

**PROSPECTUS SUPPLEMENT NO. 5**

**TO THE BASE PROSPECTUS DATED 13 JANUARY 2023**

**GOLDMAN, SACHS & CO. WERTPAPIER GMBH**

*(Incorporated with limited liability in Germany)*

**as Issuer**

**GOLDMAN SACHS FINANCE CORP INTERNATIONAL LTD**

*(Incorporated with limited liability in Jersey)*

**as Issuer**

**GOLDMAN SACHS INTERNATIONAL**

*(Incorporated with unlimited liability in England)*

**as Issuer and, in respect of certain Securities only, as Guarantor**

**THE GOLDMAN SACHS GROUP, INC.**

*(A corporation organised under the laws of the State of Delaware)*

**in respect of certain Securities only, as Guarantor**

**SERIES P PROGRAMME FOR THE ISSUANCE OF  
WARRANTS, NOTES AND CERTIFICATES**

**This Prospectus Supplement**

This prospectus supplement (the "**Prospectus Supplement**") to the base prospectus dated 13 January 2023 prepared by Goldman, Sachs & Co. Wertpapier GmbH ("**GSW**") as issuer, Goldman Sachs Finance Corp International Ltd ("**GSFCI**") as issuer, Goldman Sachs International ("**GSI**") as issuer and as guarantor in respect of certain Securities only and The Goldman Sachs Group, Inc. ("**GSG**") as guarantor in respect of certain Securities only (the "**Original Base Prospectus**") under their Series P programme for the issuance of warrants, notes and certificates with respect to the Securities (the "**Programme**"), constitutes a supplement to the Base Prospectus for the purposes of Article 23(1) of Regulation (EU) 2017/1129 (as amended, the "**EU Prospectus Regulation**") and should be read in conjunction with Prospectus Supplement No. 1 to the Original Base Prospectus dated 30 January 2023, Prospectus Supplement No. 2 to the Original Base Prospectus dated 14 February 2023, Prospectus Supplement No. 3 to the Original Base Prospectus dated 15 March 2023 and Prospectus Supplement No. 4 to the Original Base Prospectus dated 5 May 2023 (the Original Base Prospectus as so supplemented, the "**Base Prospectus**"). On 13 January 2023, the Original Base Prospectus was approved by the *Commission de Surveillance du Secteur Financier* (the "**CSSF**") for the purposes of Article 6 of the Luxembourg Law dated 16 July 2019 on prospectuses for securities and by the Luxembourg Stock Exchange pursuant to the rules and regulations of the Luxembourg Stock Exchange for the Luxembourg Stock Exchange's Euro MTF market.

Terms defined in the Base Prospectus have the same meaning when used in this Prospectus Supplement unless otherwise defined herein. This Prospectus Supplement shall form part of and be read in conjunction with the Base Prospectus.

## Right of withdrawal

In accordance with Article 23(2) of the EU Prospectus Regulation, investors in the European Economic Area who have already agreed to purchase or subscribe for Securities issued under the Base Prospectus before this Prospectus Supplement is published and where the Securities have not yet been delivered to them at the time when the significant new factor, material mistake or material inaccuracy to which this Prospectus Supplement relates, arose or was noted have the right, exercisable until 16 May 2023, which is two working days after the publication of this Prospectus Supplement, to withdraw their acceptances. Investors may contact the relevant Authorised Offeror(s) (as set out in the Final Terms of the relevant Securities) should they wish to exercise such right of withdrawal.

## Responsibility

Each of GSI, GSW, GSFCI and GSG accepts responsibility for the information given in this Prospectus Supplement and confirms that, having taken all reasonable care to ensure that such is the case, the information contained in this Prospectus Supplement is, to the best of their knowledge, in accordance with the facts and does not omit anything likely to affect its import.

## Purpose of this Prospectus Supplement

The purpose of this Prospectus Supplement is to (a) supplement the information in relation to Goldman Sachs' proprietary indices by including a description of a further Goldman Sachs proprietary index (the "**Goldman Sachs US Technology Equity 6% Volatility Target USD ER Index**") and (b) amend and update certain information in respect of the "*Risks Factors*" section of the Base Prospectus.

This Prospectus Supplement will be available on the website of the Luxembourg Stock Exchange at [www.luxse.com](http://www.luxse.com).

## Amendments and supplements to certain information in the Base Prospectus

The Base Prospectus is amended and supplemented as follows:

### 1. Amendments to the section entitled "Risk Factors"

The information in section 5.5 entitled "*Risks associated with Proprietary Indices as Underlying Assets*" is amended and supplemented by inserting the following new sub-paragraph immediately after sub-paragraph (e) on pages 102 to 112 (and all existing sub-paragraphs thereafter shall be updated in alphabetical order accordingly):

"(f) ***Specific risks associated with the Goldman Sachs US Technology Equity 6% Volatility Target USD ER Index including its underlying and component indices and strategies***

*Risk associated with the Goldman Sachs US Technology Equity 6% Volatility Target USD ER Index (for purposes of this sub-section (f) only, the "Index"), the US Technology Equity Futures Rolling Strategy ER Net Index (for purposes of this sub-section (f) only, the "Underlying Index") and the US Technology Equity Futures Rolling Strategy Series Q Excess Return Index (for purposes of this sub-section (f) only, the "Futures Rolling Index") are set out below. For the purposes of the risk factors below, each of the Index, the Underlying Index, and the Futures Rolling Index, shall be a "Relevant Strategy" and any underlying index, financial instrument, asset, price, level, component or other underlying comprising, directly or indirectly, a Relevant Strategy, a "Strategy Component".*

(i) ***The weights of the Strategy Component may be less than 100%***

The Index's absolute overall exposure to the Strategy Component may be less than 100%. If the absolute weight of the Strategy Component is less than 100% the Index will have a reduced participation to the Strategy Component and may underperform as compared to a strategy where the exposure was greater.

**(ii) *Volatility and Strategy risk***

The Index has a volatility adjustment feature which aims to provide a notional volatility-controlled exposure to the Strategy Component. This is achieved by increasing or decreasing the exposure of the Index to the Strategy Component, based on the historical realized volatility of the Strategy Component relative to a pre-determined Volatility Target. An increase in the realized volatility of the Strategy Component may decrease the exposure of the Index to the Strategy Component and vice versa. The future realized volatility of the Strategy Component may differ from the historical realized volatility of the Strategy Component and as such, the weighting of the Strategy Component and the performance of the Index may be different if it was calculated based on the future realized volatility rather than the historical realized volatility.

**(iii) *An investment in the Index may be subject to dilution, which may limit the gains in such investment***

The Index may be subject to dilution if the Reference Volatility exceeds the Volatility Target, such that investors in products linked to the Index may not benefit fully from increases in the value of the Strategy Component. Dilution means that the return or loss on an investment is subject to a multiplier decreasing exposure to such investment and reducing the volatility and risk of loss should the value of such investment decline, but reducing the potential gain should the value of such investment increase. Investors should be aware that if the value of the Strategy Component increases or decreases, an investment linked to the Index may not have the same magnitude of increased or decreased value as the Strategy Component.

**(iv) *No assurance can be given that the volatility adjustment feature will be successful in producing a realized volatility of the Index being equal to the Volatility Target which may negatively affect the performance of the Index, potentially materially so***

The volatility adjustment feature of the Index aims to provide a notional volatility-controlled exposure to the Strategy Component. However, such volatility adjustment feature may lead to a realized volatility which is lower than or exceeds the Volatility Target. Such difference may negatively affect the performance of the Index, potentially materially so.

**(v) *The Reference Volatility calculation relies on assumptions as to the number of days in a calendar year over which the returns of the Strategy Component are annualised, which may negatively affect the performance of the Index, potentially materially so***

The calculation of the Reference Volatility computes the realized volatility of the Strategy Components based on several assumptions, including the number of days in a calendar year over which the returns in respect of the Strategy Components are annualised. Such number may lead to a higher or lower Reference Volatility and as a result to a higher or lower exposure of the Index to the Strategy Components. An increased or lower exposure of the Index to the Strategy Component may in turn negatively affect the performance of the Index, potentially materially so.

