BlueStar Quantum Computing and Machine Learning Index

Index Methodology Guide 1.3

Issue Date:
December 2019

Produced by:

BlueStar Global Investors, LLC d/b/a BlueStar Indexes
1350 Avenue of the Americas, Fourth Floor, New York, NY 1009
www.bluestarindexes.com

Contents

Chapter 1: Introduction and Index Description

This document summarizes the methodology and rules used to construct, calculate, and maintain the BlueStar Quantum Computing and Machine Learning Index ("BQTUM").

BQTUM is a rules-based index that tracks the performance of a group of globally-listed stocks of companies involved in a range of industries, collectively defined by BlueStar Indexes as Quantum Computing and Machine Learning companies. Index components are reviewed semi-annually for eligibility, and weights are re-set accordingly.

Companies may not apply and may not be nominated for inclusion in the Index. Companies are added or removed by BlueStar based on the methodology described herein. The BlueStar Index Advisory Committee advises on index methodology construction and adherence to the methodology guide as it relates to decisions on which companies shall be considered Quantum Computing and Machine Learning companies. The BlueStar Index Advisory Committee serves a strictly advisory function and is not responsible for making decisions on which companies to add or remove from the Index. Whenever possible, BlueStar will publicly announce changes to the index on its website at least five trading days in advance of the actual change. The Index is calculated and maintained by Solactive AG based on a methodology developed by BlueStar.

BQTUM is calculated on a price and total return basis in real-time. The total return index is disseminated in real-time via the price marketing services of Boerse Stuttgart AG every day the exchange of at least one index component is open. Real-time index values for the total return index are available on Bloomberg by entering "BQTUMTR INDEX <GO>", and end-of-day values are freely available on BlueStar's or Solactive's website, www.bluestarindexes.com and Solactive.com, respectively, and/or through market data vendors.

Chapter 2: Index Construction

This chapter outlines and defines the key steps in constructing and calculating the index, including: eligibility requirements, formulas, initial component selection, and special adjustments

2.1 Base Date and Value

BQTUM has the following variants, base dates and values:

Name	Index Symbol	Base Date	Base Value
BlueStar Quantum Computing and Machine Learning Index (Price Index)	BQTUM	Dec. 18, 2015	100
BlueStar Quantum Computing and Machine Learning Index Total Return	BQTUMTR	Dec. 18, 2015	100

2.2 Component Eligibility Requirements

All the following requirements must be met for a company's security to be included in BQTUM:

1. Companies whose business activity, products, or services include one of the following in relation to the development or commercialization of Quantum Computing and Machine Learning technology are considered for inclusion in the Index: Quantum computers including superconducting materials, qubits, applications built on quantum computers, equipment and materials used in manufacturing hardware for quantum computers; Machine Learning including advanced computing hardware such as graphic processing units, field programmable gate arrays, application specific integrated circuits, embedded artificial intelligence chips, solid state memory, high powered computing cooling systems, semiconductor manufacturing equipment, heterogeneous database management systems, and companies that specialize in the perception, collection and management of big data in for such machine learning uses as natural language processing and machine vision.

2. BlueStar screens a broad universe of globally-listed publicly-traded common equity securities of companies for those that might be considered Quantum Computing and Machine Learning companies. BlueStar researches company annual filings, investor and analyst presentations, sell-side research reports, industry reports and trade journals, and company descriptions on bona-fide sources such as public websites and Bloomberg LP, to determine which companies are to be considered Quantum Computing and Machine Learning companies and included in the Global Universe of Quantum Computing and Machine Learning Companies.

3. Companies included in the global universe of Quantum Computing and Machine Learning companies are then screened to meet Index market capitalization and liquidity criteria. Only those companies included in the global universe of Quantum Computing and Machine Learning companies which have a free-float-adjusted market capitalization of at least $150 million USD equivalent, a six-month average daily value traded of at least $250,000 USD equivalent, free float percentage greater than 10%, and average bid-ask spread less than 1% will be selected for inclusion in the index. For securities that do not have six months of average daily value traded data available, three months of data will be used and their eligibility for inclusion will be reviewed by the BlueStar Index Advisory Committee, which will consider factors such as liquidity over the time frame for which data is available, lock-up periods, and market capitalization.

4. For existing components to be removed from the index, they must fail to meet market cap and liquidity criteria in 2.3.3, above, for two consecutive rebalance periods, or any other investability criteria only at the current rebalance period.

5. Companies that were previously removed from the index must meet market cap and liquidity criteria in 2.3.3., above, for two consecutive rebalance periods in order to be eligible for re-entry into the index.

