MarketVector™ Smart Contract Leaders Brazil Index

Informações sobre o Índice

Descrição do Índice

O **MarketVector™ Smart Contract Leaders Brazil Index** ("Índice") é administrado pela **MV Index Solutions GmbH** ("MVIS") e foi projetado para refletir a variação de preço dos maiores e mais líquidos criptoativos do segmento de *smart contracts,* em dólares americanos (US$), sendo que o Índice é composto de uma cesta de ativos selecionados conforme critérios estabelecidos pela MVIS. O Índice foi inaugurado em 8 de outubro de 2021.

O índice é calculado diariamente entre 00:00 e 24:00 (CET) e os valores do índice são divulgados para fornecedores de dados a cada 15 segundos. O índice é divulgado em dólares americanos e o valor de fechamento é calculado às 16:00h (ET) com taxas de câmbio fixas às 16:00h (ET).

Os ajustes aos componentes do Índice serão anunciados 4 (quatro) dias úteis antes do primeiro dia útil do mês seguinte às 23:00h (CET). O Índice é rebalanceado às 16:00h (ET) no último dia útil no Brasil de cada mês.

Cálculo do Valor do Índice

O cálculo do valor dos criptoativos integrantes do Índice é feito por meio da plataforma CryptoCompare (www.cryptocompare.com), por meio do "*Crypto Coin Comparison Aggregated Index*" ("CCCAGG"), o qual realiza uma média ponderada das últimas cotações disponíveis dos criptoativos em cada *exchange* coberta, sendo certo que *exchanges* podem ser adicionadas ou excluídas por decisão da CryptoCompare. O procedimento de revisão das *exchanges* será feito do seguinte modo:

I. Se uma *exchange* elegível estiver entre as 5 mais bem classificadas com base na tabela CryptoCompare Exchange Benchmark ("Exchange Benchmark") por duas revisões semestrais consecutivas, esta substituirá a *exchange* de menor classificação.

II. Se uma *exchange* elegível tiver sua classificação rebaixada por dois ou mais pontos numa revisão semestral e deixar de estar entre as 5 mais bem classificadas, ela será substituída pela *exchange* de mais alta classificação até então não coberta.

A metodologia de seleção das *exchanges* constituintes possui um aspecto qualitativo, utilizando o Exchange Benchmark, e um aspecto quantitativo, o processo mensal de seleção de componentes ("Seleção Mensal dos Componentes"), o qual leva em consideração movimentos históricos de preços e liquidez.

O Exchange Benchmark é conduzido como um processo de *due diligence* sobre *exchanges*, sendo atualizado semestralmente, e os seus resultados são utilizados no processo de Seleção Mensal dos Componentes. A Seleção Mensal dos Componentes é conduzida de modo a decidir se uma *exchange* deve ser incluída ou excluída do CCCAGG, sendo certo que a elegibilidade de cada *exchange* é testada para ser incluída no CCCAGG.

O CCCAGG consiste em metodologia de cálculo do índice em tempo real, cujo objetivo é mostrar a melhor estimativa de preço de criptoativos. O CCCAGG é a metodologia de cálculo de índice proprietário da *CryptoCompare* para ativos digitais, baseada no cálculo da média ponderada do volume de negociações do criptoativo num período de 24 horas. O CCCAGG agrega dados de transação de mais de 250 *exchanges*, sendo calculado especificamente para cada criptoativo em cada mercado específico (por exemplo, CCCAGG BTC-USD).

A CryptoCompare possui uma lista de *exchanges*, mas apenas uma parcela delas é levada em consideração para fins do cálculo do CCCAGG. Ao avaliar a elegibilidade de uma *exchange* a ser incluída/excluída em cada índice CCCAGG, a CryptoCompare distingue entre os pares líquidos e os demais pares. Isto decorre do fato de que, para os pares líquidos, o principal objetivo é manter a integridade dos preços, enquanto para os ilíquidos, o objetivo é promover a melhor descoberta de preços.

