuer of the securities, Royal Bank of Canada, which are described in Royal Bank of Canada’s annual report on Form 40-F for its most recently completed fiscal year, filed with the SEC and incorporated by reference herein. See the categories of risks, identified and disclosed in the management’s discussion and analysis of financial condition and results of operations included in the annual report on Form 40-F. This section (and the management’s discussion and analysis section of the annual report on Form 40-F) describes the most significant risks relating to the securities. You should carefully consider whether the securities are suited to your particular circumstances.

The securities do not pay interest or guarantee return of any principal. The terms of the securities differ from those of ordinary debt securities in that the securities do not pay interest or guarantee the payment of any principal amount at maturity. If the final index level is less than the trigger level (which is 80% of the initial index level), the absolute return feature will not apply and the payout at maturity will be an amount in cash that is at least 20% less than the § \$10 stated principal amount of each security. In this case, you will lose a significant portion of your principal amount equal to the full percentage decrease in the level of the underlying index from the initial index level to the final index level. There is no minimum payment at maturity on the securities, and, accordingly, you could lose your entire initial investment in the securities.

The market price of the securities will be influenced by many unpredictable factors. Several factors will influence § the value of the securities in the secondary market and the price at which RBCCM may be willing to purchase or sell the securities in the secondary market, including:

- § the trading price and volatility (frequency and magnitude of changes in value) of the securities represented by the underlying index;
- § dividend yields on the securities represented by the underlying index;
- § market interest rates;
- § our creditworthiness, as represented by our credit ratings or as otherwise perceived in the market;
- § time remaining to maturity; and
- § geopolitical conditions and economic, financial, political, regulatory or judicial events that affect the underlying index.

Generally, the longer the time remaining to maturity, the more the market price of the securities will be affected by the other factors described above. The level of the underlying index may be volatile, and you should not take the historical levels of the underlying index as an indication of future performance. See “Information About the Underlying Index” below. You may receive less, and possibly significantly less, than the stated principal amount per security if you sell your securities prior to maturity.

The securities are subject to the credit risk of Royal Bank of Canada, and any actual or anticipated changes to its credit ratings or credit spreads may adversely affect the market value of the securities. You are dependent on Royal Bank of Canada’s ability to pay all amounts due on the securities at maturity and therefore you are subject to the credit risk of Royal Bank of Canada. If Royal Bank of Canada defaults on its obligations under the securities, your § investment would be at risk and you could lose some or all of your investment. As a result, the market value of the securities prior to maturity will be affected by changes in the market’s view of Royal Bank of Canada’s creditworthiness. Any actual or anticipated decline in Royal Bank of Canada’s credit ratings or increase in the credit spreads charged by the market for taking Royal Bank of Canada credit risk is likely to adversely affect the market value of the securities.



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The amount payable on the securities is not linked to the level of the underlying index at any time other than the valuation date. The final index level will be based on the closing level of the underlying index on the valuation date, subject to adjustment for non-trading days and certain market disruption events. Even if the level of the underlying index increases prior to the valuation date but then decreases by the valuation date to a level that is less than the trigger level, the payment at maturity will be significantly less than it would have been had the payment at maturity been linked to the level of the underlying index prior to that decrease. Although the actual level of the underlying index on the maturity date or at other times during the term of the securities may be higher than the final index level, the payment at maturity will be based solely on the closing level of the underlying index on the valuation date. Investing in the securities is not equivalent to investing in the underlying index. Investing in the securities is not equivalent to investing in the underlying index or its component stocks. Investors in the securities will not have voting rights or rights to receive dividends or other distributions or any other rights with respect to stocks that constitute the underlying index.

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

Our initial estimated value of the securities is an estimate only, calculated as of the pricing date. The initial estimated value of the securities is based on the value of our obligation to make the payments on the securities, together with the mid-market value of the derivative embedded in the terms of the securities. See "Structuring the Securities" below. Our estimate is based on a variety of assumptions, including our credit spreads, expectations as to dividends, interest rates and volatility, and the expected term of the securities. These assumptions are based on certain forecasts about future events, which may prove to be incorrect. Other entities may value the securities or similar securities at a price that is significantly different than we do.

The value of the securities at any time after the pricing date will vary based on many factors, including changes in market conditions, and cannot be predicted with accuracy. As a result, the actual value you would receive if you sold the securities in any secondary market, if any, should be expected to differ materially from the initial estimated value of your securities.

Adjustments to the underlying index could adversely affect the value of the securities. The sponsor of the underlying index (the "index sponsor") may add, delete or substitute the stocks constituting the underlying index, or make other methodological changes. Further, the index sponsor may discontinue or suspend calculation or publication of the underlying index at any time. Any of these actions could affect the value of and the return on the securities. We have no affiliation with the index sponsor and will not be responsible for any actions taken by the index sponsor. The index sponsor is not an affiliate of ours and will not be involved in the offering of the securities in any

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way. Consequently, we have no control over the actions of the index sponsor, including any actions of the type that would require the calculation agent to adjust the payment to you at maturity. The index sponsor has no obligation of any sort with respect to the securities. Thus, the index sponsor has no obligation to take your interests into consideration for any reason, including in taking any actions that might affect the value of the securities. None of our proceeds from the issuance of the securities will be delivered to the index sponsor.