2.3 Initial Component Selection

The following steps are taken to assign weights to BQTUM components at each semi-annual rebalance period:

1. Establish the list of index components according to Chapter 2.2

2. Determine the index weight of each security in the list of index components:

$$W_i = \frac{1}{N}$$

Where:

W_i = Weight for component i
N = Total number of index components

3. Set liquidity thresholds:
    a. Calculate six-month average daily value traded in USD equivalent for each component based on the daily closing price and number of shares traded
    b. Set percentage of average daily value traded threshold to 1000%
    c. Set investment threshold to $1 billion USD

4. Determine component percentage of average daily value traded given the investment threshold and the calculated weight of the component using the following equation:

$$ADV_{\%i} = \frac{W_i * \$100,000,000,000}{ADV_{\$i}}$$

Where:

$ADV_{\%i\,i}$ = Percentage of six month average daily value traded for component i
$ADV_{\$i\,i}$ = Six month average daily value traded for component i

5. If the component percentage of average daily value traded is greater than the percentage average daily value threshold then assign component a Final Weight, FW, such that its percentage average daily value traded is equal to the percentage average daily value traded threshold using the following steps:

    a. Calculate the component's FW based on the investment threshold and six-month average daily value traded threshold using the following equation:

$$FW_i = \frac{1000\% * ADV_{\$i}}{\$100,000,000,000}$$

Where:

FW'_i = Final weight for component i

    b. Take the aggregate difference between the W and FW of those components whose W was modified in step 5a, above, and distribute evenly among stocks whose W was not modified in step 5a, above to find their Final Weight such that each component now has a Final Weight, FW_i.

2.4 Dividend Treatment

The price index does not take normal dividend payments into account. Dividends are accounted for by reinvesting them daily. BQTUM uses the ex-dividend date to determine the total daily dividends for each day. Special dividends require an index divisor adjustment, as described in Chapter 3, to prevent such distributions from distorting the price index.

2.5 Index Equations

1. The price index is calculated using the following basic equations:

$$I_{(t)} = \frac{\sum_{i=1}^{n} P_{i(t)} * S_{i(t)}}{D_{(t)}}$$

Where:

$I_{(t)}$= Index value at time $_{(t)}$
$D_{(t)}$= Divisor at time $_{(t)}$
n= Number of stocks in the index
t= The time that the index is calculated
$P_{i(t)}$ = Price of stock $_i$ at time $_t$ in USD terms
$S_{i(t)}$ = Number of assigned shares of stock $_i$ at time $_t$

Where:

$$D_{(t)} = \frac{\sum_{i=1}^{n} P_{i(t-1)} * S_{i(t-1)}}{I_{(t-1)}}$$

Where:

$I_{(t-1)}$= Index value at time $_{t-1}$
$D_{(t)}$= Divisor at time $_t$
n= Number of stocks in the index
$P_{i(t-1)}$ = Closing price of stock $_i$ at time $_{t-1}$ in USD terms
$S_{i(t-1)}$ = Number of assigned shares of stock $_i$ at time $_{t-1}$

Where:

$$D_{(0)} = \frac{\sum_{i=1}^{n} P_{i(0)} * S_{i(0)}}{I_{(0)}}$$

Where:

$I_{(0)}$= Index value at time $_0$ 100
$D_{(o)}$= Divisor at time $_0$
n= Number of stocks in the index
$P_{i(t-1)}$ = Closing price of stock $_i$ at time $_0$ in USD terms
$S_{i(t-1)}$ = Number of assigned shares of stock $_i$ at time $_0$

2. Assigned shares are the number of shares needed for each component such that the component conforms to the weighting distribution outlined in Chapter 2.3.5

3. Changes to the index composition require divisor adjustments to retain index continuity before and after specific events, as outlined in Chapter 3. Divisor changes are made according to the following equation:

$$D_{(t+1)} = D_{(t)} * \frac{\sum_{i=1}^{n} P_{i(t+1)} * S_{i(t+1)}}{\sum_{i=1}^{n} P_{i(t)} * S_{i(t)}}$$

Where:

$D_{(t+1)}$= Initial Divisor after changes are made to the index

Chapter 3: Index Maintenance

This chapter describes the circumstances that require index changes, as well as the details on performing those changes

3.1 Divisor Changes

Changes to the index composition due to corporate actions or component eligibility changes will require adjustments to the index divisor, as follows:

*Spinoff**

1. Subtract the following from the price of the parent company:

$$\frac{\text{Spinoff stock price}}{\text{Share exchange ratio}}$$

2. Adjust the component's assigned shares such that its weighting is not changed because of the spinoff

Special Cash Dividend

1. Subtract special dividend from share price

Rights Offering

1. Subtract the following from the price of the parent company:

$$\frac{\text{Price of rights}}{\text{Rights ratio}}$$

2. Adjust the component's assigned shares such that its weighting is not changed because of the rights offering

Divisor changes are usually make on the date the corporate action becomes effective. For example, BQTUM uses the ex-dividend date rather than the payment date to determine when making divisor adjustments.