Critérios de Elegibilidade

foi projetado para refletir a variação de preço dos maiores e mais líquidos criptoativos do segmento de *smart contracts,* que atendam à classificação de *smart contracts* da MVIS e, cumulativamente:

I. Critérios de Capitalização de Mercado: São elegíveis os criptoativos classificados como *smart contracts* que possuam capitalização de mercado igual ou superior a US$ 1.000.000.000,00 (um bilhão de dólares dos Estados Unidos da América). Após comporem o Índice, os criptoativos classificados como *smart contracts* continuarão no Índice mesmo que venham a reduzir sua capitalização de mercado para valor igual ou superior a US$ 800.000.000,00 (oitocentos milhões de dólares dos Estados Unidos da América).

II. Critérios de Liquidez: São elegíveis os criptoativos classificados como *smart contracts* que registrem volume médio de negociação diária de US$ 25.000.000,00 (vinte e cinco milhões de dólares dos Estados Unidos da América). Após comporem o Índice, os criptoativos classificados como *smart contracts* continuarão no Índice mesmo que venham a reduzir seu volume médio de negociação diária para valor igual ou superior a US$ 20.000.000,00 (vinte milhões de dólares dos Estados Unidos da América). Além disso, os criptoativos devem ter disponibilidade aprovada pela custodiante dos criptoativos.

III. Outros critérios: Todos os criptoativos elegíveis não podem registrar riscos de segurança de curto prazo, como, por exemplo, ataques em montante igual ou superior a 51% dos mineradores que controlem a rede. Ademais, criptoativos que componham o índice e venham a sofrer um "hard fork" (modificação introduzida no código do ativo e aceita pela maioria substancial dos usuários e mineradores), não serão adicionados ao índice. Apenas no caso de o novo código ser significativo o suficiente para substituir a versão antiga, em termos de capitalização de mercado e aceitação, a MVIS pode decidir por um diferente tratamento.

Demais Informações

O presente material representa um resumo das informações contidas no "Index Guide" e no "CCCAG Index Methodology". Para mais informações, vide o Anexo I e o Anexo II, respectivamente.

Todas as informações sobre o Índice aqui dispostas foram obtidas junto à MVIS e à CryptoCompare, e podem ser encontradas na página do Fundo na rede mundial de computadores (https://investoetf.com/blok11/), bem como nos materiais de divulgação do Fundo, se aplicável. Nem o Fundo, o Administrador, o Gestor, ou qualquer outro prestador de serviço que preste serviços ao Fundo ou em benefício do Fundo, tampouco quaisquer de suas coligadas, será responsável por qualquer incorreção de tais informações sobre o Índice ou, ainda, por incorreções no cálculo do Índice.

Anexo I

Index Guide

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MarketVector™ Indexes

INDEX GUIDE

MARKETVECTOR™ DIGITAL ASSETS INDEXES

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1 Introduction

In accordance with Art. 13 No. 1 (a) of Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 (the "Benchmark Regulation"), this document provides the rules for calculating and maintaining the MarketVector™ Digital Assets Index family (the "Indexes").
MarketVector Indexes GmbH (the "Index Owner") makes no warranties or representations as to the accuracy and/or completeness of the Indexes and does not guarantee the results obtained by persons using the Indexes in connection with trading funds or securities. The Index Owner makes no representations regarding the advisability of investing in any fund or security.
The Index Owner reserves the right to update the rules in this Index Guide at any time. The Index Owner also reserves the right to make, in exceptional cases or in temporary situations, exceptions to the rules in this Index Guide. The Indexes are the property of MarketVector Indexes GmbH. The Index Owner has selected an index calculator to calculate the Indexes.
MarketVector™ is a registered trademark of Van Eck Associates Corporation and therefore protected against unlawful usage. The use of MarketVector™ Indexes in connection with any financial products or for benchmarking purposes requires a license. Please contact MarketVector Indexes GmbH for more details.

1.1 Approval of Index Methodologies

The Index Owner has established the Indexes and their individual methodology covered in this Index Guide. A detailed written "Procedure for Index Development" describes the steps and approvals required to develop, document and approve an Index and its methodology. The intention of the Procedure for Index Development is to ensure that the methodology of an Index meets the requirements of Art. 12 of the Benchmark Regulation and is approved and implemented according to a robust and reliable process.
The methodology for each index and its methodology covered in this Index Guide has been analysed by the Index Owner's Index Operations department in order to ensure that it is robust and reliable, has clear rules on use of discretion, allows sustainable validation (based on reasonable back testing) and is traceable and verifiable. Furthermore, the size, liquidity and transparence of the underlying market for each methodology has been tested and particular circumstances for each relevant market have been taken into account.

