

ROYAL BANK OF CANADA  
Form 424B2  
August 30, 2017

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#### PRICING SUPPLEMENT

Filed Pursuant to Rule 424(b)(2)

Registration Statement No. 333-208507

Dated August 28, 2017

Royal Bank of Canada Trigger GEARS

\$15,221,500 Securities Linked to the S&P 500® Index due on August 31, 2020

#### Investment Description

Trigger GEARS are unconditional, unsecured and unsubordinated debt securities issued by Royal Bank of Canada with returns linked to the performance of the S&P 500® Index (the “Underlying”) (each, a “Security” and collectively, the “Securities”). If the Underlying Return is positive, we will repay the principal amount at maturity plus pay a return equal to the Upside Gearing times the Underlying Return. If the Underlying Return is zero or negative, but the Final Underlying Level is greater than or equal to the Downside Threshold, we will pay you the principal amount at maturity. If the Final Underlying Level is less than the Downside Threshold, we will pay less than the full principal amount at maturity, if anything, resulting in a loss on your initial investment that is proportionate to the negative performance of the Underlying over the term of the Securities, and you may lose up to 100% of your initial investment. Investing in the Securities involves significant risks. The Securities do not pay dividends or interest. You may lose some or all of your principal amount. The contingent repayment of principal applies only if you hold the Securities to maturity. Any payment on the Securities, including any repayment of principal, is subject to our creditworthiness. If we were to default on our payment obligations, you may not receive any amounts owed to you under the Securities and you could lose your entire investment. The Securities will not be listed on any securities exchange.

#### Features

**Enhanced Growth Potential**— At maturity, if the Underlying Return is positive, we will pay you the principal amount plus a return equal to the Upside Gearing times the Underlying Return. If the Underlying Return is negative, investors may be exposed to the negative Underlying Return at maturity.

**Contingent Repayment of Principal**— If the Underlying Return is negative, but the Final Underlying Level is not below the Downside Threshold, we will repay your principal amount. However, if the Final Underlying Level is less than the Downside Threshold, investors will be exposed to the full downside performance of the Underlying and we will pay less than the principal amount, resulting in a loss of principal amount that is proportionate to the percentage decline in the Underlying. Accordingly, you may lose some or all of the principal amount of the Securities. The contingent repayment of principal applies only at maturity. Any payment on the Securities, including any repayment of principal, is subject to our creditworthiness.

#### Key Dates

Trade Date August 28, 2017

Settlement Date August 31, 2017

Final Valuation Date<sup>1</sup> August 26, 2020

Maturity Date<sup>1</sup> August 31, 2020

<sup>1</sup> Subject to postponement in the event of a market disruption event and as described under “General Terms of the Securities—Payment at Maturity” in the accompanying product prospectus supplement no. UBS-IND-1.

**NOTICE TO INVESTORS: THE SECURITIES ARE SIGNIFICANTLY RISKIER THAN CONVENTIONAL DEBT INSTRUMENTS. THE ISSUER IS NOT NECESSARILY OBLIGATED TO REPAY THE FULL PRINCIPAL AMOUNT OF THE SECURITIES AT MATURITY, AND THE SECURITIES CAN HAVE THE FULL DOWNSIDE MARKET RISK OF THE UNDERLYING. THIS MARKET RISK IS IN ADDITION TO THE CREDIT RISK INHERENT IN PURCHASING OUR DEBT OBLIGATION. YOU SHOULD NOT PURCHASE THE SECURITIES IF YOU DO NOT UNDERSTAND OR ARE NOT COMFORTABLE WITH THE**

**SIGNIFICANT RISKS INVOLVED IN INVESTING IN THE SECURITIES.**

YOU SHOULD CAREFULLY CONSIDER THE RISKS DESCRIBED UNDER “KEY RISKS” BEGINNING ON PAGE 5 OF THIS PRICING SUPPLEMENT AND UNDER “RISK FACTORS” BEGINNING ON PAGE PS-4 OF THE ACCOMPANYING PRODUCT PROSPECTUS SUPPLEMENT NO. UBS-IND-1 BEFORE PURCHASING ANY SECURITIES. EVENTS RELATING TO ANY OF THOSE RISKS, OR OTHER RISKS AND UNCERTAINTIES, COULD ADVERSELY AFFECT THE MARKET VALUE OF, AND THE RETURN ON, YOUR SECURITIES. YOU COULD LOSE SOME OR ALL OF THE PRINCIPAL AMOUNT OF THE SECURITIES.

**Security Offering**

We are offering Trigger GEARS Linked to the S&P 500® Index. The Securities are offered at a minimum investment of 100 Securities at the Price to Public described below.