The securities will not be listed on any securities exchange and secondary trading may be limited. The securities will not be listed on any securities exchange. Therefore, there may be little or no secondary market for the securities. RBCCM may, but is not obligated to, make a market in the securities, and, if it chooses to do so at any time, it may cease doing so. When it does make a market, it will generally do so for transactions of routine secondary market size at prices based on its estimated of the current value of the securities, taking into account its bid/offer spread, our credit spreads, market volatility, the notional size of the proposed sale, the cost of unwinding any related § hedging positions, the time remaining to maturity and the likelihood that it will be able to resell the securities. Even if there is a secondary market, it may not provide enough liquidity to allow you to trade or sell the securities easily. Because we do not expect that other broker-dealers will participate significantly in the secondary market for the securities, the price at which you may be able to trade your securities is likely to depend on the price, if any, at which RBCCM is willing to transact. If, at any time, RBCCM were not to make a market in the securities, it is likely that there would be no secondary market for the securities. Accordingly, you should be willing to hold your securities to maturity.

Historical levels of the underlying index should not be taken as an indication of its future levels during the term of the securities. The trading prices of the equity securities comprising the underlying index will determine the level of § the underlying index at any given time. As a result, it is impossible to predict whether the level of the underlying index will rise or fall. Trading prices of the equity securities comprising the underlying index will be influenced by complex and interrelated political, economic, financial and other factors.

Hedging and trading activity by us and our subsidiaries could potentially adversely affect the value of the securities. One or more of our subsidiaries and or third party dealers expect to carry out hedging activities related to the securities (and possibly to other instruments linked to the underlying index or the securities it represents), including trading in those securities as well as in other related instruments. Some of our subsidiaries also may conduct trading activities relating to the underlying index on a regular basis as part of their general broker-dealer and other § businesses. Any of these hedging or trading activities on or prior to the pricing date could have affected the initial index level and, therefore, have increased the level above which the underlying index must close on the valuation date so that investors do not suffer a significant loss on their initial investment in the securities. Additionally, such hedging or trading activities during the term of the securities, including on the valuation date, could adversely affect the closing level of the underlying index on the valuation date and, accordingly, the amount of cash an investor will receive at maturity, if any.

Our business activities may create conflicts of interest. We and our affiliates may engage in trading activities related to the underlying index or the securities represented by the underlying index that are not for the account of holders of § the securities or on their behalf. These trading activities may present a conflict between the holders' interest in the securities and the interests we and our affiliates will have in proprietary accounts, in facilitating transactions, including options and other derivatives transactions, for our customers and in accounts under our management.

These trading activities could be adverse to the interests of the holders of the securities.

We and our affiliates may presently or from time to time engage in business with one or more of the issuers of the securities represented by the underlying index. This business may include extending loans to, or making equity investments in, such companies or providing advisory services to such companies, including merger and acquisition advisory services. In the course of business, we and our affiliates may acquire non-public information relating to these companies, which we have no obligation to disclose to you, and, in addition, one or more of our affiliates may publish research reports about these companies. Neither we nor the agent have made any independent investigation regarding any matters whatsoever relating to the issuers of the securities represented by the underlying index.



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Moreover, we and our affiliates may have published, and in the future expect to publish, research reports with respect to the underlying index or the securities which it represents. This research is modified from time to time without notice and may express opinions or provide recommendations that are inconsistent with purchasing or holding the securities. Any of these activities by us or one or more of our affiliates may affect the level of the underlying index and, therefore, the market value of the securities.

§ The calculation agent, which is a subsidiary of the issuer, will make determinations with respect to the securities, which may create a conflict of interest. Our wholly owned subsidiary, RBCCM, will serve as the calculation agent. As calculation agent, RBCCM determined the initial index level and will determine the final index level, the underlying index return, and the amount of cash, if any, you will receive at maturity. Moreover, certain determinations made by RBCCM, in its capacity as calculation agent, may require it to exercise discretion and make subjective judgments, such as with respect to the occurrence or non-occurrence of market disruption events and the selection of a successor index or the calculation of the final index level in the event of a market disruption event or discontinuance of the underlying index. These potentially subjective determinations may adversely affect the payout to you at maturity, if any. For further information regarding these types of determinations, see “Additional Terms of the Securities” below.

§ Significant aspects of the tax treatment of the securities are uncertain. The tax treatment of an investment in the securities is uncertain. We do not plan to request a ruling from the Internal Revenue Service (the “IRS”) or from the Canada Revenue Agency regarding the tax treatment of an investment in the securities, and the IRS, the Canada Revenue Agency or a court may not agree with the tax treatment described in this document.