**(vi) *The Index Inception Date and back-tested performance of the Index***

The Index has only been calculated since the "Strategy Inception Date" of the Index, being a date determined by the Strategy Sponsor as the date on which the value of the Index would have been equal to the initial value of the Index based on back-tested data and analysis ("Back-testing"). Such Back-testing with respect to the operation and/or potential returns of the Index is based on simulated analyses and hypothetical circumstances to estimate how the Index may have performed historically. The Strategy Sponsor provides

no assurance or guarantee that the Index will operate or would have operated in the past in a manner consistent with any such back-tested results.

As such, any historical returns or any hypothetical simulations based on these analyses with respect to the period from the Strategy Inception Date of the Index to the date on which investment products linked to the Strategy are first implemented (which may be materially later than the Strategy Inception Date of the Index), may not reflect the performance of, and are no guarantee or assurance in respect of the performance or returns of, the Index over any time period. Furthermore, any Back-testing of the Index is based on information and data provided to the Strategy Sponsor by third parties. The Strategy Sponsor has not independently verified or guaranteed the accuracy and/or the completeness of such information or data provided and is not responsible for any inaccuracy, omission or error in such information, data and/or back-testing

**(vii) *Specific risks in respect of each Relevant Strategy***

- (A) ***Potential amendment to the methodology of a Relevant Strategy or replacement of a Relevant Strategy to enable the Strategy Sponsor and/or any affiliate to be able to effectively hedge its exposure to the Relevant Strategy and to reduce the impact of such hedging transactions on the relevant markets***

If the Strategy Sponsor determines that the aggregate notional or principal amount of financial products linked to a Relevant Strategy is above a certain threshold it may (a) change the methodology of the Relevant Strategy so that the rebalancing of the Relevant Strategy is executed over one or more additional business days or that the rebalancing of the Relevant Strategy occurs more frequently, (b) replace the Relevant Strategy with a replacement Relevant Strategy which will be identical in all material respects other than the day or days on which the Relevant Strategy is rebalanced and/or (c) make such other adjustments to the Relevant Strategy, in each case, in order to enable the Strategy Sponsor and/or any affiliate to be able to effectively hedge its exposure to such Relevant Strategy and/or to reduce the expected impact of such hedging transactions on the relevant markets. Although such amendments or such replacement would be designed to minimise potential market impact, the performance of the Relevant Strategy may be affected by such amendments or replacement, potentially materially so.

- (B) ***Excess Return Strategies will nearly always underperform Total Return Strategies***

The Relevant Strategy is calculated on an excess return basis. Unlike a total return strategy, a strategy which is calculated on an excess return basis does not include the accrual of any amount in relation to a notional interest rate. Thus, the performance of an excess return strategy will nearly always be less than the performance of the equivalent total return strategy.

**(viii) *In respect of the Futures Rolling Index only***

- (A) ***The rolling methodology of the Strategy Components and other factors may have a negative impact on the value of the Futures Rolling Index***

The Futures Rolling Index is designed to provide investors with a synthetic exposure to the performance of the Strategy Components by notionally entering into, and then rolling, two Strategy Components.

The relevant underlying asset of the Strategy Components may fluctuate in value quite differently from the performance of the Strategy Components due to losses or

gains that may arise from the rolling. In addition, the rolling methodology may be disclosed, and such disclosure may result in market activity that could adversely affect the value of the Futures Rolling Index.

(B) ***Hedging activity by Goldman Sachs International by way of active trades in the Strategy Components underlying the Futures Rolling Index may have a detrimental impact on the value of the Futures Rolling Index***

Goldman Sachs International may hedge its exposure to the Futures Rolling Index, including by actively trading in the Strategy Components underlying the Futures Rolling Index. Such activities may be particularly frequent during, but are not necessarily confined to, periods in which Goldman Sachs International's exposure fluctuates as a result of either the rebalancing methodologies used by the Futures Rolling Index, or the rolling of Strategy Components in accordance with the methodology of the Futures Rolling Index. The market for the Strategy Components which are tracked by the Futures Rolling Index may have limited liquidity. Trading by Goldman Sachs International in the Strategy Components underlying the Futures Rolling Index may negatively affect the value of the Futures Rolling Index.

(C) ***Sponsors of the underlying assets of Strategy Components included in the Futures Rolling Index have authority to make determinations that could materially affect the value of the Futures Rolling Index***

Determinations that the sponsors and operators of the underlying assets of the Strategy Components included in the Futures Rolling Index may make in connection with the composition, calculation and maintenance of this underlying asset may materially affect the values of the Strategy Components and, in turn, the value of the Futures Rolling Index. Those sponsors and operators have no obligation to take the interests of Goldman Sachs International or any holders of investments linked to the Futures Rolling Index into consideration for any reason in carrying out their functions and have generally disclaimed all liability to the extent permitted by law.

In addition, sponsors of such underlying assets may have licensed, and may continue to license, their underlying assets for use by other market participants, for publication in newspapers and periodicals, for distribution by information and data dissemination services and for various other purposes, any of which may contribute to an increased level of investment in these indices, which could affect the value of the Strategy Components and, in turn, the value of the Futures Rolling Index.

(D) ***The Futures Rolling Index may provide exposure to stock markets in emerging markets, which are subject to special risks***

The Futures Rolling Index may provide exposure, although indirect, to the stock markets in emerging markets. Political and economic structures in countries with emerging economies or stock markets may be undergoing or may undergo significant evolution and rapid development, and such countries may lack the social, political, economic and regulatory stability of more developed countries including, without limitation, a significant risk of currency value fluctuation or inflation, change in law or regulations or change in the interpretation of law and regulations or the implementation of policies. Such instability may result from, among other things, authoritarian governments, or military involvement in political and economic decision-making, including changes or attempted changes in governments through extra-constitutional or constitutional means; popular unrest associated with demands for improved political, economic, social or regulatory conditions; internal insurgencies; hostile relations with neighbouring countries; and

ethnic, religious and racial disaffections or conflict. Certain of such countries may have in the past failed to recognize private property rights and may have at times nationalized or expropriated the assets of private companies or significantly restricted the direct or indirect investment by foreign entities. As a result, the risks from investing in those countries, including, without limitation, the risks of nationalization, expropriation or forced divestiture of assets, may be heightened. In addition, unanticipated political, social, economic or regulatory developments may affect the values or liquidity of investments in those countries. In addition, any change in the law or regulations or any change in the interpretation of law or regulations or the implementation of policies may impact the availability of replacement assets in the event any relevant underlying security is discontinued, cancelled, terminated, delisted or otherwise ceased to exist. Furthermore, the small size and inexperience of the securities markets in certain countries and the limited volume of trading in securities may make an investment in those countries illiquid and more volatile than investments in more established markets. There may be little financial or accounting information available with respect to local issuers, and it may be difficult as a result to assess the value or prospects of an investment in one of these issuers. All of these factors may have an effect on the value of the Futures Rolling Index providing exposure to stock markets in emerging markets."