Underlying	Upside Gearing	Initial Underlying Level	Downside Threshold	CUSIP	ISIN
S&P 500® Index	1.24	2,444.24	1,955.39, which is 80% of the Initial Underlying Level (rounded to two decimal places)	78013F248	US78013F2487

See “Additional Information About Royal Bank of Canada and the Securities” in this pricing supplement. The Securities will have the terms specified in the prospectus dated January 8, 2016, the prospectus supplement dated January 8, 2016, product prospectus supplement no. UBS-IND-1 dated January 5, 2017 and this pricing supplement.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of the Securities or passed upon the accuracy or the adequacy of this pricing supplement or the accompanying prospectus, prospectus supplement and product prospectus supplement no. UBS-IND-1. Any representation to the contrary is a criminal offense.

Offering of Securities	Price to Public		Fees and Commissions <sup>(1)</sup>		Proceeds to Us	
	Total	Per Security	Total	Per Security	Total	Per Security
Securities Linked to the S&P 500® Index (the “SPX”)	\$15,221,500	\$10.00	\$0.00	\$0.00	\$15,221,500	\$10.00

<sup>(1)</sup> All sales of the Securities will be made to certain fee-based advisory accounts for which UBS Financial Services Inc., which we refer to as UBS, is an investment advisor and UBS will act as placement agent. The purchase price will be \$10.00 per Security and UBS will forgo any commissions related to these sales. See “Supplemental Plan of Distribution (Conflicts of Interest)” on page 12 of this pricing supplement.

The initial estimated value of the Securities as of the date of this document is \$9.8114 per \$10 in principal amount, which is less than the price to public. The actual value of the Securities at any time will reflect many factors, cannot be predicted with accuracy, and may be less than this amount. We describe our determination of the initial estimated value under “Key Risks” beginning on page 5, “Supplemental Plan of Distribution (Conflicts of Interest)” on page 12 and “Structuring the Securities” on page 12 of this pricing supplement.

The Securities will not constitute deposits insured under the Canada Deposit Insurance Corporation Act or by the United States Federal Deposit Insurance Corporation or any other Canadian or United States government agency or instrumentality.

UBS Financial Services Inc. RBC Capital Markets, LLC

Additional Information About Royal Bank of Canada and the Securities

You should read this pricing supplement 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 these Securities are a part, and the more detailed information contained in product prospectus supplement no. UBS-IND-1 dated January 5, 2017. This pricing supplement, together with the documents listed below, 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, fact sheets, brochures or other educational materials of ours. You should carefully consider, among other things, the matters set forth in “Risk Factors” in the accompanying product prospectus supplement no. UBS-IND-1, as the Securities involve risks not associated with conventional debt securities. If the terms discussed in this pricing supplement differ from those discussed in the product prospectus supplement, the prospectus supplement or the prospectus, the terms discussed herein will control. You may access these on the SEC website at [www.sec.gov](http://www.sec.gov) as follows (or if such address has changed, by reviewing our filing for the relevant date on the SEC website):

..Product prospectus supplement no. UBS-IND-1 dated January 5, 2017:

<https://www.sec.gov/Archives/edgar/data/1000275/000114036117000609/form424b5.htm>

..Prospectus supplement dated January 8, 2016:

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

..Prospectus dated January 8, 2016:

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

As used in this pricing supplement, “we,” “us” or “our” refers to Royal Bank of Canada.

### Investor Suitability

The Securities may be suitable for you if, among other considerations:

- .. You fully understand the risks inherent in an investment in the Securities, including the risk of loss of your entire initial investment.
- .. You can tolerate the loss of all or a substantial portion of the principal amount of the Securities and are willing to make an investment that may have the full downside market risk as a hypothetical investment in the Underlying.
- .. You believe the level of the Underlying will appreciate over the term of the Securities.
- .. You are willing to invest in the Securities based on the Upside Gearing indicated on the cover page of this pricing supplement.
- .. You can tolerate fluctuations in the price of the Securities prior to maturity that may be similar to or exceed the downside fluctuations in the level of the Underlying.
- .. You do not seek current income from your investment and are willing to forgo dividends paid on the securities represented by the Underlying.
- .. You are willing to hold the Securities to maturity and accept that there may be little or no secondary market for the Securities.
- .. You are willing to assume our credit risk for all payments under the Securities, and understand that if we default on our obligations, you may not receive any amounts due to you, including any repayment of principal.
- .. You fully understand and accept the risks associated with the Underlying.