The IRS has issued a notice indicating that it and the U.S. Treasury Department are actively considering whether, among other issues, a holder should be required to accrue interest over the term of an instrument such as the securities even though that holder will not receive any payments with respect to the securities until maturity and whether all or part of the gain a holder may recognize upon sale, exchange or maturity of an instrument such as the securities should be treated as ordinary income. The outcome of this process is uncertain and could apply on a retroactive basis. Please read carefully the sections entitled “Canadian Federal Income Tax Consequences” and “Supplemental Discussion of U.S. Federal Income Tax Consequences” in this document, the section entitled “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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Additional Terms of the Securities  
Please read this information in conjunction with the summary terms on the front cover of this document.

Additional Provisions

Postponement of the valuation date: If the valuation date occurs on a day that is not a trading day or on a day on which the calculation agent has determined that a market disruption event (as defined below) has occurred or is continuing, then the valuation date will be postponed until the next succeeding trading day on which the calculation agent determines that a market disruption event does not occur or is not continuing; provided that in no event will the valuation date be postponed by more than five trading days. If the valuation date is postponed by five trading days, and a market disruption event occurs or is continuing on that fifth trading day, then the calculation agent may determine, in its good faith and reasonable judgment, what the closing level of the underlying index would have been in the absence of the market disruption event. If the valuation date is postponed, then the maturity date will be postponed by an equal number of business days. No interest shall accrue or be payable as a result of such postponement. With respect to the underlying index and any relevant successor index, a “market disruption event” means:

- a suspension, absence or material limitation of trading of equity securities then constituting 20% or more of the level of the underlying index (or the relevant successor index) on the relevant exchanges (as defined below) for such securities for more than two hours of trading during, or during the one hour period preceding the close of, the principal trading session on such relevant exchange; or
- a breakdown or failure in the price and trade reporting systems of any relevant exchange as a result of which the reported trading prices for equity securities then constituting 20% or more of the level of the underlying index (or the relevant successor index) during the one hour preceding the close of the principal trading session on such relevant exchange are materially inaccurate; or
- a suspension, absence or material limitation of trading on the primary exchange or market for trading in futures or options contracts related to the underlying index (or the relevant successor index) for more than two hours of trading during, or during the one hour period preceding the close of, the principal trading session on such exchange or market; or
- a decision to permanently discontinue trading in the relevant futures or options contracts; in each case as determined by the calculation agent in its sole discretion; and
- a determination by the calculation agent in its sole discretion that the event described above materially interfered with our ability or the ability of any of our affiliates to adjust or unwind all or a material portion of any hedge with respect to the securities.

Market disruption events:

For purposes of determining whether a market disruption event with respect to the underlying index (or the relevant successor index) exists at any time, if trading in a security included in the underlying index (or the relevant successor index) is materially suspended or materially limited at that time, then the relevant percentage contribution of that security to the level of the underlying index (or the relevant successor index) will be based on a comparison of (a) the portion of the level of the underlying index (or the relevant successor index) attributable to that security relative to (b) the overall level of the underlying index (or the relevant successor index), in each case immediately before that suspension or limitation.

For purposes of determining whether a market disruption event with respect to the

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underlying index (or the relevant successor index) has occurred:

- a limitation on the hours or number of days of trading will not constitute a market disruption event if it results from an announced change in the regular business hours of the relevant exchange, or the primary exchange or market for trading in futures or options contracts related to the underlying index (or the relevant successor index);
- limitations pursuant to the rules of any relevant exchange similar to NYSE Rule 80B (or any applicable rule or regulation enacted or promulgated by any other self-regulatory organization or any government agency of scope similar to NYSE Rule 80B as determined by the calculation agent) on trading during significant market fluctuations will constitute a suspension, absence or material limitation of trading;
- a suspension of trading in futures or options contracts on the underlying index (or the relevant successor index) by the primary exchange or market trading in such contracts by reason of:
  - a price change exceeding limits set by such exchange or market,
  - an imbalance of orders relating to such contracts, or
  - a disparity in bid and ask quotes relating to such contracts,will, in each such case, constitute a suspension, absence or material limitation of trading in futures or options contracts related to the underlying index (or the relevant successor index); and
- a “suspension, absence or material limitation of trading” on any relevant exchange or on the primary exchange or market on which futures or options contracts related to the underlying index (or the relevant successor index) are traded will not include any time when such exchange or market is itself closed for trading under ordinary circumstances.

“Relevant exchange” means the primary exchange or market of trading for any security (or any combination thereof) then included in the underlying index or such successor index, as applicable.

If the index sponsor discontinues publication of the underlying index 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 index being referred to herein as a “successor index”), then the closing level of the underlying index on the valuation date will be determined by reference to the level of such successor index at the close of trading on the relevant exchange for the successor index on such day.

Upon any selection by the calculation agent of a successor index, the calculation agent will cause written notice to be promptly furnished to the trustee, to us and to the holders of the securities.