## 2. Inclusion of a new section

The Base Prospectus is further amended and supplemented by inserting a new section immediately after the section entitled "*DESCRIPTION OF THE GOLDMAN SACHS GLOBAL DIVERSIFIED MULTI-ASSET 5% INDEX*" which is set out on pages 1340 to 1394:

### **"DESCRIPTION OF THE GOLDMAN SACHS US TECHNOLOGY EQUITY 6% VOLATILITY TARGET USD ER INDEX**

*The following description (this "Description") of each of:*

- (i) the Goldman Sachs US Technology Equity 6% Volatility Target USD ER Index (the "Index");*
- (ii) the US Technology Equity Futures Rolling Strategy ER Net Index (the "Underlying Index"); and*
- (iii) the US Technology Equity Futures Rolling Strategy Series Q Excess Return Index (the "Futures Rolling Index"),*

*(the Index, the Underlying Index and the Future Rolling Index, each a "Relevant Strategy"),*

*is subject to, and qualified in its entirety by, the methodology in respect of such Relevant Strategy as published or made available by Goldman Sachs International (or any successor thereto) (the "Strategy Sponsor" in respect of such Relevant Strategy) from time to time.*

*Any such methodology may be amended or modified from time to time at the discretion of the Strategy Sponsor in accordance with the terms set out therein. Copies of a summary of each such methodology shall be made available by the Strategy Sponsor from [www.goldmansachsindices.com](http://www.goldmansachsindices.com) (or any successor page thereto).*

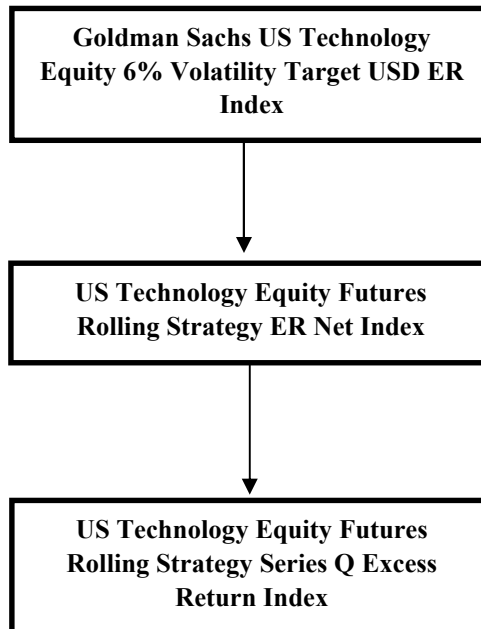
*A prospective purchaser of Index Linked Securities should also carefully review the risk factors in relation to the Index and the other Relevant Strategies set out in the section of this Base Prospectus entitled "Risk Factors" before purchasing any Index Linked Securities.*

Each Relevant Strategy is a synthetic rules-based proprietary strategy created by the Strategy Sponsor. All determinations made pursuant to each Relevant Strategy are reserved for the Strategy Sponsor only, save that, in respect of each Relevant Strategy, Goldman Sachs International (acting as calculation agent,

the "**Strategy Calculation Agent**" in respect of the Relevant Strategy unless otherwise specified in any of the sections of this description below) may determine the value of the Relevant Strategy from time to time in accordance with the relevant methodology.

The Strategy Sponsor owns the copyright and all other rights to each Relevant Strategy.

The structure of the Index is set out in the diagram below:



## 1. Description of the Index

Capitalised terms defined in this Section 1 (*Description of the Index*) (including in Section 1.8 (*Definitions in respect of the Index*)) shall have the meaning given to them solely for the purposes of this Section 1 (*Description of the Index*) unless otherwise specified or cross-referred to.

### 1.1 Overview of the Index

The Goldman Sachs US Technology Equity 6% Volatility Target USD ER Index (*Bloomberg Code: GSISTEC6 <Index>*) (referred to herein as the "**Index**") seeks to provide a volatility-targeted exposure to the performance of the Underlying Index.

The volatility adjustment feature systematically adjusts the exposure of the Index to the performance of the Index by allocating a percentage of its exposure to the Underlying Index if a specified measure of the realised volatility of the Index would otherwise deviate from a pre-defined volatility target of 6 per cent. (the "**Volatility Target**") on any Strategy Rebalancing Day (the "**Volatility Adjustment Feature**"). The notional weight assigned to the Index is rebalanced on a daily basis for the Index and is subject to a cap of 100 per cent.

The Index is an "excess return" strategy and, therefore, the value of the Index shall not include the accrual of any amount or interest in relation to any money market rate in respect of any notional cash amount.

The Index is denominated in U.S. dollars ("**USD**") (the "**Strategy Currency**").

The level of the Index is reduced by the deduction of synthetic costs of establishing and unwinding transactions in respect of the Index resulting from the application of the Volatility Adjustment Feature, which has the effect of reducing the performance of the Index.

The value of the Index will not be reduced by an annual fixed rate deduction (the "**Strategy Deduction Rate**"). The Strategy Deduction Rate is zero for the purposes of any calculations in this Section 1 (*Description of the Index*).

## 1.2 Calculation of the Index Value

The value of the Index (the "**Index Value**") on the Strategy Inception Date was equal to 100.

The Index Value shall be calculated by the Strategy Calculation Agent on each Strategy Business Day following the Strategy Inception Date as an amount in the Strategy Currency (subject to a floor of zero) equal to: (a) the Index Value immediately prior to subtracting the Asset Rebalancing Cost in respect of such Strategy Business Day minus (b) the Asset Rebalancing Cost in respect of such Strategy Business Day (" $RC_t^V$ ").

Expressed as a formula, the value of the Index on each Strategy Business Day following the Strategy Inception Date is as follows:

$$V_t^{Pre} - RC_t^V$$

The Index Value immediately before subtracting the Asset Rebalancing Cost in respect of each Strategy Business Day following the Strategy Inception Date (" $V_t^{Pre}$ ") shall be calculated by the Strategy Calculation Agent as an amount in the Strategy Currency equal to:

- (a) the Index Value in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day (" $V_{VRt}$ "); multiplied by
- (b) an amount equal to:
  - (i) (1) the Asset Weight on the Strategy Rebalancing Day immediately preceding such Strategy Business Day (" $w_{VRt}^V$ "); multiplied by
  - (2) the quotient of (i) the Underlying Index Value in respect of the Underlying Index in respect of such Strategy Business Day (" $A_t$ "), as numerator; and (ii) the Underlying Index Value in respect of the Underlying Index in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day (" $A_{VRt}$ "), as denominator,

*plus*

  - (ii) one (1) *minus* the Asset Weight on the Strategy Rebalancing Day immediately preceding such Strategy Business Day,

*minus*

  - (iii) (1) the actual number of days in the period commencing on (and including) the Strategy Rebalancing Day immediately preceding such Strategy Business Day and ending on (but excluding) such Strategy Business Day (" $DCF_{VRt,t}$ "); multiplied by
  - (2) the Strategy Deduction Rate.

*provided that* if the Index Value in respect of such Strategy Business Day is (or is deemed to be) zero, the value of the Index in respect of each Strategy Business Day immediately following such Strategy Business Day shall also be zero.



Expressed as a formula, the Index Value immediately before subtracting the Asset Rebalancing Cost in respect of each Strategy Business Day following the Strategy Inception Date is as follows:

$$V_{VRt} \times \left[ w_{VRt}^V \times \frac{A_t}{A_{VRt}} + (1 - w_{VRt}^V) - DCF_{VRt,t} \times 0.00\% \right]$$

Subject to the occurrence of a disruption event (in respect of which see Sections 4.1 and 4.2 (*Disruption Events, Adjustment Events and Consequences*) below), each Index Value in respect of a Strategy Business Day will be published on the Strategy Publication Data Source.

### 1.3 Calculation of the Asset Value in respect of the Underlying Index

In respect of any calendar day, the Underlying Index Value in respect of the Underlying Index shall be as calculated in accordance with Section 2.2 (*Calculation of the Underlying Index Value*) set out in Section 2 (*Description of the Underlying Index*) below.

In respect of any relevant calendar day, if the Underlying Index Value in respect of the Underlying Index is not available, then such Underlying Index Value shall be the latest available Underlying Index Value in respect of the Underlying Index immediately preceding such relevant calendar day.

### 1.4 Calculation of the Asset Weight

The Asset Weight in respect of a Strategy Rebalancing Day is an amount equal to the lower of:

- (a) 100 per cent.; and
- (b) the quotient of (i) 6 per cent., as numerator; and (ii) the Reference Volatility in respect of such Strategy Rebalancing Day, as denominator.

Any such Asset Weight shall be rounded to three decimal places with 0.0005 being rounded upwards.

### 1.5 Calculation of the Reference Volatility and the Exponential Asset Realized Volatility

In respect of a Strategy Rebalancing Day, the Reference Volatility shall be equal to the Exponential Asset Realized Volatility in respect of the Asset Sampling Business Day falling on or immediately before such Strategy Rebalancing Day.

The Exponential Asset Realized Volatility in respect of the Strategy Inception Date was equal to 6 per cent.