*If a company being spun-off is only trading on a "when-issued" basis, the "when-issued" price will be used to adjust the parent company's closing price.

3.2 Details of Share Changes

Stock splits and reverse splits do not require index divisor adjustments because the corresponding change to the stock price equally offsets the number of assigned shares, therefore not affecting the component's influence in the index.

3.3 Scheduled Component Changes and Review

BQTUM has a semi-annual review in June and December of each year. Fundamental data, prices and trading volumes are captured on the Selection Date which is the first Thursday of June and December. The new number of assigned shares for each component is determined based on the component's weight as determined in 2.3 and the closing price of that component on the Selection Date. Component changes are announced and made available after the close on the second Thursday of June and December. Component changes are made after the close on the third Thursday of June and December and are effective at the opening on the third Friday of June and December.

3.4 Interim Component Changes

1. Component changes may occur between regularly-scheduled review periods if a specific corporate event makes an existing component ineligible. The following events may require a component's removal or replacement:

    Merger or Acquisition
    If a merger or acquisition results in one component absorbing another, the resulting company will remain a component and the absorbed company will be removed or replaced. If a non-component company absorbs a component company, the original component will be removed, unless the non-component company, after absorbing the assets of the component company, would be considered a Quantum Computing and Machine Learning company as described in Chapter 2.2. If a component is the target of an acquisition BlueStar may decide to remove or reduce the weight of that component after the "go-shop" period concludes to reduce potential volatility or liquidity risk in the index.

    Spin-Off
    The spun-off company will be added to the index according to the transaction terms of the effective date. Furthermore, the spun-off company will remain in the index until the next ordinary rebalance date. The parent company will remain in the index provided it fulfills all the selection criteria.

    Bankruptcy
    A component company will be removed and replaced immediately after bankruptcy filing. Exceptions are made on a case-by-case basis. For example, a security may not be removed immediately if bankruptcy filing is not the result of operating or financial difficulties.

    Delisting
    A component company will be removed or replaced immediately after being delisted from its primary market.

Whenever possible, interim component changes are announced on BlueStar's publicly-available website at least three trading days prior to component changes becoming effective.

Chapter 4: Index Calculation and Dissemination

This chapter summarizes calculation and dissemination practices, quality assurance practices, and the circumstances requiring calculation corrections.

4.1 Price Calculation

Price and total return indexes for BQTUM are calculated by Solactive AG on both an end-of-day and real-time basis. The BQTUM is calculated using the last traded price for each company in the Index from the relevant exchanges and markets.

Index values are rounded to two decimal places and divisors are rounded to 14 decimal places.

4.2 Calculation Frequency and Dissemination

BQTUM is calculated on a real-time basis beginning when the first traded price of any of the Index components is received by Solactive AG. Prices are delivered to Boerse Stuttgart AG every 15 seconds and subsequently published at that frequency. Total return index values are available on a real-time basis through the Bloomberg information system under the index symbol "BQTUMTR INDEX". End-of-day total return index values are posted on BlueStar's and Solactive AG's publicly available websites, www.bluestarindexes.com and www.Solactive.com, respectively.

If the exchange a stock is listed on is closed or if trading in a stock is suspended prior to the market opening, the stock's adjusted closing price from the previous day will be used in the Index calculation until trading commences. If trading in a stock is suspended while the relevant market is open, the last traded price for that stock will be used for all subsequent Index calculations until trading resumes.

4.3 Input Data

Solactive AG uses various quality assurance tools to audit, monitor, and maintain the accuracy of its input data. While every reasonable effort is taken to ensure high standards of data integrity, there is no guarantee against errors. Please refer to the Data Correction section for more detail.

The index closing price is calculated using the closing prices issued by the primary exchange for each component stock in the index. If the primary exchange changes the closing price of a component stock, the new price will be used to calculate the index closing price.

4.4 Data Corrections

Incorrect index component data, corporate action data, or Index Divisors will be corrected upon detection or as soon and feasible.

Incorrect intraday index tick data will not be corrected. However, incorrect opening and closing values will be corrected as soon as possible after detection.

Appendices

This section provides additional information related to BQTUM as well as changes to this document.

