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STOXX

STOXX GLOBAL QUANTUM COMPUTING INDEX GUIDE

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1. STOXX GLOBAL QUANTUM COMPUTING INDEX

1.1. OVERVIEW

The STOXX Global Quantum Computing Index aims to select companies involved in the development and application of quantum computing technologies. This includes areas such as quantum processors, quantum hardware and quantum software. The index also considers companies engaged in exploratory research and development that support the advancement of the quantum computing field. STOXX uses a detailed breakdown of companies' patent classification, annual report and company's websites to identify companies that have significant exposure to the theme.

Companies that are non-compliant based on the ISS ESG Norms Based Screening assessment or are involved in Controversial Weapons are not eligible for selection.

Universe: The index universe is defined as all stocks from the STOXX World AC All Cap Index.

Weighting scheme: The index constituents are weighted according to their exponential quantum computing scores and are subject to security capping.

Base value and dates: 100 on June 21, 2021

Index types and currencies: Price, net and gross return in EUR and USD

Calendar: STOXX Global Calendar

1.2. INDEX REVIEW

The free-float market capitalization of stocks used in selection and weighting of the index is adjusted for foreign ownership restrictions and China inclusion adjustment, in line with the STOXX World AC All Cap Index.

Initial screening
The index review cut-off date is the last dissemination day of the month preceding the review month of the index, and upon this date all stocks in the universe are screened for the following:

1. **Country classification:** Stocks classified under the STOXX World Country classification as India, Pakistan, Kuwait, Saudi Arabia are not eligible for index membership.

2. **Minimum size:** free-float market capitalization greater than or equal to 200 million USD.

3. **Minimum liquidity:** 3-month median daily trading value (MDTV) greater than or equal to 1 million USD.

4. **Multiple share lines:** in case a company is present with multiple listings and/or DR lines and/or multiple share classes, only the most liquid line, as measured by the 3 month MDTV, is eligible.

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5. **Norm Based Screening:** Companies are assessed against their adherence to international norms on human rights, labor standards, environmental protection and anti-corruption established in the UN Global Compact and the OECD Guidelines. Companies identified as 'Red' are excluded. ISS ESG identifies companies as 'Red', if they fail to respect established norms and where the issue remains unaddressed. If there is no data for a company, that name is excluded.

6. **Controversial Weapons:** Not involved in Controversial Weapons activities, as identified by ISS ESG. The following weapons are considered controversial: anti-personnel mines, biological weapons, chemical weapons, cluster munitions, depleted uranium program and white phosphorus. ISS ESG's Controversial Weapons Research is designed to identify all companies in a corporate structure that have control over the relevant business. If there is no data for a company, that name is excluded.

7. **Quantum Computing Involvement:** Companies without involvement in quantum computing are excluded. A company's involvement in quantum computing is determined by having high quality patent higher than one or text analysis score higher than one. Both metrics are described below.

The remaining companies after applying the above screens, define the Eligible Universe.

From the Eligible Universe, the STOXX Global Quantum Computing Index selects companies with significant exposure to the theme. The exposure to theme is assessed using EconSight' s patent classification and AI foundation model[1]. The following definitions and metrics are used for selection:

Patent exposure: companies are screened for their patent exposure to the following technology associated with the theme.

Nr.	Patents
1	Quantum Computing

The patent exposure and their involvement is assessed using the following patent metrics:

» **High Quality Patents**: defined as the number of active patents that a company holds that fall in the top 10% in terms of patent quality within the defined technology. Patent quality is the product of citations (a measure of technology relevance) and countries covered within the patent (market coverage). Citations can be viewed as an external assessment of how competitors assessed the importance of a patent. Market coverage is seen as an internal assessment of how patents owners assessed the importance of their own invention. Both indicators are weighted so that newer citations or larger countries are more relevant. The High Quality Patents metric allows for comparisons of patent strength between individual companies.

» **Patent Specialization:** defined as the total number of active patents associated with the technology divided by the total number of active patents the company has. It provides an

[1] EconSight - Measuring Technological Progress

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indication of the importance the identified technology to the overall patent activities of the company and is a measure of technological innovation.

» **Patent Score**: the scores are based on the number of high quality patents and are rescaled[2] , with boundaries set to 0 and 5. If there is no high quality patent for a company, a high quality patent of 0 is assigned.

