

# JPMORGAN CHASE & CO.

## ***Notes Linked to an S&P 500® Dividend Aristocrats Daily Risk Control Excess Return Index***

JPMorgan Chase & Co. may, from time to time, offer and sell notes linked to the S&P 500® Dividend Aristocrats Daily Risk Control 8% Excess Return Index or the S&P 500® Dividend Aristocrats Daily Risk Control 10% Excess Return Index (each, an "Index," and collectively, the "Indices"). This underlying supplement no. 7-I describes the Indices, the relationship between JPMorgan Chase & Co. and the sponsor or publisher of the Indices and other relevant information. This underlying supplement no. 7-I supplements the terms described in the accompanying product supplement, prospectus supplement and prospectus. A separate term sheet or pricing supplement, as the case may be, will describe terms that apply to specific issuances of the notes, including any changes to description of the Indices. We refer to such term sheets and pricing supplements generally as terms supplements. If the terms described in the relevant terms supplement are inconsistent with those described herein or in any other relevant underlying supplement, or in the accompanying product supplement, prospectus supplement or prospectus, the terms described in the relevant terms supplement will control. In addition, if this underlying supplement no. 7-I and the accompanying product supplement or another relevant underlying supplement contain information relating to the Indices, the information contained in the document with the most recent date will control.

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J.P.Morgan

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### Risks Relating to the Indices

**Our affiliate, J.P. Morgan Securities LLC, helped develop the Indices.**

One of our affiliates, J.P. Morgan Securities LLC, which we refer to as JPMS, worked with Standard & Poor's Financial Services LLC ("S&P") in developing the guidelines and policies governing the composition and calculation of the Indices. Although judgments, policies and determinations concerning the Indices were made by JPMS, JPMorgan Chase & Co., as the ultimate parent company of JPMS, ultimately controls JPMS.

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**An Index may be partially uninvested, which will result in a portion that Index reflecting no return.**

The Indices utilize the existing S&P 500® Dividend Aristocrats Total Return Index (the "Base Index") methodology, plus an overlying mathematical algorithm designed to control the level of risk of the Base Index by establishing a specific volatility target and dynamically adjusting the exposure to the Base Index based on its observed historical volatility. If the Base Index experiences volatility in excess of the applicable volatility target over the relevant period, the exposure to the Base Index is decreased, meaning that the applicable Index will be partially uninvested and, accordingly, that Index will reflect no return with respect to the uninvested portion. Increased volatility in the Base Index may adversely affect the performance of the Index and the notes.

**The Indices have limited histories and may perform in unexpected ways.**

The Indices each began publishing on August 25, 2010. Therefore, the Indices have limited histories. S&P has calculated the returns that hypothetically might have been generated had the Indices existed in the past, but those calculations are subject to many limitations. Such hypothetical calculations do not reflect actual trading, liquidity constraints, fees and other costs. In addition, the models used to calculate these hypothetical returns are based on certain data, assumptions and estimates. Different models or models using different data, assumptions or estimates might result in materially different hypothetical performance. Regardless of the hypothetical historical and actual historical performance of the Indices, the value of the notes could be adversely affected by future performance of the Index.

**The Indices may not be successful, may not outperform the Base Index and may not achieve their target volatility.**

Each Index employs a mathematical algorithm intended to control the level of risk of the Base Index by establishing a specific volatility target and dynamically adjusting the exposure to the Base Index based on its observed historical volatility. No assurance can be given that the volatility strategy will be successful or that the Indices will outperform the Base Index or any alternative strategy that might be employed to reduce the level of risk of the Base Index. We also can give you no assurance that any Index will achieve its target volatility.

**Each Index dynamically adjusts exposure to the Base Index based on observed volatility that may lead to an underexposure of your notes to the performance of the Base Index.**

Each Index represents a portfolio consisting of the Base Index and a borrowing cost component accruing interest based on the overnight U.S. LIBOR rate or a synthetically rolling 3-month bond, with reference to the 2-month and 3-month U.S. LIBOR rates, respectively. Each Index dynamically adjusts its exposure to the Base Index based on the observed volatility of the Base Index. Each Index's exposure to the Base Index will decrease, or deleverage, when historical volatility causes the risk level of the Base Index to reach a high threshold. If, at any time, any Index exhibits low exposure to the Base Index, and the Base Index subsequently appreciates significantly, such Index will not participate fully in this appreciation. Under these circumstances, the return on the notes, if any, may be less than the amount you would have received by investing the same principal amount directly in the Base Index or in the underlying securities composing the Base Index.