If the index sponsor discontinues publication of the underlying index prior to, and that

Discontinuation of/adjustments to the underlying index:

discontinuation is continuing on the valuation date, and the calculation agent determines, in its sole discretion, that no successor index is available at that time or the calculation agent has previously selected a successor index and publication of that successor index is discontinued prior to, and that discontinuation is continuing on, the valuation date, then the calculation agent will determine the closing level of the underlying index for that date. The closing level of the underlying index will be computed by the calculation agent in accordance with the formula for and method of calculating the underlying index or successor index, as applicable, last in effect prior to the discontinuation, using the closing price (or, if trading in the relevant securities has been materially suspended or materially limited, the calculation agent’s good faith estimate of the closing price that would have prevailed but for the suspension or limitation) at the close of the principal trading session on that date of each security most recently included in the underlying index or successor index, as applicable.

If at any time the method of calculating the underlying index or a successor index, or the level thereof, is changed in a material respect, or if the underlying index or a successor index is in any other way modified so that the underlying index or successor index does

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not, in the opinion of the calculation agent, fairly represent the level of the underlying index or successor index had those changes or modifications not been made, then the calculation agent will, at the close of business in New York City on the date on which the closing level of the underlying index is to be determined, make any calculations and adjustments as, in the good faith judgment of the calculation agent, may be necessary in order to arrive at a level of a stock index comparable to the underlying index or successor index, as the case may be, as if those changes or modifications had not been made, and calculate the closing level of the underlying index with reference to the underlying index or such successor index, as adjusted. Accordingly, if the method of calculating the underlying index or a successor index is modified so that the level of the underlying index or such successor index is a fraction of what it would have been if there had been no such modification (e.g., due to a split in the underlying index), then the calculation agent will adjust its calculation of the underlying index or such successor index in order to arrive at a level of the underlying index or such successor index as if there had been no such modification (e.g., as if such split had not occurred).

Notwithstanding these alternative arrangements, discontinuation the publication of or modification of the underlying index or successor index, as applicable, may adversely affect the value of the securities. A business day means a Monday, Tuesday, Wednesday, Thursday or Friday that is not a day on which

Business day: banking institutions in The City of New York generally are authorized or obligated by law, regulation or executive order to close.

A trading day means a day, as determined by the calculation agent, on which trading is generally conducted on (i) the relevant exchanges for securities comprising the underlying index or the successor index and (ii) the exchanges on which futures or options contracts related to the underlying index or the successor index are traded, other than a day on which trading on such relevant exchange or exchange on which such futures or options contracts are traded is scheduled to close prior to its regular weekday closing time.

Trading day:

In the event we fail to make a payment on the maturity date, any overdue payment in respect of such payment on the securities will bear interest until the date upon which all sums due are received by or on behalf of the relevant holder, at a rate per annum which is the rate for deposits in U.S. dollars for a period of six months which appears on the Reuters Screen LIBOR page as of 11:00 a.m. (London time) on the first business day following such failure to pay. Such rate shall be determined by the calculation agent. If interest is required to be calculated for a period of less than one year, it will be calculated on the basis of a 360-day year consisting of the actual number of days in the period.

Default interest upon acceleration:

If the maturity of the securities is accelerated upon an event of default under the Indenture, the amount payable upon acceleration will be determined by the calculation agent. Such amount will be the payment at maturity, calculated as if the date of declaration of acceleration were the valuation date.

Events of default and acceleration:

Minimum ticketing size: \$1,000 / 100 securities

Additional amounts:

We will pay any amounts to be paid by us on the securities 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 securities, 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 security or of a right to receive payments in respect thereto (a “Payment Recipient”), which we refer to

as an "Excluded Holder," in respect of any taxes imposed because the

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beneficial owner or Payment Recipient:

- (i) is someone 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;
- (ii) is subject to such taxes by reason of its being connected presently or formerly with Canada or any province or territory thereof otherwise than by reason of the holder's activity in connection with purchasing the securities, the holding of the securities or the receipt of payments thereunder;
- (iii) is, or 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 "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);
- (iv) presents such security for payment (where presentation is required) more than 30 days after the relevant date (except to the extent that the holder thereof would have been entitled to such Additional Amounts on presenting a security for payment on the last day of such 30 day period); for this purpose, the "relevant date" in relation to any payments on any security means:
  - a. the due date for payment thereof, or
  - b. if the full amount of the monies payable on such date has not been received by the trustee on or prior to such due 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 securities in accordance with the Indenture;
- (v) could lawfully avoid (but has not so avoided) such withholding or deduction by complying, or requiring that any agent comply with, any statutory requirements necessary to establish qualification for an exemption from withholding or by making, or requiring that any agent make, a declaration of non-residence or other similar claim for exemption to any relevant tax authority; or
- (vi) 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 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 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 securities at maturity.

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 securities (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 securities, 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.

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For additional information, see the section entitled “Tax Consequences—Canadian Taxation” in the accompanying prospectus.

Form of the securities: Book-entry

Trustee: The Bank of New York Mellon

Calculation agent: RBCCM. The calculation agent will make all determinations regarding the securities. Absent manifest error, all determinations of the calculation agent will be final and binding on you and us, without any liability on the part of the calculation agent. You will not be entitled to any compensation from us for any loss suffered as a result of any of the above determinations or confirmations by the calculation agent.