The Securities may not be suitable for you if, among other considerations:

- .. You do not fully understand the risks inherent in an investment in the Securities, including the risk of loss of your entire initial investment.
- .. You require an investment designed to provide a full return of principal at maturity.
- .. You cannot tolerate the loss of all or a substantial portion of the principal amount of the Securities, and you are not willing to make an investment that may have the full downside market risk as a hypothetical investment in the Underlying.
- .. You believe that the level of the Underlying will decline over the term of the Securities.
- .. You are unwilling to invest in the Securities based on the Upside Gearing indicated on the cover page of this pricing supplement.
- .. You cannot tolerate fluctuations in the price of the Securities prior to maturity that may be similar to or exceed the downside fluctuations in the level of the Underlying.
- .. You seek current income from this investment or prefer to receive the dividends paid on the securities represented by the Underlying.
- .. You are unable or unwilling to hold the Securities to maturity or you seek an investment for which there will be an active secondary market.
- .. You are not willing to assume our credit risk for all payments under the Securities, including any repayment of principal.
- .. You do not fully understand and accept the risks associated with the Underlying.

The suitability considerations identified above are not exhaustive. Whether or not the Securities are a suitable investment for you will depend on your individual circumstances, and you should reach an investment decision only after you and your investment, legal, tax, accounting, and other advisers have carefully considered the suitability of an investment in the Securities in light of your particular circumstances. You should also review carefully the “Key Risks” in this pricing supplement and “Risk Factors” in the accompanying product prospectus supplement no. UBS-IND-1 for risks related to an investment in the Securities. In addition, you should review carefully the section below, “Information About the Underlying,” for more information about the Underlying.

Final Terms of the Securities<sup>1</sup>

Issuer: Royal Bank of Canada  
 Issue Price: \$10 per Security (subject to a minimum purchase of 100 Securities).  
 Principal Amount: \$10 per Security.  
 Term: Approximately 36 months  
 Underlying: S&P 500<sup>®</sup> Index  
 Upside Gearing: 1.24  
 If the Underlying Return is positive, we will pay you:  
 $\$10 + (\$10 \times \text{the Upside Gearing} \times \text{the Underlying Return})$   
 If the Underlying Return is zero or negative and the Final Underlying Level is greater than or equal to the Downside Threshold, we will pay you:  
 Payment at Maturity \$10  
 (per \$10 Security): If the Final Underlying Level is less than the Downside Threshold, we will pay you:  
 $\$10 + (\$10 \times \text{the Underlying Return})$   
 In this scenario, you will lose some or all of the principal amount of the Securities in an amount proportionate to the negative Underlying Return.  
 Underlying Return: Final Underlying Level – Initial Underlying Level  
 Initial Underlying Level: Initial Underlying Level  
 Initial Underlying Level: 2,444.24, which was the closing level of the Underlying on the Trade Date.  
 Final Underlying Level: The closing level of the Underlying on the Final Valuation Date.  
 Downside Threshold: 1,955.39, which is 80% of the Initial Underlying Level (rounded to two decimal places).  
 Investment Timeline

Trade Date: The Upside Gearing was set. The Initial Underlying Level and Downside Threshold were determined.

The Final Underlying Level and Underlying Return are determined.  
 If the Underlying Return is positive, we will pay you a cash payment per \$10.00 Security that provides you with your principal amount plus a return equal to the Underlying Return times the Upside Gearing. Your payment at maturity per \$10.00 Security will be equal to:  
 $\$10 + (\$10 \times \text{the Upside Gearing} \times \text{the Underlying Return})$   
 Maturity Date: If the Underlying Return is zero or negative and the Final Underlying Level is greater than or equal to the Downside Threshold, we will pay you a cash payment of \$10.00 per \$10.00 Security.  
 If the Final Underlying Level is less than the Downside Threshold, we will pay you a cash payment that is less than the principal amount of \$10.00 per Security, resulting in a loss of principal that is proportionate to the percentage decline in the Underlying, and equal to:  
 $\$10.00 + (\$10.00 \times \text{Underlying Return})$   
 In this scenario, you will lose some or all of the principal amount of the Securities, in an amount proportionate to the negative Underlying Return.

INVESTING IN THE SECURITIES INVOLVES SIGNIFICANT RISKS. YOU MAY LOSE SOME OR ALL OF YOUR PRINCIPAL AMOUNT. ANY PAYMENT ON THE SECURITIES, INCLUDING ANY REPAYMENT OF PRINCIPAL, IS SUBJECT TO OUR CREDITWORTHINESS. IF WE WERE TO DEFAULT ON OUR PAYMENT OBLIGATIONS, YOU MAY NOT RECEIVE ANY AMOUNTS OWED TO YOU UNDER THE SECURITIES AND YOU COULD LOSE YOUR ENTIRE INVESTMENT.

<sup>1</sup> Terms used in this pricing supplement, but not defined herein, shall have the meanings ascribed to them in the product prospectus supplement.

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## Key Risks

An investment in the Securities involves significant risks. Investing in the Securities is not equivalent to investing directly in any of the component securities of the Underlying. These risks are explained in more detail in the “Risk Factors” section of the accompanying product prospectus supplement no. UBS-IND-1. We also urge you to consult your investment, legal, tax, accounting and other advisors before investing in the Securities.