The Exponential Asset Realized Volatility shall be calculated by the Strategy Calculation Agent on each Asset Sampling Business Day falling after the Strategy Inception Date as an amount equal to the greater of the Short Term Exponential Asset Realized Volatility and the Long Term Exponential Asset Realized Volatility, in each case, in respect of such Asset Sampling Business Day.

The Short Term Exponential Asset Realized Volatility shall be calculated by the Strategy Calculation Agent on each Asset Sampling Day falling after the Strategy Inception Date in accordance with the following formula:

$$\sqrt{0.94 \times AssetVol_{ST,t-1}^2 + (1 - 0.94) \times \frac{252}{5} \times \left[ \ln \left( \frac{A_{t-d}}{A_{t-d-k}} \right) \right]^2}$$

The Long Term Exponential Asset Realized Volatility shall be calculated by the Strategy Calculation Agent on each Asset Sampling Business Day falling after the Strategy Inception Date in accordance with the following formula:

$$\sqrt{0.97 \times AssetVol_{ST,t-1}^2 + (1 - 0.97) \times \frac{252}{5} \times \left[ \ln \left( \frac{A_{t-d}}{A_{t-d-k}} \right) \right]^2}$$

Where:

$AssetVol_{ST,t-1}^2$  means, in respect of an Asset Sampling Business Day, the square of the Short Term Exponential Asset Realized Volatility in respect of the Asset Sampling Business Day immediately preceding such Asset Sampling Business Day;

$A_{t-d}$  means, in respect of an Asset Sampling Business Day, the Underlying Index Value in respect of the Underlying Index in respect of the Asset Sampling Business Day that is two Asset Sampling Business Days immediately preceding such Asset Sampling Business Day;

$A_{t-d-k}$  means, in respect of an Asset Sampling Business Day, the Underlying Index Value in respect of the Underlying Index in respect of the Asset Sampling Business Day that is three Asset Sampling Business Days immediately preceding such Asset Sampling Business Day;

$\ln$  means the natural logarithm function; and

$AssetVol_{LT,t-1}^2$  means, in respect of an Asset Sampling Business Day, the square of the Long Term Exponential Asset Realized Volatility in respect of the Asset Sampling Business Day immediately preceding such Asset Sampling Business Day.

#### 1.6 Calculation of the Asset Rebalancing Cost in respect of the Index

The Asset Rebalancing Cost in respect of (a) the Strategy Inception Date and (b) each Strategy Business Day following the Strategy Inception Date that is not a Strategy Rebalancing Day, is equal to zero.

The Asset Rebalancing Cost in respect of each Strategy Rebalancing Day following the Strategy Inception Date shall be calculated by the Strategy Calculation Agent in accordance with the following formula:

$$[0.0005 \times] \left| w_t^v - \overline{w}_t^v \right| \times V_t^{Pre}$$

Where:

$w_t^v$  means the Asset Weight in respect of such Strategy Rebalancing Day;

$\overline{w}_t^v$  means the Asset Actual Weight in respect of such Strategy Rebalancing Day immediately prior to the rebalancing process; and

$V_t^{Pre}$  means the Index Value immediately before subtracting the Asset Rebalancing Cost in respect of such Strategy Rebalancing Day.

#### 1.7 Calculation of the Asset Actual Weight in respect of the Index

The Asset Actual Weight in respect of each Strategy Business Day shall be calculated by the Strategy Calculation Agent as an amount equal to:

- (a) the Asset Weight in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day; multiplied by
- (b) the quotient of (i) the Underlying Index Value in respect of the Underlying Index in respect of such Strategy Business Day, as numerator; and (ii) the Underlying Index Value in respect of the Underlying Index in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day, as denominator; multiplied by

- (c) the quotient of (i) the Index Value in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day, as numerator; and (ii) the Index Value in respect of such Strategy Business Day immediately before subtracting the Asset Rebalancing Cost in respect of such Strategy Business Day.

#### 1.8 Definitions in respect of the Index

"**Asset Sampling Business Day**" means the Strategy Inception Date and thereafter each calendar day which is a "Strategy Business Day" (as defined in Section 2 (*Description of the Underlying Index*) below);

"**Asset Trading Day**" means each "Strategy Trading Day" (as defined in Section 2 (*Description of the Underlying Index*) below);

"**Strategy Business Day**" means the Strategy Inception Date and thereafter each Asset Sampling Business Day;

"**Strategy Inception Date**" means 2 May 2013;

"**Strategy Publication Data Source**" means <https://marquee.gs.com/studio> (or any successor page thereto); and

"**Strategy Rebalancing Day**" means the Strategy Inception Date and thereafter each Asset Trading Day.

#### 1.9 Disruption Events, Adjustment Events, Change in Methodology and Corrections

In respect of the Index, please see Sections 4.1 and 4.2 (*Disruption Events*), Section 5 (*Corrections*) and Section 6 (*Change in Methodology*).

### 2. Description of the Underlying Index

Capitalised terms defined in this Section 2 (*Description of the Underlying Index*) (including in Section 2.4 (*Definitions in respect of the Underlying Index*)) shall have the meaning given to them solely for the purposes of this Section 2 (*Description of the Underlying Index*) unless otherwise specified or cross-referred to herein.

#### 2.1 Overview of the Underlying Index

The US Technology Equity Futures Rolling Strategy ER Net Index (referred to herein as the "**Underlying Index**") seeks to provide a synthetic exposure to the performance of the Futures Rolling Index.

The Underlying Index is an "excess return" strategy and, therefore, the value of the Underlying Index shall not include the accrual of any amount or interest in relation to any money market rate in respect of any notional cash amount. The Futures Rolling Index is also an "excess return" strategy and, therefore, the level of the Underlying Index that reflect the level of the Futures Rolling Index will not be reduced or increased by a synthetic interest rate return on a notional cash amount.

The Underlying Index is denominated in U.S. dollars ("**USD**") (the "**Strategy Currency**").

The value of the Underlying Index will be reduced by an annual fixed rate deduction (the "**Strategy Deduction Rate**"), which has the effect of reducing the performance of the Underlying Index. The Strategy Deduction Rate is 0.25% for the purposes of any calculations in this Section 2 (*Description of the Underlying Index*).

The exposure of the Underlying Index to the performance of the Futures Rolling Index is 100 per cent and is rebalanced to reflect the Strategy Deduction Rate (such rebalancing a "**Strategy Rebalancing**").

#### 2.2 Calculation of the Underlying Index Value

The value of the Underlying Index (the "**Underlying Index Value**") on the Strategy Inception Date was equal to 100.

The Underlying Index Value in respect of each Strategy Business Day shall be calculated by the Strategy Calculation Agent in the Strategy Currency as an amount equal to:

- (a) the Underlying Index Value in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day (" $V_{VRt}$ "); multiplied by
- (b) an amount equal to:
  - (i) the quotient of (i) the Futures Rolling Index Value in respect of the Futures Rolling Index in respect of such Strategy Business Day (" $A_t$ "), as numerator; and (ii) the Futures Rolling Index Value in respect of the Futures Rolling Index in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day (" $A_{VRt}$ "), as denominator  
  
*minus*
  - (ii) (1) the actual number of days in the period commencing on (and including) the Strategy Rebalancing Day immediately preceding such Strategy Business Day and ending on (but excluding) such Strategy Business Day (" $DCF_{VRt,t}$ "); multiplied by  
  
(2) the Strategy Deduction Rate.

*provided that* if the Underlying Index Value in respect of such Strategy Business Day is (or is deemed to be) zero, the value of the Underlying Index in respect of each Strategy Business Day immediately following such Strategy Business Day shall also be zero.

Expressed as a formula, the Underlying Index Value on each Strategy Business Day following the Strategy Inception Date is as follows:

$$V_{VRt} \times \left( \frac{A_t}{A_{VRt}} - DCF_{VRt,t} \times 0.25\% \right)$$

Subject to the occurrence of a disruption event (in respect of which see Sections 4.1 and 4.2 (*Disruption Events, Adjustment Events and Consequences*) below), each Underlying Index Value in respect of a Strategy Business Day will be published on the Strategy Publication Data Source.