Contact: Morgan Stanley Wealth Management clients may contact their local Morgan Stanley Wealth Management branch office or our principal executive offices at 1585 Broadway, New York, New York 10036 (telephone number 1-(866)-477-4776). All other clients may contact their local brokerage representative. Third-party distributors may contact Morgan Stanley Structured Investment Sales at 1-(800)-233-1087. In the opinion of Norton Rose Fulbright Canada LLP, the issue and sale of the securities has been duly authorized by all necessary corporate action of the Bank in conformity with the Indenture, and when the securities have been duly executed, authenticated and issued in accordance with the Indenture and delivered against payment therefor, the securities will be validly issued and, to the extent validity of the securities is a matter governed by the laws of the Province of Ontario or Québec, or the laws of Canada applicable therein, and will be valid obligations of the Bank, subject to equitable remedies which may only be granted at the discretion of a court of competent authority, subject to applicable bankruptcy, to rights to indemnity and contribution under the securities or the Indenture which may be limited by applicable law; to insolvency and other laws of general application affecting creditors’ rights, to limitations under applicable limitations statutes, and to limitations as to the currency in which judgments in Canada may be rendered, as prescribed by the Currency Act (Canada). This opinion is given as of the date hereof and is limited to the laws of the Provinces of Ontario and Québec and the federal laws of Canada

Validity of the securities: applicable thereto. In addition, this opinion is subject to customary assumptions about the Trustee’s authorization, execution and delivery of the Indenture and the genuineness of signatures and certain factual matters, all as stated in the letter of such counsel dated January 8, 2016, which has been filed as Exhibit 5.1 to Royal Bank’s Form 6-K filed with the SEC dated January 8, 2016. In the opinion of Morrison & Foerster LLP, when the securities have been duly completed in accordance with the Indenture and issued and sold as contemplated by the prospectus supplement and the prospectus, the securities will be valid, binding and enforceable obligations of Royal Bank, entitled to the benefits of the Indenture, subject to applicable bankruptcy, insolvency and similar laws affecting creditors’ rights generally, concepts of reasonableness and equitable principles of general applicability (including, without limitation, concepts of good faith, fair dealing and the lack of bad faith). This opinion is given as of the date hereof and is limited to the laws of the State of New York. This opinion is subject to customary assumptions about the Trustee’s authorization, execution and delivery of the Indenture and the genuineness of signatures and to such counsel’s reliance on the Bank and other sources as to certain factual matters, all as stated in the legal opinion dated January 8, 2016, which has been filed as Exhibit 5.2 to the Bank’s Form 6-K dated January 8, 2016.

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Terms incorporated in the master note: All of the terms in “Summary Terms” (except the item captioned “Commissions and issue price”) and the terms above the item captioned “Contact” in “Additional Terms of the Securities” of this pricing supplement, and the section “Supplemental Discussion of U.S. Federal Income Tax Consequences.”

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#### Information About the Underlying Index

All disclosures contained in this document regarding the underlying index, including, without limitation, its make-up, method of calculation, and changes in its components, have been derived from publicly available sources. The information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC, as the sponsor of the underlying index (the “index sponsor”). The index sponsor, which owns the copyright and all other rights to the underlying index, has no obligation to continue to publish, and may discontinue publication of, the underlying index. The consequences of the index sponsor discontinuing publication of the underlying index are discussed above in the section entitled “Additional Terms of the Securities—Discontinuation of/adjustments to the underlying index.” Neither we nor RBCCM accepts any responsibility for the calculation, maintenance or publication of the underlying index or any successor index.

#### The S&P 500<sup>®</sup> Index

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

The index sponsor calculates the SPX by reference to the prices of the constituent stocks of the SPX without taking account of the value of dividends paid on those stocks. As a result, the return on the securities will not reflect the return you would realize if you actually owned the SPX constituent stocks and received the dividends paid on those stocks.

Effective with the September 2015 rebalance, consolidated share class lines will no longer be included in the SPX. Each share class line will be subject to public float and liquidity criteria individually, but the company’s total market capitalization will be used to evaluate each share class line. This may result in one listed share class line of a company being included in the SPX while a second listed share class line of the same company is excluded.

#### Computation of the SPX

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

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

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

In September 2012, all shareholdings representing more than 5% of a stock’s outstanding shares, other than holdings by “block owners,” were removed from the float for purposes of calculating the SPX. Generally, these “control holders” will include officers and directors, private equity, venture capital and special equity firms, other publicly traded companies that hold shares for control, strategic partners, holders of restricted shares, ESOPs, employee and family trusts, foundations associated with the company, holders of unlisted share classes of stock, government entities at all levels (other than government retirement/pension funds) and any individual person who controls a 5% or greater stake in a company as reported in regulatory filings. However, holdings by block owners, such as depository banks, pension funds, mutual funds and ETF providers, 401(k) plans of the company, government retirement/pension funds, investment funds of insurance companies, asset managers and investment funds, independent foundations and savings and investment plans, will ordinarily be considered part of the float.