### Risks Relating to the Securities Generally

**Your Investment in the Securities May Result in a Loss of Principal —** The Securities differ from ordinary debt securities in that we are not necessarily obligated to repay the full principal amount of the Securities at maturity. The return on the Securities at maturity is linked to the performance of the Underlying and will depend on whether, and the extent to which, the Underlying Return is positive or negative. If the Final Underlying Level is less than the Downside Threshold, you will be fully exposed to any negative Underlying Return and we will pay you less than your principal amount at maturity, resulting in a loss of principal of your Securities that is proportionate to the percentage decline in the Underlying. Accordingly, you could lose the entire principal amount of the Securities.

**The Contingent Repayment of Principal Applies Only if You Hold the Securities to Maturity —** You should be willing to hold your Securities to maturity. If you are able to sell your Securities prior to maturity in the secondary market, you may have to sell them at a loss even if the level of the Underlying is above the Downside Threshold at the time of sale.

**The Upside Gearing Applies Only if You Hold the Securities to Maturity —** The application of the Upside Gearing only applies at maturity. If you are able to sell your Securities prior to maturity in the secondary market, the price you receive will likely not reflect the full effect of the Upside Gearing and the return you realize may be less than the Upside Gearing times the return of the Underlying at the time of sale, even if that return is positive.

**No Interest Payments —** We will not pay any interest with respect to the Securities.

**An Investment in the Securities Is Subject to Our Credit Risk —** The Securities are unsubordinated, unsecured debt obligations of the issuer, Royal Bank of Canada, and are not, either directly or indirectly, an obligation of any third party. Any payment to be made on the Securities, including any repayment of principal at maturity, depends on our ability to satisfy our obligations as they come due. As a result, our actual and perceived creditworthiness may affect the market value of the Securities and, in the event we were to default on our obligations, you may not receive any amounts owed to you under the terms of the Securities and you could lose your entire initial investment.

**Your Return on the Securities May Be Lower than the Return on a Conventional Debt Security of Comparable Maturity —** The return that you will receive on the Securities, which could be negative, may be less than the return you could earn on other investments. Even if your return is positive, your return may be less than the return you could earn if you bought a conventional senior interest bearing debt security of ours with the same maturity date or if you were able to invest directly in the Underlying or the securities included in the Underlying. Your investment may not reflect the full opportunity cost to you when you take into account factors that affect the time value of money.

**No Dividend Payments or Voting Rights —** Investing in the Securities is not equivalent to investing directly in any of the component securities of the Underlying. As a holder of the Securities, you will not have voting rights or rights to receive cash dividends or other distributions or other rights that holders of the equity securities represented by the Underlying would have. The Underlying is a price return index, and the Underlying Return excludes any cash dividend payments paid on its component stocks.

**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, which is less than the public offering price you pay for the Securities, does not represent a minimum price at which we, RBCCM or any of our other 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, the borrowing rate we pay to issue securities of this kind, and the inclusion in the price to the public and our estimated profit and the 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 the price to public, as any such sale price would not be expected to include our estimated profit and the costs relating to our hedging of the Securities. In addition, any price at which you may sell the Securities is likely to reflect customary bid-ask spreads for similar trades. In addition to bid-ask spreads, the value of the Securities determined for any secondary market price is expected to be based on a secondary market rate rather than the internal borrowing 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 borrowing 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 Time the Terms of the Securities Were Set** — 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 Trade Date will vary based on many factors, including changes in market conditions, and cannot be predicted with accuracy. As a result, the actual value you would receive if you sold the Securities in any secondary market, if any, should be expected to differ materially from the initial estimated value of your Securities and the amount that may be paid at maturity.

**Changes Affecting the Underlying** — The policies of the index sponsor concerning additions, deletions and substitutions of the stocks included in the Underlying and the manner in which the index sponsor takes account of certain changes affecting those stocks included in the Underlying may adversely affect its level. The policies of the index sponsor with respect to the calculation of the Underlying could also adversely affect its level. The index sponsor may discontinue or suspend calculation or dissemination of the Underlying and has no obligation to consider your interests in the Securities when taking any action regarding the Underlying. Any such actions could have an adverse effect on the value of the Securities and the amount that may be paid at maturity.

**Lack of Liquidity** — The Securities will not be listed on any securities exchange. RBC Capital Markets, LLC (“RBCCM”) intends to offer to purchase the Securities in the secondary market, but is not required to do so. Even if there is a secondary market, it may not provide enough liquidity to allow you to trade or sell the Securities easily. Because other dealers are not likely to make a 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 buy the Securities.