### 2.3 Calculation of the Futures Rolling Index Value in respect of the Futures Rolling Index

In respect of any calendar day, the Futures Rolling Index Value in respect of the Futures Rolling Index shall be as calculated in accordance with Section 3.2 (*Calculation of the Futures Rolling Index Value*) set out in Section 3 (*Description of the Futures Rolling Index*) below.

In respect of any relevant calendar day, if the Futures Rolling Index Value in respect of the Futures Rolling Index is not available, then such Futures Rolling Index Value shall be the latest available Futures Rolling Index Value in respect of the Futures Rolling Index immediately preceding such relevant calendar day.

### 2.4 Definitions in respect of the Underlying Index

"**Asset Business Day**" means each calendar day which is a "Strategy Business Day" (as defined in Section 3 (*Description of the Futures Rolling Index*) below);

"**Strategy Business Day**" means the Strategy Inception Date and thereafter each Asset Business Day;

"**Strategy Inception Date**" means 30 April 2013;

"**Strategy Publication Data Source**" means <https://marquee.gs.com/studio> (or any successor page thereto); and

"**Strategy Rebalancing Day**" means the Strategy Inception Date and thereafter each Strategy Business Day.

## 2.5 Disruption Events, Adjustment Events, Change in Methodology and Corrections

In respect of the Index, please see Sections 4.1 and 4.2 (*Disruption Events*), Section 5 (*Corrections*) and Section 6 (*Change in Methodology*).

## 3. Description of the Futures Rolling Index

Capitalised terms defined in this Section 3 (*Description of the Futures Rolling Index*) (including in Section 3.5 (*Definitions in respect of the Futures Rolling Index*)) shall have the meaning given to them solely for the purposes of this Section 3 (*Description of the Futures Rolling Index*) unless otherwise specified or cross-referred to.

### 3.1 Overview of the Futures Rolling Index

The US Technology Equity Futures Rolling Strategy Series Q Excess Return Index (*Bloomberg Code: FRSINQEE <Index>*) (referred to herein as the "**Futures Rolling Index**") seeks to provide a synthetic exposure to the performance of the futures contracts referencing the NASDAQ 100 Stock Index (the "**Underlier**") by notionally entering into and rolling two futures contracts (each such roll to occur during the prescribe Roll Period (as defined below)) with the same Underlier and different expiration dates (each a "**Futures Contract**"). The Futures Rolling Index tracks the dynamically weighted returns of such Futures Contracts with such weights being assigned and rebalanced periodically to the relevant Futures Contracts to reflect such rolling methodology. A Futures Contract shall be an "**Eligible Futures Contract**" where such Futures Contract has an Eligible Expiration Date.

The Futures Rolling Index is an "excess return" strategy and, therefore, the value of the Index shall not include the accrual of any amount or interest in relation to any money market rate in respect of any notional cash amount.

The Futures Rolling Index is denominated in U.S. dollars ("**USD**") (the "**Strategy Currency**").

### 3.2 Calculation of the Futures Rolling Index Value

The value of the Futures Rolling Index (the "**Futures Rolling Index Value**") on the Strategy Inception Date was equal to 100.

The Futures Rolling Index Value in respect of each Strategy Business Day shall be calculated by the Strategy Calculation Agent in the Strategy Currency as an amount equal to:

- (a) the Futures Rolling Index Value in respect of the Cash Rebalancing Day immediately preceding such Strategy Business Day (" $V_{CRt}$ "); multiplied by
- (b) the quotient of (i) the Excess Return Value in respect of the Futures Rolling Index in respect of such Strategy Business Day (" $E_t$ "), as numerator; and (ii) the Excess Return Value in respect of the Futures Rolling Index in respect of the Cash Rebalancing Day immediately preceding such Strategy Business Day (" $E_{CRt}$ "), as denominator,

*provided that* if the Futures Rolling Index Value in respect of such Strategy Business Day is (or is deemed to be) zero, the value of the Futures Rolling Index in respect of each Strategy Business Day immediately following such Strategy Business Day shall also be zero.

Expressed as a formula, the Futures Rolling Index Value on each Strategy Business Day following the Strategy Inception Date is as follows:

$$V_{CRt} \times \left( \frac{E_t}{E_{CRt}} \right)$$

Subject to the occurrence of a disruption event (in respect of which see Sections 4.2 and 4.3 (*Disruption Events, Adjustment Events and Consequences*) below), each Futures Rolling Index Value in respect of a Strategy Business Day will be published on the Strategy Publication Data Source and the Bloomberg Ticker rounded to four decimal places (with 0.00005 being rounded upwards).

### 3.3 Calculation of the Excess Return Value in respect of the Futures Rolling Index

The excess return value of the Futures Rolling Index (the "Excess Return Value") on the Strategy Inception Date was equal to 100.

The Excess Return Value in respect of each Strategy Business Day shall be calculated by the Strategy Calculation Agent in the Strategy Currency as an amount equal to:

(a) the Excess Return Value in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day (" $E_{Rt}$ "); multiplied by

(b) an amount equal to:

(i) one (1);

*plus*

(ii) the Front Contract Weight in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day;

*multiplied by*

(iii) (1) the quotient of (i) the Reference Level in respect of such Strategy Business Day of the Front Futures Contract in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day, as numerator; and (ii) the Reference Level in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day of the Front Futures Contract in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day, as denominator; minus

(2) one (1)

*plus*

(iv) the Back Contract Weight in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day;

*multiplied by*

(v) (1) the quotient of (i) the Reference Level in respect of such Strategy Business Day of the Back Futures Contract in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day, as numerator; and (ii) the Reference Level in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day of the Back Futures Contract in respect of the Strategy Rebalancing Day immediately preceding such Strategy Business Day, as denominator; minus

(vi) (2) one (1).

Expressed as a formula, the Excess Return Value on each Strategy Business Day following the Strategy Inception Date is as follows:

$$E_{Rt} \times \left[ 1 + W_{Rt}^F \times \left( \frac{F_t^{F,Rt}}{F_{Rt}^{F,Rt}} - 1 \right) + W_{Rt}^B \times \left( \frac{F_t^{B,Rt}}{F_{Rt}^{B,Rt}} - 1 \right) \right]$$

### 3.4 Roll Methodology

The Futures Rolling Index provides a synthetic exposure to each Eligible Futures Contract – being a Futures Contract with an expiration date falling in March, June, September and December in each calendar year. The Futures Rolling Index will periodically roll its synthetic exposure from the first to the second Eligible Futures Contract, in each case, with expiration dates falling strictly after any relevant Strategy Business Day as (such Eligible Futures Contracts being referred to herein as the Front Futures Contract and Back Futures Contract respectively in respect of each Strategy Business Day). For example, on a Strategy Business Day falling in July of a calendar year, the (i) Front Futures Contract would be the Eligible Futures Contract with an expiration date falling in September and (ii) the Back Futures Contract would be Eligible Futures Contract with an expiration date falling in December, in each case, of the same calendar year.

Any such "rolling" in respect of an Eligible Futures Contract shall occur in the period commencing on (and including) the fifth Strategy Business Day immediately preceding the Futures Contract Selection Date and ending on (but excluding) the Futures Contract Selection Date, in each case, in respect of such Eligible Futures Contract.