Treasury stock, stock options, restricted shares, equity participation units, warrants, preferred stock, convertible stock, and rights are not part of the float. Shares held in a trust to allow investors in countries outside the country of

domicile, such as depositary shares and Canadian exchangeable shares are normally part of the float unless those shares form a control block.

For each stock, an investable weight factor (“IWF”) is calculated by dividing the available float shares by the total shares outstanding. Available float shares are defined as the total shares outstanding less shares held by control holders. This

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calculation is subject to a 5% minimum threshold for control blocks. For example, if a company's officers and directors hold 3% of the company's shares, and no other control group holds 5% of the company's shares, the index sponsor would assign that company an IWF of 1.00, as no control group meets the 5% threshold. However, if a company's officers and directors hold 3% of the company's shares and another control group holds 20% of the company's shares, the index sponsor would assign an IWF of 0.77, reflecting the fact that 23% of the company's outstanding shares are considered to be held for control. As of July 31, 2017, companies with multiple share class lines are no longer eligible for inclusion in the SPX. Constituents of the SPX prior to July 31, 2017 with multiple share class lines will be grandfathered in and continue to be included in the SPX. If a constituent company of the SPX reorganizes into a multiple share class line structure, that company will remain in the SPX at the discretion of the S&P Index Committee in order to minimize turnover.

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

Index Maintenance

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

To prevent the level of the SPX from changing due to corporate actions, corporate actions which affect the total market value of the SPX require an index divisor adjustment. By adjusting the index divisor for the change in market value, the level of the SPX remains constant and does not reflect the corporate actions of individual companies in the SPX. Index divisor adjustments are made after the close of trading and after the calculation of the index closing level. Changes in a company's shares outstanding and IWF due to its acquisition of another public company are made as soon as reasonably possible. At S&P's discretion, de minimis merger and acquisition share changes are accumulated and implemented with the quarterly share rebalancing.

All other changes of less than 5% are accumulated and made quarterly on the third Friday of March, June, September, and December.

Changes in a company's total shares outstanding of 5% or more due to public offerings are made as soon as reasonably possible. Other changes of 5% or more (for example, due to tender offers, Dutch auctions, voluntary exchange offers, company stock repurchases, private placements, acquisitions of private companies or non-index companies that do not trade on a major exchange, redemptions, exercise of options, warrants, conversion of preferred stock, notes, debt, equity participations, at-the-market stock offerings or other recapitalizations) are made weekly, and are generally announced on Fridays for implementation after the close of trading the following Friday (one week later). If a 5% or more share change causes a company's IWF to change by five percentage points or more, the IWF is updated at the same time as the share change. IWF changes resulting from partial tender offers are considered on a case-by-case basis.

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License Agreement

S&P<sup>®</sup> is a registered trademark of Standard & Poor's Financial Services LLC ("S&P") and Dow Jones is a registered trademark of Dow Jones Trademark Holdings LLC ("Dow Jones"). These trademarks have been licensed for use by S&P Dow Jones Indices LLC. "Standard & Poor's", "S&P 500" and "S&P" are trademarks of S&P. These trademarks have been sublicensed for certain purposes by us. The SPX is a product of S&P Dow Jones Indices LLC and/or its affiliates and has been licensed for use by us.

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

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

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Historical Information

The graph below sets forth the daily official closing levels of the underlying index for the period from January 1, 2012 through November 30, 2017. The table below the graph sets forth the published high and low official closing levels, as well as the end-of-quarter official closing levels, of the underlying index for the same period.

We obtained the information below from Bloomberg Financial Markets, without independent verification.

You should not take the historical levels of the underlying index as an indication of future performance, and no assurance can be given as to the level of the underlying index on the valuation date.

The S&P 500® Index

Information as of market close on November 30, 2017:

Bloomberg Index Symbol: SPX	52 Week High (on 11/30/2017):	2,647.58
Current Index Level:	2,647.58	52 Week Low (on 12/1/2016): 2,191.08
52 Weeks Ago:	2,198.81	

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	High	Low	Period End
2012			
First Quarter	1,416.51	1,277.06	1,408.47
Second Quarter	1,419.04	1,278.04	1,362.16
Third Quarter	1,465.77	1,334.76	1,440.67
Fourth Quarter	1,461.40	1,353.33	1,402.43
2013			
First Quarter	1,569.19	1,457.15	1,569.19
Second Quarter	1,669.16	1,541.61	1,606.28
Third Quarter	1,725.52	1,614.08	1,681.55
Fourth Quarter	1,848.36	1,655.45	1,848.36
2014			
First Quarter	1,878.04	1,741.89	1,872.34
Second Quarter	1,962.87	1,815.69	1,960.23
Third Quarter	2,011.36	1,909.57	1,972.29
Fourth Quarter	2,090.57	1,862.49	2,058.90
2015			
First Quarter	2,117.39	1,992.67	2,067.89
Second Quarter	2,130.82	2,057.64	2,063.11
Third Quarter	2,128.28	1,867.61	1,920.03
Fourth Quarter	2,109.79	1,923.82	2,043.94
2016			
First Quarter	2,063.95	1,829.08	2,059.74
Second Quarter	2,119.12	2,000.54	2,098.86
Third Quarter	2,190.15	2,088.55	2,168.27
Fourth Quarter	2,271.72	2,085.18	2,238.83
2017			
First Quarter	2,395.96	2,257.83	2,362.72
Second Quarter	2,453.46	2,328.95	2,423.41
Third Quarter	2,519.36	2,409.75	2,519.36
Fourth Quarter (through November 30, 2017)	2,647.58	2,529.12	2,647.58

