

SG Rise Of The Robots VT 9 Index **(Excess Return - USD)**

Index Rules

Version as of 21st June 2018

SG Rise Of The Robots VT 9 Index (Excess Return - USD)

1. Index Summary Description:

1.1. Index description

The SG Rise Of The Robots VT 9 Index (USD - Excess Return) (the “**Index**”) is designed to produce a better risk return ratio than a basket that is long of the SG Rise Of Robots Index(USD – Net Total Return).

The Index is calculated and published by Stoxx Limited (the “**Index Calculation Agent**”), and is sponsored by Société Générale (the “**Index Sponsor**”).

Main Characteristics

Bloomberg ticker:	SGMDROBT <Index>
Type of Return:	Excess Return
Calculation Frequency:	Daily
Publication Time:	End of Day
Index Launch Date:	TBD
Currency:	USD
Fees and Costs:	As specified under the “Index Fees and Costs” section below
Asset Class:	Equity
Index Components:	Equity Instrument, Underlying Index and Market Data

1.2. Mechanism

1.1.1 Index Composition

The Index is composed of a hypothetical basket that is long of the SG Rise Of Robots Index (USD – Net Total Return).

1.1.2 Daily “Vol Target” Mechanism

The Index is constructed pursuant to a daily Vol Target process where the deemed exposure of the Index to the Subindex (the “**Exposure**”) is based on a formula using the following input parameters:

- (i) the short term historical volatility of the Subindex (the “**Realized Volatility**”) ;
- (ii) a target volatility of 9% (the “**Target Volatility**”) ; and
- (iii) the historical volatility of the Index itself;

such that, in most cases, when the short-term historical volatility of the Subindex increases, the deemed exposure to the Subindex decreases, and when the short-term historical volatility of the Subindex decreases, the deemed exposure to the Subindex increases.

The Exposure is capped at 150% of the Index Level and can be as low as 0%.

If the Exposure is less than 100%, a percentage of the Index’s level is deemed invested in the Subindex in an amount equal to the product of (i) the Exposure and (ii) the Index Level.

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1.3. Index Fees and Costs

The Index is calculated net of the following fees and costs:

Synthetic Dividend	means 1.5% p.a.
Liquidity Spread	Means 0.50% p.a
Replication Costs:	As per Appendix 1 under RC(i).
Transaction Costs:	As per Appendix 1 under C(i).

1.4. Information available on the SGI website

The Index is computed and maintained pursuant to these Index Rules which incorporate by reference the SGI Indices Global Methodology (version dated 16 January 2017, as supplemented, amended and restated or replaced from time to time, the “**SGI Global Methodology**”). The SGI Global Methodology is published on the SGI website under the link “SGI Cross Asset Methodology” at <https://sgi.sgmarkets.com>. These Index Rules should be read together with the SGI Global Methodology.

Capitalized terms used but not defined herein shall have the respective meanings ascribed to such terms in the SGI Global Methodology.

In the event of any inconsistency between the SGI Global Methodology and the Index Rules, for purposes of the Index, the Index Rules will prevail.

The SGI Global Methodology notably includes important events applicable in respect of the Index Components selected in section 1.1 above.

The SGI Global Methodology is expected to be updated and revised from time to time where necessary or desirable, pursuant to legal developments and for the purpose of technical improvement. The Index Sponsor may also act in good faith and a commercially reasonable manner to amend the SGI Global Methodology in order to cure ambiguities, errors and omissions, if any, thereunder. SGI Global Methodology subsequently updated and revised shall be approved in accordance with the Index Sponsor’s internal index procedures and published on the SGI website under the link “SGI Cross Asset Methodology” at <https://sgi.sgmarkets.com> and shall, upon such publication, apply to the Index and these Index Rules.

The Index levels (including performance and volatility of the Index), further Index data and important disclaimers relating to the Index are available by entering the ticker (i.e. SGMDROBT) in the index research field of the SGI website <https://sgi.sgmarkets.com>.

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2. Index Rules:

2.1 Terms and definitions relating to the dates:

ACT(t-1,t)	means the number of calendar days between the Calculation Date (t-1) (included) and the Calculation Date (t) (excluded).
Calculation Date	means any Scheduled Calculation Date on which no Index Disruption Event exists.
Index Launch Date, “t₀”	means 2 nd February 2018.
Index Start Date, “t_s”	means 14 th April 2014
N(t-1,t)	means the number of Calculation Dates between the Calculation Date (t-1) included and the Calculation Date (t) (excluded).
Scheduled Calculation Date	means any day that the Index Sponsor deems suitable based on the Index composition.
Rebalancing Date	means the Index Start Date and the third Friday of any month or the preceding Calculation Date if such date is not a Calculation Date.
Valuation Time	means 6:30 p.m. (New York time).
“t_R(t)”	means, in respect of Calculation Date (t), the Rebalancing Date preceding Calculation Date (t) (with $t > t_R(t)$).
“t_{RR}(t)”	means, in respect of Calculation Date (t), the Rebalancing Date preceding Calculation Date (t) (with $t \geq t_{RR}(t)$).