Potential Conflicts — We and our affiliates play a variety of roles in connection with the issuance of the Securities, including hedging our obligations under the Securities. In performing these duties, the economic interests of the calculation agent and other affiliates of ours are potentially adverse to your interests as an investor in the Securities. Potentially Inconsistent Research, Opinions or Recommendations by RBCCM, UBS or Their Affiliates — RBCCM, UBS or their affiliates may publish research, express opinions or provide recommendations that are inconsistent with investing in or holding the Securities, and which may be revised at any time. Any such research, opinions or recommendations could affect the level of the Underlying or the equity securities included in the Underlying, and therefore, the market value of the Securities.

Uncertain Tax Treatment — Significant aspects of the tax treatment of an investment in the Securities are uncertain. You should consult your tax adviser about your tax situation.

Potential Royal Bank of Canada and UBS Impact on Price — Trading or other transactions by Royal Bank of Canada, UBS and our respective affiliates in the equity securities included in the Underlying or in futures, options, exchange-traded funds or other derivative products on the equity securities included in the Underlying may adversely affect the market value of those equity securities, the level of the Underlying and therefore, the market value of the Securities.

The Probability That the Underlying Will Fall Below the Downside Threshold on the Final Valuation Date Will Depend on the Volatility of the Underlying — "Volatility" refers to the frequency and magnitude of changes in the level of the Underlying. Greater expected volatility with respect to the Underlying reflects a higher expectation as of the Trade Date that the Underlying could close below its Downside Threshold on the Final Valuation Date, resulting in the loss of some or all of your investment. However, an Underlying's volatility can change significantly over the term of the Securities. The level of the Underlying could fall sharply, which could result in a significant loss of principal.

The Terms of the Securities at Issuance Were Influenced and Their Market Value Prior to Maturity Will Be Influenced by Many Unpredictable Factors — Many economic and market factors influenced the terms of the Securities at issuance and will influence their value prior to maturity. These factors are similar in some ways to those that could affect the value of a combination of instruments that might be used to replicate the payments on the Securities, including a combination of a bond with one or more options or other derivative instruments. For the market value of the Securities, we expect that, generally, the level of the Underlying on any day will affect the value of the Securities more than any other single factor. However, you should not expect the value of the Securities in the secondary market to vary in proportion to changes in the level of the Underlying. The value of the Securities will be affected by a number of other factors that may either offset or magnify each other, including:

the actual or expected volatility of the Underlying;

.. the time remaining to maturity of the Securities;

the dividend rates on the equity securities included in the Underlying;

interest and yield rates in the market generally, as well as in each of the markets of the equity securities included in the Underlying;

a variety of economic, financial, political, regulatory or judicial events; and

our creditworthiness, including actual or anticipated downgrades in our credit ratings.

Some or all of these factors influenced the terms of the Securities at issuance and will influence the price you will receive if you choose to sell the Securities prior to maturity. The impact of any of the factors set forth above may enhance or offset some or all of any change resulting from another factor or factors. You may have to sell the Securities at a substantial discount from the principal amount if, for example, the level of the Underlying is at, below or not sufficiently above, the Initial Underlying Level.

Hypothetical Examples and Return Table at Maturity

Hypothetical terms only. Actual terms may vary. See the cover page for actual offering terms.

The following table and hypothetical examples below illustrate the payment at maturity per \$10.00 Security for a hypothetical range of Underlying Returns from -100.00% to +100.00% and assume a hypothetical Initial Underlying Level of 2,000 and a hypothetical Downside Threshold of 1,600.00, and reflect the Upside Gearing of 1.24. The actual Initial Underlying Level and Downside Threshold are set forth in “Final Terms of the Securities” and on the cover page of this pricing supplement. The hypothetical Payment at Maturity examples set forth below are for illustrative purposes only and may not be the actual returns applicable to a purchaser of the Securities. The actual payment at maturity will be determined based on the Final Underlying Level on the Final Valuation Date. You should consider carefully whether the Securities are suitable to your investment goals. The numbers appearing in the table below have been rounded for ease of analysis.

Example 1 – On the Final Valuation Date, the Underlying closes 10% above the Initial Underlying Level. Because the Underlying Return is positive, we will pay you an amount based upon the Underlying Return times the Upside Gearing, and the payment at maturity per \$10 principal amount Security will be calculated as follows:

$$\$10 + (\$10 \times 1.24 \times 10\%) = \$10 + \$1.24 = \$11.24$$

Example 2 – On the Final Valuation Date, the Underlying closes 10% below the Initial Underlying Level. Because the Underlying Return is negative, but the Final Underlying Level is greater than the Downside Threshold, we will pay you at maturity the principal amount of \$10 per \$10 principal amount Security.