**The Indices are subject to short-term money market fund borrowing costs.**

Each Index is designed to track an unfunded investment in the Base Index with a leveraged or deleveraged position according to the applicable target volatility. As an "excess return" index, each Index reflects the return on a leveraged or deleveraged investment with an increased or decreased exposure to the Base Index where the investment was made through the use of borrowed funds. Thus, the level of each Index will reflect the leveraged or deleveraged return of the Base Index, less the associated borrowing costs. Accordingly, the level of each Index will be subject to short-term money market fund borrowing costs and will not include the "total return" feature or cash component of a "total return" index, which would represent a funded position in the Base Index.

## THE S&P 500® DIVIDEND ARISTOCRATS DAILY RISK CONTROL EXCESS RETURN INDICES

We have derived all information contained in this underlying supplement regarding the S&P 500® Dividend Aristocrats Daily Risk Control 8% Excess Return Index (the “**RC8 Index**”) and the S&P 500® Dividend Aristocrats Daily Risk Control 10% Excess Return Index (the “**RC10 Index**”) (each, a “**Risk Control Index**” and together, the “**Risk Control Indices**”), including, without limitation, their make-up, method of calculation and changes in their components, from publicly available information and other information provided by Standard & Poor’s Financial Services LLC (“**S&P**”). Such information reflects the policies of, and is subject to change by, S&P. We make no representation or warranty as to the accuracy or completeness of such information. The Risk Control Indices were developed by S&P and J.P. Morgan Securities LLC and are calculated, maintained and published by S&P. S&P has no obligation to continue to publish, and may discontinue publication of, either of the Risk Control Indices.

### The S&P 500® Dividend Aristocrats Daily Risk Control 8% Excess Return Index

The RC8 Index is intended to provide a performance benchmark for large cap, blue-chip companies within the S&P 500® Index that have followed a managed dividends policy of consistently increasing dividends every year for at least 25 years while also seeking greater stability than and a reduction in the overall risk level relative to the S&P 500® Dividend Aristocrats Total Return Index (the “**Base Index**”). The RC8 Index utilizes the existing Base Index methodology, plus an overlying mathematical algorithm designed to control the level of risk of the Base Index by establishing a specific volatility target of 8% and dynamically adjusting the exposure to the Base Index based on its observed historical volatility. If the risk level reaches a threshold that is too high, the cash level is increased in order to maintain the target volatility of 8%. If the risk level is too low, then the RC8 Index will employ leverage to maintain the target volatility of 8%.

The RC8 Index is reported by Bloomberg L.P. under the ticker symbol “SPXD8UE.”

### The S&P 500® Dividend Aristocrats Daily Risk Control 10% Excess Return Index

The RC10 Index is intended to provide a performance benchmark for large cap, blue-chip companies within the S&P 500® Index that have followed a managed dividends policy of consistently increasing dividends every year for at least 25 years while also seeking greater stability than and a reduction in the overall risk level relative to the Base Index. The RC10 Index utilizes the existing Base Index methodology, plus an overlying mathematical algorithm designed to control the level of risk of the Base Index by establishing a specific volatility target of 10% and dynamically adjusting the exposure to the Base Index based on its observed historical volatility. If the risk level reaches a threshold that is too high, the cash level is increased in order to maintain the target volatility of 10%. If the risk level is too low, then the RC10 Index will employ leverage to maintain the target volatility of 10%.

The RC10 Index is reported by Bloomberg L.P. under the ticker symbol “SPXD10UE.”

### The Risk Control Indices

Each Risk Control Index tracks the return of the Base Index over and above a short-term money market investment. In other words, each Risk Control Index calculates the return on an investment in the Base Index where the investment was made through the use of borrowed funds. Thus the return of each Risk Control Index will be equal to that of the Base Index less the associated borrowing costs.

Each Risk Control Index represents a portfolio consisting of the Base Index and a borrowing cost component accruing interest based on a synthetically rolling 3-month bond, with reference to the 2-month and 3-month U.S. LIBOR rates. Each Risk Control Index is rebalanced and reweighted between the Base Index and a borrowing cost component daily, in order to seek to maintain the target volatility. There are no guarantees that the Risk Control Indices will achieve their stated targets.