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Dual Directional Trigger Jump Securities Based on the Performance of the S&P 500<sup>®</sup> Index, due December 5, 2022  
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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.

Supplemental Discussion of U.S. Federal Income Tax Consequences

The following, together with the discussion of U.S. federal income taxation in the accompanying prospectus and prospectus supplement, is a general description of the material U.S. tax considerations relating to the securities. It does not purport to be a complete analysis of all tax considerations relating to the securities. Prospective purchasers of the securities 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 securities and receiving payments under the securities. This summary is based upon the law as in effect on the date of this document and is subject to any change in law that may take effect after such date.

Supplemental U.S. Tax Considerations

The following section supplements the discussion of U.S. federal income taxation in the accompanying prospectus and prospectus supplement. It applies only to those 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 SECURITIES 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 SECURITIES 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 SECURITIES, 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 underlying 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 underlying index were so treated, certain adverse U.S. federal income tax consequences could possibly apply to U.S. and non-U.S. holders, respectively. You should refer to any available information filed with the SEC and other authorities by the entities whose stock is included in the underlying index and consult your tax advisor regarding the possible consequences to you in this regard.

In the opinion of our counsel, Morrison & Foerster LLP, it would generally be reasonable to treat a security as a pre-paid cash-settled derivative contract in respect of the underlying index for U.S. federal income tax purposes, and the terms of the securities 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 securities for all tax purposes in accordance with such characterization. If the securities are so treated, a U.S. holder should generally recognize capital gain or loss upon the sale, exchange or maturity of the securities in an amount equal to the difference between the amount a holder receives at such time and the holder’s tax basis in the securities. In general, a U.S. holder’s tax basis in the securities will be equal to the price the holder paid for the securities. 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 deductibility of capital losses is subject to limitations.

Alternative Treatments. Alternative tax treatments of the securities are also possible and the IRS might assert that a treatment other than that described above is more appropriate. For example, it is possible to treat the securities, and the IRS might assert that a security should be treated, as a single debt instrument. Pursuant to such characterization, since the securities 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 securities are so treated, a holder would generally be required to accrue interest income over the term of the securities based upon the yield at which we would issue a non-contingent fixed-rate debt instrument with terms and conditions similar to the securities. In addition, any gain a holder might recognize upon the sale, exchange or maturity of the securities would generally be ordinary income and any loss recognized by a holder at such time would generally 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 securities, and thereafter, would be capital loss.

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

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The IRS has released a notice that may affect the taxation of holders of the securities. According to the notice, the IRS and the U.S. Treasury Department are actively considering whether the holder of an instrument such as the securities should be required to accrue ordinary income on a current basis. 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 securities will ultimately be required to accrue income currently and this could be applied on a retroactive basis. The IRS 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 constructive ownership rules of Section 1260 of the Code, which very generally can 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. We intend to treat the securities for U.S. federal income tax purposes in accordance with the treatment described in this document unless and until such time as the U.S. Treasury Department and IRS determine that some other treatment is more appropriate.

Backup Withholding and Information Reporting. Payments made with respect to the securities and proceeds from the sale or exchange of the securities 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 IRS 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 IRS.

Reports will be made to the IRS 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 securities. A non-U.S. holder is a beneficial owner of a security that, for U.S. federal income tax purposes, is a non-resident alien individual, a foreign corporation, or a foreign estate or trust.

Except as described below, a non-U.S. holder will generally not be subject to U.S. federal income or withholding tax for amounts paid in respect of the securities, provided that (i) the holder complies with any applicable certification requirements, (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 sale, exchange or maturity of the securities. 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 U.S. trade or business, 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.