Example 4 – On the Final Valuation Date, the Underlying closes 50% below the Initial Underlying Level. Because the Underlying Return is negative and the Final Underlying Level is less than the Downside Threshold, we will pay you at maturity a cash payment of \$5.00 per \$10 principal amount Security (a 50% loss on the principal amount), calculated as follows:

$$\$10 + (\$10 \times -50\%) = \$10 - \$5.00 = \$5.00$$

Hypothetical Final Underlying Level	Hypothetical Underlying Return <sup>1</sup>	Hypothetical Payment at Maturity (\$)	Hypothetical Total Return on Securities <sup>2</sup> (%)
4,000.00	100.00%	\$22.40	124.00%
3,500.00	75.00%	\$19.30	93.00%
3,000.00	50.00%	\$16.20	62.00%
2,800.00	40.00%	\$14.96	49.60%
2,600.00	30.00%	\$13.72	37.20%
2,400.00	20.00%	\$12.48	24.80%
2,200.00	10.00%	\$11.24	12.40%
2,100.00	5.00%	\$10.62	6.20%
2,040.00	2.00%	\$10.25	2.48%
2,000.00	0.00%	\$10.00	0.00%
1,900.00	-5.00%	\$10.00	0.00%
1,800.00	-10.00%	\$10.00	0.00%
1,600.00	-20.00%	\$8.00	-20.00%
1,400.00	-30.00%	\$7.00	-30.00%
1,000.00	-50.00%	\$5.00	-50.00%
800.00	-60.00%	\$4.00	-60.00%
500.00	-75.00%	\$2.50	-75.00%
0.00	-100.00%	\$0.00	-100.00%

<sup>1</sup> The Underlying Return excludes any cash dividend payments.

<sup>2</sup> The “total return” is the number, expressed as a percentage, that results from comparing the payment at maturity per \$10 principal amount Security to the purchase price of \$10 per Security.



## What Are the Tax Consequences of the Securities?

### U.S. Federal Income Tax Consequences

Set forth below, together with the discussion of U.S. federal income tax in the accompanying product prospectus supplement, prospectus supplement, and prospectus, is a summary of the material U.S. federal income tax consequences relating to an investment in the Securities. The following summary supplements and to the extent inconsistent with supersedes the discussion under the section entitled “Supplemental Discussion of U.S. Federal Income Tax Consequences” in the accompanying product prospectus supplement, the section entitled “Certain Income Tax Consequences” in the accompanying prospectus supplement, and the section entitled “Tax Consequences” in the accompanying prospectus, which you should carefully review prior to investing in the Securities.

In the opinion of our counsel, Morrison & Foerster LLP, it would generally be reasonable to treat the Securities as pre-paid cash-settled derivative contracts in respect of the Underlying 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 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. 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 tax treatments are also possible and the Internal Revenue Service might assert that a treatment other than that described above is more appropriate. In addition, the Internal Revenue Service has released a notice that may affect the taxation of holders of the Securities. According to the notice, the Internal Revenue Service and the 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 Internal Revenue Service and the Treasury Department are also considering other relevant issues, including whether additional gain or loss from such instruments should be treated as ordinary or capital and whether the special “constructive ownership rules” of Section 1260 of the Internal Revenue Code 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.

Individual holders that own “specified foreign financial assets” may be required to include certain information with respect to such assets with their U.S. federal income tax return. You are urged to consult your own tax advisor regarding such requirements with respect to the Securities.

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 or the Securities (for example, upon an Underlying 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 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.

Please see the discussion under the section entitled “Supplemental Discussion of U.S. Federal Income Tax Consequences” in the accompanying product prospectus supplement for a further discussion of the U.S. federal income tax consequences of an investment in the Securities.

Canadian Federal Income Tax Consequences

For a discussion of the material Canadian federal income tax consequences relating to an investment in the Securities, please see the section entitled "Tax Consequences—Canadian Taxation" in the accompanying prospectus, which you should carefully review prior to investing in the Securities.

### Information About the Underlying

We have derived all information contained in this document regarding the SPX, including, without limitation, its make-up, method of calculation, and changes in its components, from publicly available sources. The information reflects the policies of, and is subject to change by, the index sponsor. The index sponsor, which owns the copyright and all other rights to the SPX, has no obligation to continue to publish, and may discontinue publication of the SPX. None of us, UBS or RBCCM accepts any responsibility for the calculation, maintenance or publication of the SPX or any successor 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 chooses companies for inclusion in the SPX with the aim of achieving a distribution by broad industry groupings that approximates the distribution of these groupings in the common stock population of its Stock Guide Database of over 10,000 companies, which the index sponsor uses as an assumed model for the composition of the total market. Relevant criteria employed by the index sponsor include the viability of the particular company, the extent to which that company represents the industry group to which it is assigned, the extent to which the market price of that company's common stock generally is responsive to changes in the affairs of the respective industry, and the market value and trading activity of the common stock of that company.

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.