For information related to the criteria for inclusion in the Base Index and information on how the Base Index is calculated, please refer the “Base Index” below and to “Background on the S&P 500® Dividend Aristocrats Index” in this underlying supplement.

The return of each Risk Control Index consists of two components: (1) the return on the position in the Base Index and (2) the associated borrowing costs of the investment funds, depending upon whether the position is leveraged or deleveraged. For example, if the exposure to the Base Index is 80%, the remaining 20% will not accumulate borrowing costs in the applicable Risk Control Index. If the leverage factor is greater than 100%, the full exposure will be charged borrowing costs, which are deducted from the applicable Risk Control Index.

As an excess return index, each Risk Control Index represents an unfunded position in the Base Index. The borrowing rate is generally based on a synthetically rolling 3-month bond, with reference to the 2-month and 3-month U.S. LIBOR rates. S&P may use other successor interest rates if the U.S. LIBOR rates could not be obtained. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices.

Each Risk Control Index is dynamically adjusted to target a particular level of volatility. The applicable target level of volatility is 8% with respect to the RC8 Index and 10% with respect to the RC10 Index. Volatility is calculated as a function of historical returns that uses exponential weightings to give more significance to recent observations. Short- and long-term measures of volatility are used to cause each Risk Control Index to deleverage quickly, but increase exposure more gradually on a relative basis. The short-term and long-term decay factors, which are numbers greater than zero and less than one that determine the weight of each weekly return in the calculation of historical variance, are 0.94 (94%) and 0.97 (97%), respectively. If the risk level reaches a threshold that is too high, the cash level is increased in order to maintain the target volatility. If the risk level is too low, then the applicable Risk Control Index will employ leverage to maintain the targeted level of volatility.

Each Risk Control Index includes a leverage factor that changes based on realized historical volatility. A leverage factor greater than 1 represents a leveraged position and a leverage factor less than 1 represents a deleveraged position. The maximum leverage factor each Risk Control Index may have is 1.50 (150%).

#### Calculation of the Risk Control Index Return

The formula for calculating the return of each Risk Control Index is as follows:

$$RiskControlIndexReturn_t = \left[ K_{rb} * \left( \frac{UnderlyingIndex_t}{UnderlyingIndex_{rb}} - 1 \right) + (-K_{rb}) * \left[ \prod_{i=rb+1}^1 (1 + InterestRate_{i-1}) - 1 \right] \right]$$

The Risk Control Index Value at time  $t$  can then be calculated as:

$$RiskControlIndexValue_t = (RiskControlIndexValue_{rb}) * (1 + RiskControlIndexReturn_t)$$

Substituting the first equation above into the second equation and expanding yields:

$$Risk\ Control\ Index\ Value_t =$$

$$Risk\ Control\ Index\ Value_{rb} * \left[ 1 + \left[ K_{rb} * \left( \frac{UnderlyingIndex_t}{UnderlyingIndex_{rb}} - 1 \right) + (-K_{rb}) * \left[ \prod_{i=rb+1}^t (1 + InterestRate_{i-1}) - 1 \right] \right] \right]$$

where:

$Interest\ Rate_{i-1}$  = the interest rate set for the Risk Control Index. The interest rate is the return from a synthetically daily rolling of a 3-month bond, with reference to the 2-month and 3-month U.S. LIBOR rates. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices.

$rb$  = the last Risk Control Index rebalancing date.

$K_{rb}$  = the leverage factor, calculated as:

$$Min(Max\ K, Target\ Volatility/Realized\ Volatility_{rb-d})$$

$Underlying\ Index_t$  = the level of the Base Index on day  $t$

$Underlying\ Index_{rb}$  = the level of the Base Index as of the previous rebalancing date.

$Max\ K$  = the maximum leverage factor allowed in the Risk Control Index (150%).

$Target\ Volatility$  = the target level of volatility set for the Risk Control Index (8% with respect to the RC8 Index or 10% with respect to the RC10 Index).

$Realized\ Volatility_{rb-d}$  = The historical realized volatility of the Base Index as of the close of  $d$  trading days prior to the previous rebalancing date  $rb$ , where a trading day is defined as a day on which the Base Index is calculated.

$d$  = two (2), the number of days between when volatility is observed and the rebalancing date. The historical volatility of the Base Index as of the close two days prior to the rebalancing date will be used to calculate the leverage factor  $K_{rb}$ .