2.2 Terms and definitions relating to the Index:

Aggregate Transaction Cost, “TC(t)”	means, in respect of Calculation Date (t), the transaction costs determined pursuant to Section 2.6.5.
Capitalization Factor, “CF(t)”	means, in respect of Calculation Date (t), the value of one unit of the Index Currency if capitalized using the Index Currency Rate and determined pursuant to Section 2.6.6.
Index	means the SG Rise Of The Robots VT 9 (Bloomberg Ticker: SGMDROBT <Index>).
Index Calculation Agent	Stoxx Limited.
Index Component	means any Underlying Basket Component and Market Data.
Index Currency	US Dollar (“USD”).
Index Sponsor	Société Générale (“SG”).

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Index Level, "IL(t)"	means in respect of any Calculation Date (t), the level of the Index calculated and published by the Index Calculation Agent as of such date at the Valuation Time, pursuant to the Index Rules set out in Section 2.6.1.
Liquidity Spread, "LS"	means 0.50% p.a.
Synthetic Dividend "SD"	means 1.50% p.a.
Sub-index Level, "SIL(t)"	means, in respect of Calculation Date (t), the level of the Subindex determined pursuant to Section 2.6.2.

2.3 Terms and definitions relating to the Vol Target Mechanism:

Exposure, "E(t)"	means in respect of any Calculation Date (t), the exposure of the Index to the Subindex determined in accordance with the formula set out in Section 2.6.10.
Historical Volatility, "HV(t)"	means in respect of a Calculation Date (t), the annualized historical volatility of the S over the past 50 Calculation Dates, determined by the Index Calculation Agent in accordance with the formula specified in Section 2.6.7.
Index Historical Volatility, "IHV(t)"	means, in respect of any Calculation Date (t), the annualized historical volatility of the Index determined since the Index Launch Date, determined by the Index Calculation Agent in accordance with the formula specified in section 2.6.8.
Target Volatility, "TV"	9%.
Volatility Adjustment Factor "VAF(t)"	means in respect of any Calculation Date (t), the volatility adjustment factor based on the Index Historical Volatility and determined by the Index Calculation Agent in accordance with the formula specified in Section 2.6.9.

2.4 Terms and definitions relating to the Index Components:

Underlying Basket Component	Any component of the Underlying Basket as provided in Appendix 1.
Underlying Basket Component Currency	means, in respect of an Underlying Basket Component, its default currency as provided in Appendix 1.
Underlying Basket Component Return Type	means, in respect of an Underlying Basket Component, its return type as provided in Appendix 1.
Underlying Basket Component Type	means, in respect of an Underlying Basket Component, its type as provided in Appendix 1.
Underlying Basket	means the hypothetical basket denominated in the Index Currency and comprising the Underlying Basket Components.

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Exchange Business Day	<p>means:</p> <ul style="list-style-type: none">- in respect of a Index Component (or, in the case of a index of Index Components, each Index Component observed separately) any Scheduled Trading Day on which each relevant Exchange and Related Exchange are open for trading during their respective regular trading sessions, notwithstanding any such Exchange or Related Exchange closing prior to its Scheduled Closing Time;- in respect of an Index Component (or, in the case of a index of Underlying Indices, each Index Component observed separately), any Scheduled Trading Day on which each relevant Exchange and Related Exchange of such Index Component are open for trading during their respective regular trading session, notwithstanding any such Related Exchange closing prior to its Scheduled Closing Time and the index sponsor of the Index Component publishes the closing level of such Index Component.
Exchange(s)	means, in respect of a Index Component, each exchange or quotation system (if applicable) on which such instrument (or the securities or instruments underlying such instrument in the case of an Index Component) trade, any successor exchange or quotation system or any substitute exchange or quotation system to which such has relocated
Fixed Replication Costs, "RC"	Means the theoretical fixed running costs that would be incurred in connection with replicating the performance of such Underlying Basket Component (i). The Fixed Replication Costs are calculated daily and accrue on a daily basis on the level or price of the Underlying Basket Component. The Fixed Replication Costs are provided in Appendix 1.
Fixed Transaction Costs, "C"	Means the theoretical fixed costs that would be charged in relation to the deemed purchase or liquidation of such Underlying Basket Component pursuant to changes in hypothetical allocations and rebalancings that impact the Index Level upon such reallocations and rebalancing. The Fixed Transaction Costs are provided in Appendix 1
Underlying Basket Component Quantity, "Q(t)"	means, in respect of a Calculation Date (t) the quantity of the Basket Component in the Underlying Basket, pursuant to Section 2.6.3.
Related Exchange(s)	means, in respect of a Index Component, each exchange or quotation system where trading has a material effect on the overall market for futures and options contracts relating to such instrument (or the securities or instruments underlying such instrument in the case of an Index Component), any successor exchange or quotation system or any substitute exchange or quotation system to which trading in futures or options contracts relating to such instrument (or the securities or instruments underlying such instrument in the case of an Index Component), has temporarily relocated.