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

block. If a company has multiple classes of stock outstanding, shares in an unlisted or non-traded class are treated as a control block.

For each stock, an investable weight factor (“IWF”) is calculated by dividing the available float shares by the total shares outstanding. As of September 21, 2012, available float shares are defined as the total shares outstanding less shares held by control holders. This calculation is subject to a 5% minimum threshold for control blocks. For example, if a company’s officers and directors hold 3% of the company’s shares, and no other control group holds 5% of the company’s shares, 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. For companies with multiple classes of stock, the index sponsor calculates the weighted average IWF for each stock using the proportion of the total company market capitalization of each share class as weights.

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

#### Index Maintenance

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

To prevent the level of the SPX from changing due to corporate actions, corporate actions which affect the total market value of the SPX require an index divisor adjustment. By adjusting the index divisor for the change in market value, the level of the SPX remains constant and does not reflect the corporate actions of individual companies in the SPX. Index divisor adjustments are made after the close of trading and after the calculation of the SPX closing level. Changes in a company’s shares outstanding of 5.00% or more due to mergers, acquisitions, public offerings, tender offers, Dutch auctions, or exchange offers are made as soon as reasonably possible. Share changes due to mergers or acquisitions of publicly held companies that trade on a major exchange are implemented when the transaction occurs even if both of the companies are not in the same headline index, and regardless of the size of the change. All other changes of 5.00% or more (due to, for example, company stock repurchases, private placements, redemptions, exercise of options, warrants, conversion of preferred stock, notes, debt, equity participation units, at the market offerings, or other recapitalizations) are made weekly and are announced on Fridays for implementation after the close of trading on the following Friday. Changes of less than 5.00% are accumulated and made quarterly on the third Friday of March, June, September, and December, and are usually announced two to five days prior.

If a change in a company’s shares outstanding of 5.00% or more causes a company’s IWF to change by five percentage points or more, the IWF is updated at the same time as the share change. IWF changes resulting from partial tender offers are considered on a case-by-case basis.

#### License Agreement

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The Securities are not sponsored, endorsed, sold or promoted by S&P Dow Jones Indices LLC, Standard & Poor's Financial Services LLC or any of their respective affiliates (collectively, "S&P Dow Jones Indices"). S&P Dow Jones Indices make no representation or warranty, express or implied, to the holders of the 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.

## Historical Information

The following table sets forth the quarterly high, low and period-end closing levels of the Underlying, as reported by Bloomberg L.P. The historical performance of the Underlying should not be taken as an indication of its future performance during the term of the Securities. We cannot give you assurance that the performance of the Underlying will result in the return of any of your initial investment.

Quarter Begin	Quarter End	Quarterly Closing High	Quarterly Closing Low	Quarterly Period-End Close
1/1/2008	3/31/2008	1,447.16	1,273.37	1,322.70
4/1/2008	6/30/2008	1,426.63	1,278.38	1,280.00
7/1/2008	9/30/2008	1,305.32	1,106.39	1,166.36
10/1/2008	12/31/2008	1,161.06	752.44	903.25
1/1/2009	3/31/2009	934.70	676.53	797.87
4/1/2009	6/30/2009	946.21	811.08	919.32
7/1/2009	9/30/2009	1,071.66	879.13	1,057.08
10/1/2009	12/31/2009	1,127.78	1,025.21	1,115.10
1/1/2010	3/31/2010	1,174.17	1,056.74	1,169.43
4/1/2010	6/30/2010	1,217.28	1,030.71	1,030.71
7/1/2010	9/30/2010	1,148.67	1,022.58	1,141.20
10/1/2010	12/31/2010	1,259.78	1,137.03	1,257.64
1/1/2011	3/31/2011	1,343.01	1,256.88	1,325.83
4/1/2011	6/30/2011	1,363.61	1,265.42	1,320.64
7/1/2011	9/30/2011	1,353.22	1,119.46	1,131.42
10/1/2011	12/31/2011	1,285.09	1,099.23	1,257.60
1/1/2012	3/31/2012	1,416.51	1,277.06	1,408.47
4/1/2012	6/30/2012	1,419.04	1,278.04	1,362.16
7/1/2012	9/30/2012	1,465.77	1,334.76	1,440.67
10/1/2012	12/31/2012	1,461.40	1,353.33	1,426.19
1/1/2013	3/31/2013	1,569.19	1,457.15	1,569.19
4/1/2013	6/30/2013	1,669.16	1,541.61	1,606.28
7/1/2013	9/30/2013	1,725.52	1,614.08	1,681.55
10/1/2013	12/31/2013	1,848.36	1,655.45	1,848.36
1/1/2014	3/31/2014	1,878.04	1,741.89	1,872.34
4/1/2014	6/30/2014	1,962.87	1,815.69	1,960.23
7/1/2014	9/30/2014	2,011.36	1,909.57	1,972.29
10/1/2014	12/31/2014	2,090.57	1,862.49	2,058.90
1/1/2015	3/31/2015	2,117.39	1,992.67	2,067.89
4/1/2015	6/30/2015	2,130.82	2,057.64	2,063.11
7/1/2015	9/30/2015	2,128.28	1,867.61	1,920.03
10/1/2015	12/31/2015	2,109.79	1,923.82	2,043.94
1/1/2016	3/31/2016	2,063.95	1,829.08	2,059.74
4/1/2016	6/30/2016	2,119.12	2,000.54	2,098.86
7/1/2016	9/30/2016	2,190.15	2,088.55	2,168.27
10/1/2016	12/31/2016	2,271.72	2,085.18	2,238.83
1/1/2017	3/31/2017	2,395.96	2,257.83	2,362.72
4/1/2017	6/30/2017	2,453.46	2,328.95	2,423.41
7/1/2017	8/28/2017	2,480.91	2,409.75	2,444.24