### Calculation of Volatility

The realized volatility is calculated as the maximum of two exponentially weighted moving averages, one measuring short-term and one measuring long-term volatility.

$$Realized\ Volatility_t = \text{Max} (Realized\ Volatility_{s,t}, Realized\ Volatility_{L,t})$$

where:

$S, t$  = The short-term volatility measure, calculated as:

$$RealizedVolatility_{s,t} = \sqrt{\frac{252}{n} * Variance_{s,t}}$$

for  $t > T_0$

$$Variance_{s,t} = \lambda_s * Variance_{s,t-1} + (1 - \lambda_s) * \left[ \ln \left( \frac{UnderlyingIndex_t}{UnderlyingIndex_{t-n}} \right) \right]^2$$

for  $t = T_0$

$$Variance_{s,T_0} = \sum_{i=m+1}^{T_0} \frac{a_{S,i,m}}{WeightingFactor_S} * \left[ \ln \left( \frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}} \right) \right]^2$$

$L, t$  = The long-term volatility measure, calculated as:

$$RealizedVolatility_{L,t} = \sqrt{\frac{252}{n} * Variance_{L,t}}$$

for  $t > T_0$

$$Variance_{L,t} = \lambda_L * Variance_{L,t-1} + (1 - \lambda_L) * \left[ \ln \left( \frac{UnderlyingIndex_t}{UnderlyingIndex_{t-n}} \right) \right]^2$$

for  $t = T_0$

$$Variance_{L,T_0} = \sum_{i=m+1}^{T_0} \frac{a_{L,i,m}}{WeightingFactor_L} * \left[ \ln \left( \frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}} \right) \right]^2$$

where:

$T_0$  = the start date for the Risk Control Index

$n$  = one (1), the number of days inherent in the return calculation used for determining volatility. If  $n = 1$  daily returns are used, while if  $n = 2$  two day returns are used, and so forth.

$m$  = the  $N^{th}$  trading date prior to  $T_0$



$N$  = the number of trading days observed for calculating initial variance as of the start date of the Risk Control Index.

$\lambda_S$  = The short-term decay factor used for exponential weighting. The decay factor is a number greater than zero and less than one that determines the weight of each daily return in the calculation of historical variance. The short-term decay factor for the Risk Control Index is 94%.

$\lambda_L$  = The long-term decay factor used for exponential weighting. The decay factor is a number greater than zero and less than one that determines the weight of each daily return in the calculation of historical variance. The long-term decay factor for the Risk Control Index is 97%.

$\alpha_{S,m,i}$  = Weight of date  $i$  in the short-term volatility calculation, as calculated based on the following formula:

$$\alpha_{S,m,i} = (1 - \lambda_S) * \lambda_S^{N+m-i}$$

$$WeightingFactor_S = \sum_{i=m+1}^{T_0} \alpha_{S,i,m}$$

$\alpha_{L,m,i}$  = Weight of date  $i$  in the long-term volatility calculation, as calculated based on the following formula:

$$\alpha_{L,m,i} = (1 - \lambda_L) * \lambda_L^{N+m-i}$$

$$WeightingFactor_L = \sum_{i=m+1}^{T_0} \alpha_{L,i,m}$$

The interest rate, maximum leverage, target volatility and decay factors are defined in relation to the Risk Control Index and are generally held constant throughout the life of the Risk Control Index. The leverage position changes at each rebalancing based on changes in realized volatility. There is a two-day lag between the calculation of the leverage factor, based on the ratio of target volatility to realized volatility, and the implementation of that leverage factor in the Risk Control Index.

### The S&P 500® Dividend Aristocrats Total Return Index

The Base Index represents the total return earned in a portfolio that tracks the S&P 500® Dividend Aristocrats Index, with dividend income reinvested in the S&P 500® Dividend Aristocrats Index (and not in the specific stock paying the dividend) after the close of the ex-date. Changes in the level of the Base Index reflect both movements in stock prices and the reinvestment of dividend income.