### 3.5 Definitions in respect of the Futures Rolling Index

"**Back Contract Weight**" means, in respect of a Strategy Rebalancing Day, one (1) *minus* the Front Contract Weight in respect of such day;

"**Back Futures Contract**" means, in respect of each Strategy Business Day, the Eligible Futures Contract with the earliest Futures Contract Selection Date which falls after the Futures Contract Selection Date of the Front Futures Contract in respect of such Strategy Business Day;

"**Bloomberg Ticker**" means FRSINQEE Index;

"**Cash Rebalancing Day**" means each Strategy Business Day from (and including) the Strategy Inception Date;

"**Eligible Expiration Date**" means an expiration date for a Futures Contract falling in March, June, September or December in a calendar year;

"**Exchange Business Day**" means any day on which the Reference Exchange is open for a trading sessions including days for the Reference Exchange has scheduled shortened trading hours;

"**Front Contract Weight**" means, in respect of each Strategy Rebalancing Day, the number of Strategy Rebalancing Days in the relevant Roll Period which fall strictly after such Strategy Rebalancing Day, divided by the number of Strategy Rebalancing Days in the relevant Roll Period;

"**Front Futures Contract**" means, in respect of each Strategy Business Day, the Eligible Futures Contract with the earliest Futures Contract Selection Date falling strictly after such Strategy Business Day;

"**Futures Contract Selection Date**" means, in respect of the Futures Rolling Index and an Eligible Futures Contract, the Exchange Business Day immediately preceding the Last Trading Date of such Eligible Futures Contract;

"**Last Trading Date**" means, in respect of a Futures Contract, the last scheduled trading day of such contract according to the trading calendar of the Reference Exchange;

**"Reference Exchange"** means the Chicago Mercantile Exchange;

**"Reference Level"** means, in respect of a Futures Contract and an Exchange Business Day, the settlement price published by the Reference Exchange in respect of such Futures Contract and Exchange Business Day;

**"Roll Period"** means, in respect of a Futures Contract the period from, and including, the day which falls five Strategy Business Days immediately prior to the Futures Contract Selection Date in respect of such Futures Contract to, but not including the Futures Contract Selection Date of such Futures Contract;

**"Strategy Business Day"** means each Exchange Business Day;

**"Strategy Calculation Agent"** means Solactive AG;

**"Strategy Inception Date"** means 30 April 2013; and

**"Strategy Publication Data Source"** means <https://360.gs.com/go/gs-systematic-strategies>.

### 3.6 Disruption Events, Adjustment Events, Change in Methodology and Corrections

In respect of the Index, please see Sections 4.2 and 4.3 (*Disruption Events*), Section 5 (*Corrections*) and Section 6 (*Change in Methodology*).

## 4. Disruption Events, Adjustment Events and Consequences

For the purposes of this Section 4, any underlying index, share, financial instrument, asset, price, level, component or other underlying comprising, directly or indirectly, a Relevant Strategy, a **"Strategy Component"**.

### 4.1 Disruption Events - In respect of the Index and the Underlying Index

In respect of each of the Index and the Underlying Index (each an **"Applicable Relevant Strategy"**) and a Strategy Component in respect of such Applicable Relevant Strategy:

- (a) if such Strategy Component is either:
  - (i) not calculated and announced by the relevant component's sponsor or calculation agent but is calculated and announced by a successor sponsor or successor calculation agent acceptable to the Strategy Sponsor; or
  - (ii) replaced by a successor strategy using, in the determination of the Strategy Sponsor the same or substantially same formula for and method of calculating such Strategy Component,

then, in relation to (i) such Strategy Component shall continue to be the underlying component in respect of such Applicable Relevant Strategy, and, in relation to (ii) such successor strategy shall be deemed to become an underlying asset in respect of such Applicable Relevant Strategy and shall replace such Strategy Component and, in each case, the Strategy Sponsor may make such temporary or permanent adjustment to such Applicable Relevant Strategy as it deems appropriate in its sole discretion to account for such change; and

- (b) in respect of such Strategy Component:
  - (i) the Strategy Component's sponsor for such Strategy Component or the sponsor of any component of such Strategy Component announces that it will make a material change in the formula for calculating the such Strategy Component (or any component thereof) or in any other way materially modifies such Strategy Component (or any component thereof) (other than any modification prescribed in the formula for the purpose of



maintaining such Strategy Component (or such component thereof) in the event of changes to its composition);

- (ii) such Strategy Component (or any component thereof) is permanently cancelled by its sponsor without any successor thereto, or ceases to exist or is no longer tradeable, including as a result of any member of the Goldman Sachs Group discontinuing such Strategy Component;
- (iii) the Strategy Sponsor (or the sponsor of any component thereof) fails to calculate and announce the level of such Strategy Component (or such component thereof);
- (iv) in the reasonable judgment of the Strategy Sponsor, the level of such Strategy Component contains a manifest error; or
- (v) any authorisation, registration, recognition, endorsement, equivalence decision, approval or inclusion in any official register in respect of such Strategy Component or the administrator or sponsor of such Strategy Component has not been, or will not be, obtained or has been, or will be, rejected, refused, suspended or withdrawn by the relevant competent authority or other relevant official body, in each case, with the effect that the Strategy Sponsor is not, or will not be permitted under any applicable law or regulation to use such Strategy Component, as determined by the Strategy Sponsor,

then, the Strategy Sponsor may take actions or take no action, including, but not limited to, the following in respect of such Applicable Relevant Strategy:

- (A) temporarily or permanently remove such Strategy Component and/or select an alternative index to replace such Strategy Component (provided that such replacement is a similar alternative) and may such adjustments to such Applicable Relevant Strategy as may be necessary, in its commercially reasonable judgement to effect such change; or
- (B) calculate the calculate the level of such Strategy Component, in lieu of the published level, using the same formula for, and method of, calculating the level of such Strategy Component last in effect prior to the occurrence of any of the circumstances described above (utilising any adjustment to such formula or method that the Strategy Sponsor determines to be commercially reasonable).

## 4.2 **Disruption Events**

### 4.2.1 **Market Disruption Events**

In respect of a Relevant Strategy:

- (a) the Strategy Sponsor becomes aware of the adoption of, or any change in, applicable law, it is illegal for the Strategy Sponsor or the Strategy Calculation Agent to undertake their respective roles in relation to such Relevant Strategy (or they would incur materially increased costs in doing the same) or any relevant entity would be prevented in entering into any transactions in respect of such Relevant Strategy or a Strategy Component in respect of such Relevant Strategy;
- (b) the Strategy Sponsor determines that a hedging party would (A) be unable to undertake certain actions in relation to all or a material portion of its hedge positions relating to any Strategy Component in respect of such Relevant Strategy or (B) there is a temporary or prolonged suspension of trading in any Strategy Component in respect of such Relevant Strategy (or its relevant hedging instrument) during regular scheduled trading sessions on the relevant reference exchange and/or a relevant reference exchange announces that there is a disruption in trading in respect of such Strategy Component (or its relevant hedging instrument), and such suspension or disruption has a material impact on the ability of market participants to enter into hedging

transactions in respect of such Strategy Component (in each case, a "**Material Trading Disruption**");

- (c) a trading disruption occurs in respect of the relevant trading venue or any other event or circumstance occurs which, in the reasonable judgement of the Strategy Sponsor, (A) affects the ability of market participants in general to enter into transactions in respect of any Strategy Component in respect of such Relevant Strategy in a notional size required in relation to any product or transaction linked to the Relevant Strategy, (B) impairs the liquidity of any transactions in relation to any Strategy Component in respect of such Relevant Strategy and/or (C) affects the value of any Strategy Component in respect of such Relevant Strategy;
- (d) a force majeure event (including, without limitation, an act of God, an armed conflict or an act of terrorism) occurs that the Strategy Sponsor determines is likely to have a material effect on such any Strategy Component in respect of such Relevant Strategy or on its ability to perform its role in relation to such Relevant Strategy;
- (e) (i) the official, price, level, rate or other measure in relation to a Strategy Component in respect of such Relevant Strategy is unavailable or incomplete on any relevant day, (ii) an unscheduled holiday occurs in respect of a trading venue of a Strategy Component in respect of such Relevant Strategy, (iii) a trading venue or the sponsor or provider of a Strategy Component in respect of such Relevant Strategy publicly announces that a day that was previously not a scheduled business day in respect of such trading venue or such Strategy Component shall be considered a scheduled business day in respect of such trading venue or such Strategy Component, (iv) any relevant exchange in respect of a Strategy Component in respect of such Relevant Strategy is not open for trading during its regular trading session or closes early, or (v) the Strategy Sponsor determines that the value of such Relevant Strategy or a Strategy Component in respect of such Relevant Strategy is manifestly incorrect;
- (f) where required, the Strategy Sponsor ceases to have any relevant data licence in respect of a Strategy Component in respect of such Relevant Strategy;
- (g) any authorisation, registration, recognition, endorsement, equivalence decision, approval or inclusion in any official register in respect of such Relevant Strategy, a Strategy Component in respect of such Relevant Strategy or the Strategy Sponsor has not been, or will not be, obtained or has been, or will be, rejected, refused, suspended or withdrawn by the relevant competent authority or other relevant official body, in each case, with the effect that the issuer of, or one of the contracting parties in respect of, a linked product is not, or will not be permitted under any applicable law or regulation to use such Relevant Strategy or such Strategy Component, as determined by the Strategy Sponsor;
- (h) a material change in national or international financial, political, legal or economic conditions that would likely prejudice the calculation and publications of the value of such Relevant Strategy, as determined by the Strategy Sponsor; or
- (i) the European Union membership or any member of the European Union is discontinued, suspended or terminated, or any member of the European Union disaffirms, disclaims, repudiates or rejects in whole or in part any obligation arising from its European Union membership under the relevant treaties or:
  - (I) the euro ceases to be the lawful currency of any member of the European Union; or
  - (II) any member of the European Union takes, or indicates its intention to take, any action in furtherance of, or indicates its consent to, approval of, or acquiescence in, any of the foregoing event;