\*This document includes information for the third calendar quarter of 2017 only for the period from July 1, 2017 through August 28, 2017. Accordingly, the “Quarterly Closing High,” “Quarterly Closing Low” and “Quarterly Period-End Close” data indicated are for this shortened period only and do not reflect complete data for the third calendar quarter of 2017.

The graph below illustrates the performance of the Underlying from January 1, 2008 to August 28, 2017, based on the Initial Underlying Level of 2,444.24, which was its closing level on August 28, 2017.

HISTORIC PERFORMANCE IS NOT AN INDICATION OF FUTURE PERFORMANCE.

Source: Bloomberg L.P. We have not independently verified the accuracy or completeness of the information obtained from Bloomberg L.P.

#### Supplemental Plan of Distribution (Conflicts of Interest)

We have agreed to indemnify UBS and RBCCM against liabilities under the Securities Act of 1933, as amended, or to contribute payments that UBS and RBCCM may be required to make relating to these liabilities as described in the prospectus supplement and the prospectus. All sales of the Notes will be made to certain fee-based advisory accounts for which UBS is an investment advisor and UBS will act as placement agent. The purchase price will be \$10.00 per Note and UBS will forgo any commissions related to these sales. Investors that purchase and hold the Notes in fee-based advisory accounts will pay advisory fees to UBS based on the amount of assets held in those accounts.

Subject to regulatory constraints and market conditions, RBCCM intends to offer to purchase the Securities in the secondary market, but it is not required to do so.

We or our affiliates may enter into swap agreements or related hedge transactions with one of our other affiliates or unaffiliated counterparties in connection with the sale of the Securities and RBCCM and/or an affiliate may earn additional income as a result of payments pursuant to the swap or related hedge transactions. See “Use of Proceeds and Hedging” beginning on page PS-13 of the accompanying product prospectus supplement no. UBS-IND-1.

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 upon the price that RBCCM may pay for the Securities in light of then prevailing market conditions, our creditworthiness and transaction costs. For a period of approximately 5 months after the issue date of the Securities, the value of the Securities that may be shown on your account statement may 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 our hedging costs and profits; however, the value of the Securities shown on your account statement during that period may be a higher amount, reflecting the addition of our estimated costs and profits from hedging the Securities. Any such excess is expected to decrease over time until the end of this period. After this period, if RBCCM repurchases your Securities, it expects to do so at prices that reflect their estimated value. This period may be reduced at RBCCM’s discretion based on a variety of factors, including but not limited to, the amount of the Securities that we repurchase and our negotiated arrangements from time to time with UBS.

For additional information as to the relationship between us and RBCCM, please see the section “Plan of Distribution—Conflicts of Interest” in the prospectus dated January 8, 2016.

#### Structuring the Securities

The Securities are our debt securities, the return on which is linked to the performance of the Underlying. 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 is a factor that resulted in a higher initial estimated value of the Securities at the time their terms are set than if the secondary market rate was used. Unlike the estimated value included on the cover of this document, any value of the Securities determined for purposes of a secondary market transaction may be based on a different borrowing rate, which may result in a lower value for the Securities than if our initial internal borrowing 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, 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 is a factor that reduced the economic terms of the Securities to you. The initial offering price of the Securities also reflects our estimated hedging costs. These factors resulted in the initial estimated value for the Securities on the Trade Date being less than their public offering price. See “Key Risks—The Initial Estimated Value of the Securities Is Less than the Price to the Public” above.

Terms Incorporated in Master Note

The terms appearing above under the caption “Final Terms of the Securities” and the provisions in the accompanying product prospectus supplement no. UBS-IND-1 dated January 5, 2017 under the caption “General Terms of the Securities,” are incorporated into the master note issued to DTC, the registered holder of the Securities.

#### Validity of the Securities

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 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.