The Base Index is calculated from the S&P 500® Dividend Aristocrats Index and a total return multiplier. The first step is to calculate the total dividends paid on a given day and convert this figure into points of the S&P 500® Dividend Aristocrats Index:

$$Index\ Dividend\ Points_t = \sum_{i=1}^N (Index\ Shares)_{i,t} * (Ex-dividends)_{i,t} / Divisor_t$$

where  $(Ex-Dividends)_{i,t}$  is the dividend per share paid for stock  $i$  for trading day  $t$  and  $(Index\ Shares)_{i,t}$  is the number of shares of stock  $i$  included in the S&P 500® Dividend Aristocrats Index on trading day  $t$ . This is done for each trading day.  $(Ex-dividends)_i$  is generally zero except for four times a year when it goes ex-dividend for the quarterly dividend payment. Some stocks do not pay a dividend and  $(Ex-dividends)_{i,t}$  is always zero. The aggregate dividend paid is measured in dollars. This is converted to index points by dividing by the divisor for the S&P 500® Dividend Aristocrats Index.

The next step is to calculate the total return multiplier, as follows:

$$Total\ Return\ Multiplier_t = \frac{[Index\ Value_t + Index\ Dividend\ Points_t]}{Index\ Value_{t-1}}$$

where  $Index\ Value_t$  and  $Index\ Value_{t-1}$  refer to the index levels of the S&P 500® Dividend Aristocrats Index on trading days  $t$  and  $t - 1$ , respectively.

The total return multiplier is used to update the Base Index from one day to the next:

$$Total\ Return\ Index\ Value_t = (Total\ Return\ Index\ Value_{t-1}) * (Total\ Return\ Multiplier_t)$$

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## BACKGROUND ON THE S&P 500® DIVIDEND ARISTOCRATS INDEX

We have derived all information contained in this underlying supplement regarding the S&P 500® Dividend Aristocrats Index, including, without limitation, its make-up, method of calculation and changes in its components, from publicly available information. Such information reflects the policies of, and is subject to change by, Standard & Poor's Financial Services LLC ("**S&P**"). We make no representation or warranty as to the accuracy or completeness of such information. The S&P 500® Dividend Aristocrats Index was developed by S&P and is calculated, maintained and published by S&P. S&P has no obligation to continue to publish, and may discontinue the publication of, the S&P 500® Dividend Aristocrats Index.

The S&P 500® Dividend Aristocrats Index is reported by Bloomberg L.P. under the ticker symbol "SPDAUDP."

### **S&P 500® Dividend Aristocrats Index Composition and Maintenance**

Launched by S&P in May 2005, the S&P 500® Dividend Aristocrats Index is designed to measure the performance of large cap, blue-chip companies within the S&P 500® Index that have followed a managed dividends policy of consistently increasing dividends every year for at least 25 years. The minimum number of constituent stocks is 40. The S&P 500® Dividend Aristocrats Index uses a particular selection procedure for its constituent stocks and an equal-weighting scheme, both of which are discussed in further detail below.

The process of selecting the constituent stocks of the S&P 500® Dividend Aristocrats Index is as follows. To qualify for membership in the S&P 500® Dividend Aristocrats Index, a stock must be a member of the S&P 500® Index. The stock must have increased dividends every year for at least 25 consecutive years. The float-adjusted market capitalization of the stock must be at least \$3 billion as of the rebalancing reference date (the "**market capitalization criterion**"). The stock also must have an average daily trading volume of at least \$5 million for the six months prior to the rebalancing reference date (the "**liquidity criterion**").

If the number of constituent stocks that satisfy the criteria above is fewer than 40, then S&P 500® Index constituent stocks that have increased dividends every year for at least 20 consecutive years and that satisfy the market capitalization criterion and the liquidity criterion described above are added in decreasing order of dividend yield until 40 constituent stocks have been selected. However, if 40 constituent stocks have not been selected pursuant to the previous procedure, the remaining constituents of the S&P 500® Index satisfying the same market capitalization and liquidity criteria are added in decreasing order of dividend yield until 40 constituent stocks have been selected. For the purposes of the S&P 500® Dividend Aristocrats Index, "dividend yield" is equal to the total dividends paid during the 12 months preceding the reference date, divided by the price on the reference date. Members of the S&P 500® Index that have reduced dividends in the 12 months preceding the reference date, as determined by S&P, are not considered for inclusion.

New members of the S&P 500® Dividend Aristocrats Index are added on the third Friday of December based on a review of the dividend payments of all S&P 500® Index constituents. Calendar years and ex-dates are used for the dividend analysis. Only regular dividend payments are considered for the purpose of calculating dividends. A dividend initiation or re-initiation does not count as a dividend increase. The initiation calendar year may include payment of all four quarterly dividends, or only one, two or three quarterly payments. Evaluations are made on a best-effort basis using *Standard & Poor's Compustat* and *Standard & Poor's Dividend Record* data.