In addition, companies that are considered highly specialized in quantum computing receive a patent score of 5. Highly specialized companies are defined as those with patent specialization greater or equal to 70% and that have at least three active patents in the defined quantum computing technology.

Text Analysis exposure: companies are screened for their annual report and company website to assess their level of involvement in the theme. These public available information are analyzed through the following metrics:

» **Annual Report Score**: score ranges from 0 to 5, where 0 indicates no relevance to the quantum computing theme and 5 represent the highest level of strategic focus. If there is no annual report score for a company, a score of 0 is assigned.

» **Website Score**: score ranges from 0 to 5, where 0 indicates no relevance to the quantum computing theme and 5 represent the highest level of strategic focus. If there is no website score for a company, a score of 0 is assigned.

» **Text Analysis Score**: determined as the maximum score between annual report score and website score.

Overall Exposure: companies are assessed by both their patent exposure and text analysis exposure using the following metric:

» **Quantum Computing score:** calculated as the sum of the patent score and the text analysis score.

Selection:
The index constituents are selected from the Eligible Universe of companies according to the following step:

1) Quantum Computing Score Ranking: Companies are ranked in descending order based on their quantum computing score. In the instances where more than one company has the same quantum computing score, preference is given to the company with the highest number of high quality patents. In the instances where more than one company has the same number of high quality patents, preference is given to the company with the highest patent specialization. In the event that the previous criteria are also equal, preference is given to the largest company by free-float market capitalization.

[2] Rescaled score: x' = a+ (x-Min(x))/(Max(x)-Min(x))* (b-a), where "a" ,"b" are the lower and upper boundary, and "x" is the original value. Rescaling is based on the Eligible Universe.

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2) Quantum Computing Composition: From the ranking above, the top thirty companies that have more than one active patents in the defined quantum computing technology, are considered part of the STOXX Global Quantum Computing Index.

Review frequency: The index is reviewed semi-annually in June and December. The result is published on the second Friday of each of those months, and becomes effective on the review effective date, which is on the Monday following the 3rd Friday of June and December. The review cut-off date for the underlying data is the last dissemination day of the month prior to the review month. Furthermore, in March and September, current components are screened for their Norm Based Screening assessment and Controversial Weapons. The cut-off date for this exercise is the last dissemination day of February and August respectively. If a current component is assessed as non-compliant based on the Norm Based Screening or Controversial Weapons, it is removed from the index, effective on the next dissemination day following the 3rd Friday of the month.

Weighting cap factors: Index weight factors are calculated quarterly in June, September, December, March. They are published on the second Friday of each of those months and based on the stocks' closing prices of the preceding Thursday.

The index considers a weighting mechanism designed to increase exposure to companies with higher quantum computing scores. Components are initially weighted using the exponential of their quantum computing scores. The resulting weights are then capped to ensure that a maximum company weight is not exceeded. This is achieved through the two steps below.

Step 1: The components are initially weighted as:

$$\widetilde{w}_{\mathrm{i}}=\frac{\exp\left(QC_{\mathrm{i}}\right)}{\sum_{j}\exp\left(QC_{\mathrm{j}}\right)}$$

where:

$\widetilde{w}_{\mathrm{i}}$	weight of company i in step 1.
QC_{i}	quantum computing score of company i as of the review cut-off date for the June and December rebalances. For March and September rebalances, quantum computing scores are carried forward from the preceding review.
$\exp_{()}$	exponential function.

Step 2: The maximum company weight is capped at a maximum of 8%.

The weighting factors are calculated such that:

$$\mathrm{wf_i}=\frac{\mathbf{w_i}}{\mathrm{p_i}}\cdot 10{,}000{,}000{,}000$$

rounded to the closest integer and where:

$\mathrm{w_i}$	final weight of company i
$\mathrm{p_i}$	close price of company i on the Thursday preceding the second Friday of the review month
$\mathrm{wf_i}$	weight factor of company i.

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An intra-quarter capping will be triggered if the largest company exceeds 35% or the second largest exceeds 20%. The process of intra-quarter capping are laid out in section 5.18. of the STOXX Index Methodology.

1.3. ONGOING MAINTENANCE

Replacements: A deleted stock is not replaced.

Fast exit: China Connect Securities are monitored on a daily basis. If there is an announcement that a China Connect Security index component is ineligible in the future, then the China Connect Security index component is removed from the index with a two-day notice.

Fast entry: Not applicable.

Spin-offs: Spin-offs are not added permanently.

2. DISCLAIMER

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