then, the Strategy Sponsor (or the Strategy Calculation Agent on the instructions of the Strategy Sponsor) may take one or more of the following actions, or take no action, in order to preserve the intended commercial purpose of such Relevant Strategy:

- (i) make such determinations or adjustments to such Relevant Strategy as it deems appropriate to account for the occurrence of such event and, as applicable, to the extent necessary to calculate the value in respect of such Relevant Strategy in respect of such day (for which purpose it may use its own internal models and other market data sources as it reasonably determines is necessary and/or input date last published or made available;
- (ii) postpone any applicable rebalancing in whole or part of such Relevant Strategy to the next applicable business day on which no such event is continuing and make such adjustments as necessary to account for such postponement;
- (iii) determine that the value assigned to the weight or unit in respect of any Strategy Component in respect of such Relevant Strategy in respect of the period from (and including) the date on which such event occurred to (but excluding) the date on which such event is no longer continuing shall remain at the value assigned immediately prior to the occurrence of such event;
- (iv) suspend the publication of the value of such Relevant Strategy until such event is not continuing;
- (v) publish an indicative value of such Relevant Strategy until such event is not continuing;
- (vi) temporarily or permanently remove or replace any affected Strategy Component in respect of such Relevant Strategy with an alternative asset where it considers that a similar alternative is available;
- (vii) in the case of a Material Trading Disruption only in respect of a Strategy Component in respect of such Relevant Strategy (the "**Affected Strategy Component**"), if the Strategy Sponsor or the Strategy Calculation Agent (as applicable) has determined that such Material Trading Disruption has occurred or is ongoing for five or more consecutive strategy business days, it may remove such Affected Strategy Component and/or select an alternative asset to replace such Affected Strategy Component and may make such adjustments to the terms of such Relevant Strategy as it deems appropriate to account for such removal and in order to preserve insofar as possible the preserve the intended commercial purpose of such Relevant Strategy.

When determining a replacement of an Affected Strategy Component in respect of an Relevant Strategy, the Strategy Sponsor may take into consideration the following criteria:

- (A) the investment objectives of such Affected Strategy Component;
- (B) the asset class exposure of such Affected Strategy Component;
- (C) the geographical focus of such Affected Strategy Component; and/or
- (D) the realised volatility of such Affected Strategy Component.

In respect of such replacement of an Affected Strategy Component in respect of an Relevant Strategy:

- (1) there is no obligation for the Strategy Sponsor to select a replacement of such Affected Strategy Component that satisfied all of the above criteria;

- (2) the replacement component shall not be limited to equivalent assets and might be composed of securities, indices or cash;
- (3) the replacement component may not be limited to a single instrument and might be composed of several instruments; and
- (4) the calculation methodology of such replacement component may refer to levels reported by the Strategy Sponsor, service provider, exchanges and/or asset sponsors.

Any removal or replacement of an Affected Strategy Component in respect of an Applicable Relevant Strategy will take into consideration a review by any relevant strategy committee; or

- (viii) if the Strategy Sponsor determines that (A) none of the actions listed above would be possible to take or, if possible to take, would achieve a commercially reasonable result and/or (B) it is no longer possible or practicable to calculate such Relevant Strategy, terminate the calculation and publication of such Relevant Strategy.

#### 4.2.2 Input Data Disruption Events

If in respect of an Relevant Strategy the Strategy Sponsor discovers, or is notified by a party responsible for collecting, calculating, distributing or publishing Input Data in respect of such Relevant Strategy (the "**Input Data Provider**", which may include a third party, the Strategy Sponsor itself or certain departments within the Goldman Sachs Group), that:

- (a) an Input Data Provider has ceased to publish such Input Data (or the Input Data Provider announces that it will cease to publish such Input Data) unless the Strategy Sponsor determines, in its sole and absolute discretion, that such Input Data has been replaced by any equivalent information or data;
- (b) there is a material change in the formula for or method of calculating, or the content or frequency of publication of, such Input Data (as determined by the Strategy Sponsor); or
- (c) the Input Data Provider (A) fails to calculate or publish such Input Data, (B) does not deliver such Input Data to the Strategy Sponsor or Strategy Calculation Agent (as the case maybe) or (C) delivers incomplete Input Data to the Strategy Sponsor or Strategy Calculation Agent (as the case maybe), in each case, on or prior to the time at which the Strategy Sponsor needs to use such Input Data for calculating the value of such Relevant Strategy,

(each an "**Input Data Disruption Event**"), then the Strategy Sponsor may, in its sole discretion determine to take actions or take no actions, including, but not limited to:

- (i) use the Input Data last published or made available by the Input Data Provider in respect of such Relevant Strategy to calculate the value of the Relevant Strategy; and/or
- (ii) in all circumstances, (A) elect to temporarily or permanently replace or remove (or assign a zero weight to) any Strategy Component in respect of such Relevant Strategy affected by the unavailability or material change(s) at the earliest possible opportunity as it determines to be commercially reasonable in order for the value of such Relevant Strategy to continue to be calculated notwithstanding the relevant circumstances, (B) use information or data from an alternative data source (which may be internal data) which it determines to be comparable to such Input Data and to be appropriate in order to preserve the intended commercial purpose of the Relevant Strategy, (C) make such adjustment(s) to such Relevant Strategy or to the composition of such Relevant Strategy as it determines to be necessary, in its discretion and acting in a commercially reasonable manner, to reflect such unavailability or change(s) or (D) if the Strategy Sponsor determines that none of the above adjustment(s) would achieve a

commercially reasonable result and/or that it is no longer possible or practicable to calculate the such Relevant Strategy, terminate the calculation and publication of such Relevant Strategy.

For the purposes of this sub-section 4.2.2, "**Input Data**" means, in respect of a Relevant Strategy, input data (including but not limited to any price or level) which is used to determine, or which constitutes, any weight(s), signal(s) or other values or parameters in relation to any Strategy Component in respect of such Relevant Strategy and any other input data (other than a Strategy Component in respect of such Relevant Strategy) or software package used in the calculation of such Relevant Strategy.