Constituent stocks are classified according to the Global Industry Classification Standard (“GICS®”). The constituent stocks of the S&P 500® Dividend Aristocrats Index in a particular GICS sector may not account for more than a 30% weight in the S&P 500® Dividend Aristocrats Index (the “sector diversification criterion”). If classification of the constituent stocks selected according to the process above results in constituent stocks in a particular GICS sector accounting for more than a 30% weight in the S&P 500® Dividend Aristocrats Index, the following additional steps are taken. The S&P 500® Index constituent stocks with a history of increased dividends of more than 20 consecutive years that also satisfy the market capitalization criterion and the liquidity criterion described above are added in decreasing order of dividend yield until the sector diversification criterion is satisfied, if possible. However, if the sector diversification criterion is not satisfied after taking the previous step, the remaining constituents of the S&P 500® Index from alternative sectors that satisfy the market capitalization criterion and the liquidity criterion are added in decreasing order of dividend yield until the sector diversification criterion is satisfied. Members of the S&P 500® Index that have reduced dividends in the 12 months preceding the reference date, as determined by S&P, are not considered for inclusion.

The S&P 500® Dividend Aristocrats Index constituent weights are adjusted after the closing of the third Friday of each quarter-ending month. Index constituent membership is reviewed once a year in December. The reference date for such additions and deletions is after the closing of the last trading day of November. At each annual reconstitution, a company's stock is added to the S&P 500® Dividend Aristocrats Index as determined by the eligibility criteria described above. No additions are made to the S&P 500® Dividend Aristocrats Index between annual reconstitutions. However, constituent stocks may be deleted during the December rebalancing if the company no longer meets the eligibility criteria described above or between rebalancings if the stock is removed from the S&P 500® Index.

The U.S. Index Committee maintains S&P's U.S. indices, including the S&P 500® Dividend Aristocrats Index. The committee members are full-time professionals of S&P's staff. The U.S. Index Committee meets monthly and, at each meeting, reviews pending corporate actions that may affect index constituents, statistics comparing the composition of the U.S. indices to the market, companies that are being considered as candidates for addition to an index and any significant market events. In addition, the U.S. Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

S&P considers information about changes to its U.S. indices and related matters to be potentially market-moving and material. Therefore, all U.S. Index Committee discussions are confidential.

As of August 31, 2011, the S&P 500® Dividend Aristocrats Index included 42 constituents with an aggregate adjusted market capitalization of \$969.99 billion. Information concerning the constituents of the S&P 500® Dividend Aristocrats Index may be obtained at the S&P website ([www.standardandpoors.com](http://www.standardandpoors.com)). Information contained in the S&P website is not incorporated by reference in, and should not be considered part of, this underlying supplement or the relevant terms supplement.

### **S&P 500® Dividend Aristocrats Index Calculation**

Once the constituent stocks are identified, S&P utilizes an equal weighting procedure to determine the composition of the S&P 500® Dividend Aristocrats Index so that each stock constituent has an equal weight in the index at each rebalancing date. Stock constituents are re-weighted every quarter to re-establish equal weighting.

The S&P 500® Dividend Aristocrats Index is calculated by means of the divisor methodology used in all Standard & Poor's equal-weighted indices. The initial divisor is set to have a base index value of 100 on December 29, 1989. The Index Level is simply the Index Market Value divided by the Divisor for the S&P 500® Dividend Aristocrats Index:

$$\text{Index Level} = \frac{\text{Index Market Value}}{\text{Divisor}} \quad (1)$$

The Index Market Value is calculated as follows:

$$\text{Index Market Value} = \sum_{i=1}^N (\text{Price})_i \times (\text{Shares})_i \times (\text{IWF})_i \times (\text{AWF})_i \quad (2)$$

where *Price* is the price of the constituent stock, *Shares* is the number of shares of the constituent stock outstanding, *IWF* is the constituent stock's Investable Weight Factor, which is a float adjustment factor designed to exclude shares that are closely held by control groups, other publicly traded companies or government agencies, and *AWF* is the adjustment factor of each constituent stock assigned at each rebalancing date.