Under Section 871(m) of the Code, a "dividend equivalent" payment is treated as a dividend from sources within the United States. Such payments generally would be subject to a 30% U.S. withholding tax if paid to a non-U.S. holder. Under U.S. Treasury Department regulations, payments (including deemed payments) with respect to equity-linked instruments ("ELIs") that are "specified ELIs" may be treated as dividend equivalents if such specified ELIs reference an interest in an "underlying security," which is generally any interest in an entity taxable as a corporation for U.S. federal income tax purposes if a payment with respect to such interest could give rise to a U.S. source dividend. However, the IRS has issued guidance that states that the U.S. Treasury Department and the IRS intend to amend the effective dates of the U.S. Treasury Department regulations to provide that withholding on dividend equivalent payments will not apply to specified ELIs that are not delta-one instruments and that are issued before January 1, 2019. Based on our determination that the securities are not delta-one instruments, non-U.S. holders should not be subject to withholding on dividend equivalent payments, if any, under the securities. However, it is possible that the securities could be treated as deemed reissued for U.S. federal income tax purposes upon the occurrence of certain events affecting the underlying index or the securities (for example, upon an underlying index rebalancing), and following such occurrence the securities 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 index or the securities 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 withholding 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 securities 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 securities to become subject to withholding tax, we will withhold tax at the applicable statutory rate. The IRS has also indicated that it is considering whether income in respect of instruments such as the securities 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 OID), 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

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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 securities 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 securities will only apply to payments made after December 31, 2018. If we determine withholding is appropriate with respect to the securities, we will withhold tax at the applicable statutory rate, and we will not pay any additional amounts in respect of such withholding. Therefore, if such withholding applies, any payments on the securities will be significantly less than what you would have otherwise received. Depending on your circumstances, these amounts withheld may be creditable or refundable to you. 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 securities.

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Use of Proceeds and Hedging

The net proceeds from the sale of the securities will be used as described under “Use of Proceeds” in the accompanying prospectus supplement and prospectus and to hedge market risks of Royal Bank of Canada associated with its obligation to make the payment at maturity on the securities. The initial public offering price of the securities includes the underwriting discount and commission and the estimated cost of hedging our obligations under the securities.

Supplemental Information Regarding Plan of Distribution;

Conflicts of Interest

Pursuant to the terms of a distribution agreement, RBCCM, an affiliate of Royal Bank of Canada, will purchase the securities from Royal Bank of Canada for distribution to Morgan Stanley Wealth Management. RBCCM will act as agent for the securities and will receive a fee of \$0.35 per \$10 stated principal amount and will pay to Morgan Stanley Wealth Management a fixed sales commission of \$0.30 for each of the securities they sell. Of the amount per \$10 stated principal amount received by RBCCM, RBCCM will pay Morgan Stanley Wealth Management a structuring fee of \$0.05 for each security.

Morgan Stanley Wealth Management may reclaim selling concessions allowed to individual brokers within Morgan Stanley Wealth Management in connection with the offering if, within 30 days of the offering, Royal Bank of Canada repurchases the securities distributed by such brokers.

Delivery of the securities will be made against payment for the securities on December 5, 2017, which is the third business day following the pricing date (this settlement cycle being referred to as “T+3”). We expect to deliver the securities on a date that is greater than two business days following the pricing date. Under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise. Accordingly, purchasers who wish to trade the securities more than two business days prior to the original issue date will be required to specify alternative settlement arrangements to prevent a failed settlement.

In addition, RBCCM or another of its affiliates or agents may use this document in market-making transactions after the initial sale of the securities, but is under no obligation to do so and may discontinue any market-making activities at any time without notice.

For additional information as to the relationship between us and RBCCM, please see the section “Plan of Distribution—Conflicts of Interest” in the accompanying prospectus.

The value of the securities shown on your account statement may be based on RBCCM’s estimate of the value of the securities if RBCCM or another of our affiliates were to make a market in the securities (which it is not obligated to do). That estimate will be based on the price that RBCCM may pay for the securities in light of then prevailing market conditions, our creditworthiness and transaction costs. For an initial period of approximately 24 months, the value of the securities that may be shown on your account statement is expected to be higher than RBCCM’s estimated value of the securities at that time. This is because the estimated value of the securities will not include the agent’s commission and our hedging costs and profits; however, the value of the securities shown on your account statement during that period is initially expected to be a higher amount, reflecting the addition of the agent’s commission and our estimated costs and profits from hedging the securities. This excess is expected to decrease over time until the end of this period, and we reserve the right to shorten this period. After this period, if RBCCM repurchases your securities, it expects to do so at prices that reflect its estimated value.

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Structuring the Securities

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

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

The lower implied borrowing rate, the underwriting commission and the hedging-related costs relating to the securities reduced the economic terms of the securities to you and resulted in the initial estimated value for the securities on the pricing date being less than their public offering price. See “Risk Factors—The initial estimated value of the securities is less than the price to the public” above.



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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 securities.

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 securities. 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 securities should consider whether the purchase or holding of such instruments might constitute a “prohibited transaction”.

Royal Bank of Canada 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 of Canada (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 securities are acquired by or with the assets of a Plan, and with respect to which Royal Bank of Canada or any of its affiliates is a “party in interest” or a “disqualified person”, unless those securities 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 securities, or exercising any rights related thereto, to represent that (a) such purchase, holding and exercise of the securities 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 of Canada 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 securities, or any exercise related thereto or as a result of any exercise by Royal Bank of Canada or any of its affiliates of any rights in connection with the securities, and no advice provided by Royal Bank of Canada 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 securities and the transactions contemplated with respect to the securities.

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