Appendix A. BlueStar Quantum Computing and Machine Learning Index Constituents

As of June 5, 2018, Selection Date

Company	Ticker	Exchange	Weight
APPLE INC	AAPL	NASDAQ GS	1.71%
ALPHABET INC-CL A	GOOGL	NASDAQ GS	1.71%
MICROSOFT CORP	MSFT	NASDAQ GS	1.71%
INTEL CORP	INTC	NASDAQ GS	1.71%
SAMSUNG ELECTR-GDR	SMSN	London Intl	1.71%
NVIDIA CORP	NVDA	NASDAQ GS	1.71%
TAIWAN SEMICONDUCTOR-SP ADR	TSM	New York	1.71%
ORACLE CORP	ORCL	New York	1.71%
INTL BUSINESS MACHINES CORP	IBM	New York	1.71%
SAP SE	SAP	Xetra	1.71%
ACCENTURE PLC-CL A	ACN	New York	1.71%
ASML HOLDING NV	ASML	EN Amsterdam	1.71%
QUALCOMM INC	QCOM	NASDAQ GS	1.71%
LOCKHEED MARTIN CORP	LMT	New York	1.71%
MICRON TECHNOLOGY INC	MU	NASDAQ GS	1.71%
NIPPON TELEGRAPH & TELEPHONE	9432	Tokyo	1.71%
RAYTHEON COMPANY	RTN	New York	1.71%
NORTHROP GRUMMAN CORP	NOC	New York	1.71%
APPLIED MATERIALS INC	AMAT	NASDAQ GS	1.71%
SK HYNIX INC	660	Korea SE	1.71%
HP INC	HPQ	New York	1.71%
NOKIA CORP-SPON ADR	NOK	New York	1.71%
LAM RESEARCH CORP	LRCX	NASDAQ GS	1.71%
WESTERN DIGITAL CORP	WDC	NASDAQ GS	1.71%
XILINX INC	XLNX	NASDAQ GS	1.71%
TOSHIBA CORP	6502	Tokyo	1.71%
SEAGATE TECHNOLOGY	STX	NASDAQ GS	1.71%
SYNOPSYS INC	SNPS	NASDAQ GS	1.71%
CADENCE DESIGN SYS INC	CDNS	NASDAQ GS	1.71%
ADVANCED MICRO DEVICES	AMD	NASDAQ CM	1.71%
FUJITSU LTD	6702	Tokyo	1.71%
COGNEX CORP	CGNX	NASDAQ GS	1.71%
FLIR SYSTEMS INC	FLIR	NASDAQ GS	1.71%
TERADYNE INC	TER	New York	1.71%
CYPRESS SEMICONDUCTOR CORP	CY	NASDAQ GS	1.71%
BLACKBERRY LTD	BB	Toronto	1.71%
ASUSTEK COMPUTER INC	2357	Taiwan	1.71%
TERADATA CORP	TDC	New York	1.71%
NATIONAL INSTRUMENTS CORP	NATI	NASDAQ GS	1.71%
INTEGRATED DEVICE TECH INC	IDTI	NASDAQ GS	1.71%
MELLANOX TECHNOLOGIES LTD	MLNX	NASDAQ GS	1.71%
NUANCE COMMUNICATIONS INC	NUAN	NASDAQ GS	1.71%
HITACHI HIGH-TECHNOLOGIES CO	8036	Tokyo	1.71%
ORBOTECH LTD	ORBK	NASDAQ GS	1.71%
MAXAR TECHNOLOGIES LTD	MAXR	Toronto	1.71%
TOWER SEMICONDUCTOR LTD	TSEM	NASDAQ GS	1.71%
ALTERYX INC - CLASS A	AYX	New York	1.71%
RENESAS ELECTRONICS CORP	6723	Tokyo	1.71%
IQE PLC	IQE	London	1.71%
NANOMETRICS INC	NANO	NASDAQ GS	1.71%
ISRA VISION AG	ISR	Xetra	1.71%
LATTICE SEMICONDUCTOR CORP	LSCC	NASDAQ GS	1.71%
CEVA INC	CEVA	NASDAQ GS	1.71%
TALEND SA - ADR	TLND	NASDAQ GM	1.71%
CLOUDERA INC	CLDR	New York	1.71%
SPLUNK INC	SPLK	NASDAQ GS	1.71%
MKS INSTRUMENTS INC	MKSI	NASDAQ GS	1.71%
ATTUNITY LTD	ATTU	NASDAQ CM	1.57%
ASETEK A/S	ASETEK	Oslo	1.03%

Appendix B. Document Change History

A history of significant changes to this document is shown in the table below

Issue	Effective Date	Change
1.0	May 1, 2018	Initial publication
1.1	June 19, 2018	Minor edits, updated constituent list
1.2	June 25, 2018	Removal of NTR index; revised wording for treatment of spin-offs under Chapter 3.4
1.3	December 20, 2019	1. Add minimum free float percent and maximum bid-ask spread to selection criteria 2. Change to rebalance schedule. 3. Addition of 2-step removal and re-entry procedure