#### 4.3 **Disruption Events - In respect of the Futures Rolling Index**

In respect of the Futures Rolling Index and a Strategy Component in respect of such Futures Rolling Index:

- (a) if, in respect of such Strategy Component, any one or more of the following occurs:
  - (i) such Strategy Component is not calculated, quoted by or traded on the relevant reference exchange (as determined by the Strategy Sponsor) but is calculated, quoted by or traded on a successor exchange acceptable to the Strategy Sponsor; or
  - (ii) is replaced by a successor futures contract having, in the determination of the Strategy Sponsor the same or substantially similar terms as such Strategy Component,

then, in relation to sub-section 4.3(a)(i) such Strategy Component shall continue to be the underlying component in respect of such Futures Rolling Index, and, in relation to sub-section 4.3(a)(ii) such successor futures contract shall be deemed to become an underlying component in respect of the Futures Rolling Index and shall replace such Strategy Component and, in each case, the Strategy Sponsor may make such temporary or permanent adjustment to the Futures Rolling Index as it deems appropriate to account for such change; and

- (b) if, in respect of such Strategy Component, any one or more of the following occurs:
  - (i) any term of such Strategy Component is (A) changed or modified by the relevant reference exchange (including, without limitation, any change or modification in the contract specifications, the delivery or settlement date, the month of expiration, methodology for calculating the settlement price of such Strategy Component, the rules and procedures governing the trading, clearing, settlement and any other related matters of such Strategy Component) or (B) otherwise subject to any order, ruling directive or law of any government agency or body;
  - (ii) other than where the underlying asset in respect of such Strategy Component is a commodity, the relevant contract price in respect of such Strategy Component becomes a "limit price" in respect of any relevant day (meaning that the price of such Strategy Component on the relevant day has increased or decreased from the previous day's settlement price for such Strategy Component by the maximum amount permitted under the applicable rules of the relevant reference exchange);
  - (iii) the relevant contract reference price in respect of such Strategy Component remains at a "limit price" for five consecutive Strategy Business Days in respect of the Futures Rolling Index; or
  - (iv) trading in such Strategy Component (A) is suspended or interrupted subsequent to the open of trading on any relevant day, (B) never commences on any relevant day, (C) is permanently discontinued at any time or (D) ceases to exist or is no longer tradeable (as determined by the Strategy Sponsor), in each case without there being a successor futures contract,

then, the Strategy Sponsor may, in its sole and absolute discretion, take no action or:

- (A) in respect of sub-sections 4.3(b)(ii) and 4.3(b)(iv), postpone any applicable rebalancing in whole or in part in respect of the Futures Rolling Index or such Strategy Component until such time or day on which the event described in sub-sections 4.3(b)(ii) and 4.3(b)(iv) (as applicable) is continuing and the Strategy Sponsor may, make any relevant adjustments to the methodology for calculating the Futures Rolling Index that it deems appropriate, in its sole discretion, to account for the postponement of such rebalancing;
- (B) in respect of sub-sections 4.3(b)(i), 4.3(b)(iii) and 4.3(b)(iv), take actions, including but not limited to, the following:
  - (x) remove such Strategy Component and/or select any futures contract (other than such Strategy Component) to replace such Strategy Component (that the Strategy Sponsor considers, in its sole and absolute discretion, to be a similar alternative), and may make such adjustments to the terms of the Futures Rolling Index as it deems appropriate to account for such removal and/or replacement; and
  - (y) amend, in the Strategy Sponsor's sole and absolute discretion, on either a permanent or temporary basis, the methodology used to determine which futures contract will constitute such Strategy Component for the purposes of the Futures Rolling Index; and
- (C) in respect of sub-sections 4.3(b)(i) and 4.3(b)(iii), amend, in the Strategy Sponsor's sole and absolute discretion, on either a temporary or permanent basis, the methodology used to calculate the price or value of such Strategy Component for the purposes of the Futures Rolling Index.

## 5. **Corrections**

Information on the policies and procedures of the Strategy Sponsor in relation to the handling of errors, incidents and restatements in respect of a Relevant Strategy can be found at the following location: <https://www.goldmansachs.com/disclosures/euro-benchmark-reg-iosco-principles-for-financial-benchmarks-f/summary-of-gs-policy-on-global-benchmark-incidents.pdf> (or any successor page thereto).

## 6. **Change in Methodology**

If any market, legal, regulatory, judicial, financial, fiscal or other circumstances arise that would, in the view of the Strategy Sponsor, necessitate or make desirable a modification or change of the methodology in respect of the Relevant Strategy in order to preserve the intended commercial purpose of a Relevant Strategy, the Strategy Sponsor reserves the right to make such changes to the relevant methodology to account for the occurrence of such circumstance(s).

Accordingly, the Strategy Sponsor shall be entitled to make modifications and/or changes to the methodology in respect of a Relevant Strategy or any data obtained from a third party data source which is used to calculate a Relevant Strategy without notice as it deems appropriate, necessary or desirable, including, without limitation:

- (a) to correct any manifest or proven error contained in the relevant strategy methodology;
- (b) to cure, correct or supplement any ambiguity or contradictory or defective provision in the relevant strategy methodology;
- (c) to change the frequency of calculation of a Relevant Strategy and make corresponding changes to the relevant strategy methodology to account for such change of frequency;

- (d) to permit the Strategy Calculation Agent to continue calculating and determining the value of a Relevant Strategy and determining the weights of any component thereof respectively if market, legal, regulatory, judicial, financial, fiscal or other circumstances arise which were not reasonably foreseeable by the Strategy Sponsor and which have not been deliberately caused by the Strategy Sponsor and such circumstances would prevent the Strategy Calculation Agent from calculating and determining the value of a Relevant Strategy and determining the weights of any component thereof respectively, and would necessitate a modification or change of the methodology in respect of a Relevant Strategy in order for the value of a Relevant Strategy to continue to be calculated and determined notwithstanding the relevant circumstances;
- (e) to preserve the intended commercial purpose of the relevant Strategy where the change is of a formal, minor or technical nature; and/or
- (f) in respect of a Relevant Strategy:
  - (i) to permit the Strategy Sponsor to continue calculating and determining the value of a Strategy and determining the weight(s), signal(s) or other values or parameters in respect of any Strategy Component in respect of such Relevant Strategy in anticipation of, or as a result of (A) the cessation of any benchmark (an "**Affected Benchmark**"), (B) any change or adjustment announced or implemented by clearing houses or exchanges with respect to an Affected Benchmark or (C) when such Affected Benchmark, as determined by the Strategy Sponsor, becomes no longer reliable and representative of market or economic reality that such Affected Benchmark is intended to measure;
  - (ii) to increase the transparency of the description of such Relevant Strategy; and/or
  - (iii) to preserve the Strategy Sponsor's or its affiliates' ability to hedge such Relevant Strategy, any Strategy Component in respect of such Relevant Strategy and/or Input Data (if applicable) and maintain such Relevant Strategy as tradable and replicable.

Any such changes shall result in a methodology consistent with the intended commercial purpose of the applicable Relevant Strategy. The Strategy Sponsor may, but is not required to, establish a committee comprising of employees of the Strategy Sponsor and an equal number of external members with the relevant academic or professional background to consider any proposed changes outlined above. The rules, responsibilities and powers of any such committee shall be pre-defined by the Strategy Sponsor.

In the event that an ambiguity or contradictory or defective provision comes to the attention of the Strategy Sponsor in the calculation of the value of a Strategy, the Strategy Sponsor may, in accordance with its own policies and procedures applicable at the time, resolve such ambiguity or contradictory or defective provision and, if necessary for resolution, make such changes to the composition of such Strategy or the methodology of calculating such Strategy.

In addition, if the aggregate notional amount of products or transactions linked to a Relevant Strategy (or any other similar strategy sponsored by the Strategy Sponsor) exceeds a certain threshold (as determined by the Strategy Sponsor by reference to the hedging capabilities of the Strategy Sponsor or any affiliate in respect of its exposure to such Relevant Strategy) then the Strategy Sponsor may:

- (a) change the methodology of such Relevant Strategy to allow for rebalancing to occur more frequently;
- (b) replace such Relevant Strategy with a replacement strategy identical in all material respects other than the days on which rebalancing occurs; and/or
- (c) make such other adjustments to such Relevant Strategy in order to allow the Strategy Sponsor (or its affiliate) to effectively hedge its exposure to such Relevant Strategy or reduce expected liquidity impact of such hedging transactions,

in each case, whilst ensuring the relevant replacement or proposed changes shall result in such Relevant Strategy being consistent with its intended commercial purpose."

**Interpretation**

To the extent that there is any inconsistency between (a) any statement in this Prospectus Supplement and (b) any other statement in or incorporated by reference into the Base Prospectus, the statements in (a) above will prevail.

References to the Base Prospectus shall hereafter mean the Base Prospectus as supplemented by this Prospectus Supplement.

**U.S. notice**

This Prospectus Supplement is not for use in, and may not be delivered to or inside, the United States.

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The date of this Prospectus Supplement is 12 May 2023.