The Adjustment Weight Factor, *AWF*, is calculated for each constituent stock, *i*, at each index rebalancing date, *t*, as follows:

$$\text{AWF}_{i,t} = \frac{Z}{N \times \text{FloatAdjustedMarketValue}_{i,t}} \quad (3)$$

where *N* is the number of stocks in the S&P 500® Dividend Aristocrats Index and *Z* is an index-specific constant set for the purpose of deriving the *AWF*.

In order to maintain index continuity, it is necessary to adjust the Divisor at the rebalancing so that the Index Level is not altered by the rebalancing:

Therefore,

$$(\text{Divisor})_{\text{after balancing}} = \frac{(\text{Index Market Value})_{\text{after rebalancing}}}{(\text{Index Value})_{\text{before rebalancing}}} \quad (4)$$

## Base Date

The base value of the S&P 500® Dividend Aristocrats Index is 100 on December 31, 1989, and daily returns are available starting from that date.

## Index Adjustments

The table below summarizes the types of index maintenance adjustments and indicates whether or not an index divisor adjustment is required.

<b>Type of S&amp;P 500® Index Action</b>	<b>Adjustment Made to Index</b>	<b>Divisor Adjustment</b>
Constituent change	If the constituent being deleted is a member of the S&P 500® Dividend Aristocrats Index, then it is removed from the S&P 500® Dividend Aristocrats Index.	Yes. A divisor adjustment is made to ensure the index level after the deletion is equal to the index level before the deletion.
Share changes between quarterly share adjustments	None.	None.
Quarterly share changes	There is no direct adjustment. However, on the same date the index rebalancing takes place, the constituent stock's weights are adjusted to equal weights.	Yes. The rebalancing causes an adjustment.

<b>Type of Corporate Action</b>	<b>Adjustment Made to Index</b>	<b>Divisor Adjustment</b>
Spin-off	No weight change. The price is adjusted to Price of Parent Company minus (Price of Spin-Off Company/Share Exchange Ratio).	None.
Rights offering	No weight change. The price is adjusted to Price of Parent Company minus (Price of Rights Subscription/Rights Ratio).	None.
Stock split	Index Shares are multiplied by, and price is divided by, the split factor.	None.
Share issuance or share repurchase	None.	None.
Special dividends	Will follow procedures for the S&P 500® Index. The price of the stock making the special dividend payment is reduced by the per-share special dividend amount after the close of trading on the day before the ex-date.	Yes. A divisor adjustment is made to ensure the index level after the price adjustment is equal to the index level before the price adjustment.

The S&P 500® Dividend Aristocrats Index is calculated when the U.S. equity markets are open. In situations where an exchange is forced to close early due to unforeseen events, such as computer or electric power failures, weather conditions or other events, S&P will calculate the closing price of the indices based on (1) the closing prices published by the exchange, or (2) if no closing price is available, the last regular trade reported for each stock before the exchange closed. In all cases, the prices will be from the primary exchange for each stock in the S&P 500® Dividend Aristocrats Index. If an exchange fails to open due to unforeseen circumstances, the index will use the prior day's closing prices. If all exchanges fail to open, S&P may determine not to publish the index for that day.

## BACKGROUND ON THE S&P 500® INDEX

We have derived all information contained in this underlying supplement regarding the S&P 500® Index from publicly available information. Such information reflects the policies of, and is subject to change by, Standard & Poor's Financial Services LLC ("S&P"). We make no representation or warranty as to the accuracy or completeness of such information. The S&P 500® Index was developed by S&P and is calculated, maintained and published by S&P. S&P has no obligation to continue to publish, and may discontinue the publication of, the S&P 500® Index.

The S&P 500® Index is reported by Bloomberg L.P. under the ticker symbol "SPX."

The S&P 500® Index is intended to provide a performance benchmark for the U.S. equity markets. The calculation of the level of the S&P 500® Index is based on the relative value of the aggregate market value of the common stocks of 500 companies as of a particular time as 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 500 companies are not the 500 largest companies listed on the New York Stock Exchange and not all 500 companies are listed on such exchange.

S&P chooses companies for inclusion in the S&P 500® Index with the objective of achieving a distribution by broad industry groupings that approximates the distribution of these groupings in the common stock population of the U.S. equity market. S&P may from time to time, in its sole discretion, add companies to, or delete companies from, the S&P 500® Index to achieve the objectives stated above. Relevant criteria employed by S&P 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 company's common stock is widely held and the market value and trading activity of the common stock of that company.