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Scheduled Closing Time	means in respect of an Exchange or Related Exchange, the scheduled weekday closing time of such Exchange or Related Exchange, without regard to after hours or any other trading outside of the regular trading session hours.
Scheduled Trading Day	means: <ul style="list-style-type: none">- in respect of a Index Component, (or, in the case of a index of Index Components, in respect of each Index Component observed separately) any day on which each Exchange and each Related Exchange are scheduled to be open for trading for their respective regular trading sessions- in respect of an Index Component (or, in the case of a index of Underlying Indices, each Index Component comprising the index and observed separately), any day on which each Exchange and each Related Exchange are scheduled to be open for trading for their respective regular trading sessions and the index sponsor of the Index Component is scheduled to publish the level of such Index Component.
Underlying Index Level, "UIL(t)"	means, in respect of a Calculation Date (t) that is an Underlying Index or an Underlying SGI Index, the level of the net of costs version of the Underlying Basket Component (i), pursuant to Section 2.6.4.
Underlying Basket Component Closing Price, "CP(t)"	means, in respect of Calculation Date (t) the Underlying Index Closing Level, in respect of an Underlying Index.
Sub Index Component	means the hypothetical basket denominated in the Index Currency and comprising the Underlying Basket Component.

2.5 Terms and definitions relating to the Market Data:

Rate, "R(t)"	means in respect of any Calculation Date (t), the percentage rate of the 3 Month US Libor rate (as displayed on BBG page US0003M <Index>, or any successor service or page for the purpose of displaying such rate, as determined by the Index Calculation Agent);
Market Data	means a rate (including an interest rate, a foreign exchange rate or a swap rate), a spread, or any other data specified in the Index Rules (including any rate specified in this section 2) or an index on the aforementioned or any other similar instrument specified in the Index Rules.

2.6 Index Calculation Rules:

2.6.1 Determination of the Index Level, “IL(t)”:

The Index Level is in respect of Calculation Date (t), calculated by the Index Calculation Agent at the Valuation Time, subject to the occurrence or existence of an Index Disruption Event or an Index Extraordinary Event, according to the following formula:

For any Calculation (t) > t_s:

$$IL(t) = IL(t - 1) \times \left[1 + E(t - 1) \times \left(\frac{SIL(t)}{SIL(t - 1)} - 1 \right) \right] \times \left(1 - (SD + LS) \times \frac{ACT(t - 1, t)}{360} \right) - TC(t - 1)$$

with,

$$IL(t_s) = 1000$$

2.6.2 Determination of the Sub Index Level, “SIL(t)”:

The Gross Index Level, in respect of Calculation Date (t), is calculated by the Index Calculation Agent at the Valuation Time, subject to the occurrence or existence of an Index Disruption Event or an Index Extraordinary Event, according to the following formula:

For any Calculation (t) > t_s:

$$SIL(t) = SIL(t_R(t)) + Q(t_R(t)) \times \left[UIL(t) - UIL(t_R(t)) \times \frac{CF(t)}{CF(t_R(t))} \right]$$

with,

$$SIL(t_s) = 1000.$$

2.6.3 Determination of the Underlying Basket Component Quantity, “Q(i,t)”:

The Underlying Basket Component Quantity, in respect of Calculation Date (t) and an Underlying Basket Component (i), is calculated by the Index Calculation Agent at the Valuation Time, subject to the occurrence or existence of an Index Disruption Event or an Index Extraordinary Event, according to the following formula:

(i) If t ≤ t_s then:

$$Q(1, t) = \frac{SIL(t_s)}{UIL(t_s)}$$

(ii) If Calculation Date (t) is a Rebalancing Date (with t = t_R(t+1)) then:

$$Q(1, t) = \frac{SIL(t_{RR}(t) - 1)}{UIL(t_{RR}(t) - 1)}$$

(iii) Otherwise:

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$$Q(1, t) = Q(1, t - 1)$$

2.6.4 Determination of the Underlying Index Level, “UIL(t)”:

The Sub Index Level is, in respect of Calculation Date (t), determined as follows:

$$UIL(t) = UIL(t - 1) \times \left(\frac{CP(1, t)}{CP(1, t - 1)} - RC \times \frac{ACT(t - 1, t)}{360} \right)$$

And,

$$UIL(1, t_s) = 1000.$$

2.6.5 Determination of the Aggregate Transaction Cost, “TC(t)”:

The Aggregate Transaction Cost is in respect of a Calculation Date (t), calculated by the Index Calculation Agent at the Valuation Time, subject to the occurrence or existence of an Index Disruption Event or an Index Extraordinary Event, according to the following formula:

$$TC(t) = C \times \text{Abs} \left(\frac{IL(t) \times E(t)}{SIL(t)} \times Q(t) - \frac{IL(t - 1) \times E(t - 1)}{SIL(t - 1)} \times Q(t - 1) \right) \times UIL(t)$$

2.6.6 Determination of the Capitalization Factor, “CF(t)”:

The Capitalization Factor is in respect of a Calculation Date (t), calculated by the Index Calculation Agent at the Valuation Time, subject to the occurrence or existence of an Index Disruption Event or an Index Extraordinary Event, according to the following formula:

$$CF(t) = CF(t - 1) \times \left(1 + R(t - 1) \times \frac{ACT(t - 1, t)}{360} \right)$$

With,

$$CF(t_s) = 1000$$

2.6.7 Determination of the Historical Volatility “HV(t)”:

The Historical Volatility of the Notional Underlying Basket is, in respect of Calculation Date (t), determined by the Index Calculation Agent in accordance with the following formula:

$$HV(t) = \sqrt{\frac{1}{50} \times \sum_{k=0}^{49} \left[\sqrt{\frac{365}{ACT(t - k - 1, t - k)}} \times \ln \left(\frac{SIL(t - k)}{SIL(t - k - 1)} \right) \right]^2}$$

Where,

“ln” means the logarithm to the base e.

2.6.8 Determination of the Index Historical Volatility “IHV(t)”:

The Index Historical Volatility is, in respect of Calculation Date (t), determined by the Index Calculation Agent in accordance with the following formula:

For any Calculation Date (t) ≥ t_s(t) + 2:

$$IHV(t) = \sqrt{\frac{1}{\alpha(t)} \times \sum_{k=0}^{\alpha(t)-1} \left(\sqrt{\frac{365}{ACT(t-k-1, t-k)}} \times \ln \left(\frac{IL(t-k)}{IL(t-k-1)} \right) \right)^2}$$

Where,

“ln” means the logarithm to the base e, and

$$\alpha(t) = \text{Min}[N(t_0, t); 126]$$

2.6.9 Determination of the Volatility Adjustment Factor “VAF(t)”:

The Volatility Adjustment Factor is, in respect of Calculation Date (t), determined by the Index Calculation Agent in accordance with the following formula:

a) For any Calculation Date (t) ≤ t_s(t) + 1:

$$VAF(t) = 1$$

b) Otherwise:

$$VAF(t) = \text{Min} \left[120\% ; \text{Max} \left[80\% ; \sqrt{\text{Max} \left[1 + \frac{\alpha(t)}{126} \times \left(1 - \left(\frac{IHV(t)}{TV} \right)^2 \right) ; 0 \right]} \right] \right]$$

Where,

$$\alpha(t) = \text{Min}[N(t_0, t) ; 126]$$

2.6.10 Determination of the Exposure “E(t)”:

The Exposure is, in respect of Calculation Date (t), determined as follows:

For calculation date t > 52

$$E(t) = \text{Min} \left[\frac{TV}{HV(t-2)} \times VAF(t-2), 150\% \right]$$

Otherwise

$$E(t) = 1$$

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3 Index Disruption Events:

As specified in the SGI Global Methodology.

4 Index Extraordinary Event

As specified in the SGI Global Methodology.

5 Disclaimers

The SG Rise Of The Robots VT 9 Index (the “**Index**”) is calculated and maintained by STOXX Limited, Zurich Switzerland, specifically for SG. Index calculation and dissemination is susceptible to errors, interruptions and delays.

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Appendix 1 - Underlying Basket

i	Bloomberg Ticker	Underlying Basket Component Currency	Underlying Basket Component Type	Basket Component Return Type	Index Component	RC(i)	C(i)
1	SGIXROBO <Index>	USD	Underlying Index	Net Total Return	Underlying Index	0.03%	0.05%