Each index methodology and the related detailed analysis was presented by the Index Operations Department to the Independent Oversight Function for its approval. Based on the aforementioned approval process and its documentation each Index Methodology was presented to the Management Board (Geschäftsführer) of the Index Owner for final approval.

1.2 Review of this Index Guide

According to Art. 13 No. 1 (b) of the Benchmark Regulation, the Index Owner reviews this Index Guide on an annual basis and immediately in case of special circumstances that require a review. The review takes place in meetings attended by the Independent Oversight Function and the Management Board of the Index Owner. If changes to this Index Guide are considered necessary, the process described in Section 5.5 applies.

2 Index Universe

2.1 Index Universe

The index universe of the MarketVector™ index family includes all crypto currencies (excl. security tokens and financial instruments) covered by the respective calculation agent. A detailed list of these crypto currencies is available on request.

In addition, the universe might be restricted based on applicable regulatory jurisdictions of the client.

3 General Definitions

3.1 Weighting Schemes

Most MarketVector™ Digital Assets Indexes use cap-factors to guarantee diversification and avoid over-weighting. Please refer to the individual index description in section 4 for the capping scheme used. Index weightings are reviewed on a monthly basis.

Weighting Scheme: 50%-Cap

The 50%-cap ensures diversification by assigning weights to components which cannot exceed 50% but still ensures bigger sizes of bigger components.
All components are ranked by their market capitalization. The maximum weight for any component is 50%. If a constituent exceeds the maximum weight, the weight will be reduced to the maximum weight and the excess weight shall be redistributed proportionally across all other index components. This process is repeated until no components have weights exceeding the respective maximum weight.

Weighting Scheme: 35%-Cap

The 35%-cap ensures diversification by assigning weights to components which cannot exceed 35% but still ensures bigger sizes of bigger components.
All components are ranked by their market capitalization. The maximum weight for any component is 35%. If a constituent exceeds the maximum weight, the weight will be reduced to the maximum weight and the excess weight shall be redistributed proportionally across all other index components. This process is repeated until no components have weights exceeding the respective maximum weight.

Weighting Scheme: 30%-Cap

The 30%-cap ensures diversification by assigning weights to components which cannot exceed 30% but still ensures bigger sizes of bigger components.
All components are ranked by their market capitalization. The maximum weight for any component is 30%. If a constituent exceeds the maximum weight, the weight will be reduced to the maximum weight and the excess weight shall be redistributed proportionally across all other index components. This process is repeated until no components have weights exceeding the respective maximum weight.

Weighting Scheme: 15%-Cap

The 15%-cap ensures diversification by assigning weights to components which cannot exceed 15% but still ensures bigger sizes of bigger components.
All components are ranked by their market capitalization. The maximum weight for any component is 15%. If a constituent exceeds the maximum weight, the weight will be reduced to the maximum weight and the excess weight shall be redistributed proportionally across all other index components. This process is repeated until no components have weights exceeding the respective maximum weight.

Weighting Scheme: 4.5%/20%/50%-Cap

This weighting scheme ensures diversification by assigning weights to constituents which cannot exceed 20% but still ensures bigger sizes of bigger components.

1. All index components are weighted by their market capitalization.

2. All components exceeding 4.5% but at least the largest 5 components are grouped together (so called "Large-Weights") and all other components are grouped together as well (so called "Small-Weights").
3. The aggregated weighting of the Large-Weights is capped at 50%:
    - Large-Weights: If the aggregated weighting of all components in Large-Weight exceeds 50%, then a capping factor is calculated to bring the weighting down to 50% - at the same time a second capping factor for the Small-Weights is calculated to increase the aggregated weight to 50%. These two factors are then applied to all components in the Large-Weights or the Small-Weights respectively. Then
    - Large-Weights: The maximum weight for any component is 20% and the minimum weighting is 5%. If a component is above the maximum or below the minimum weight, then the weight will be reduced to the maximum weight or increased to the minimum weight and the excess weight shall be redistributed proportionally across all other remaining index constituents in the Large-Weights. Then
    - Small-Weights: The maximum weight for any component is 4.5%. If a component is above the maximum weight, then the weight will be reduced to the maximum weight and the excess weight shall be redistributed proportionally across all other remaining index constituents in the Small-Weights.

Weighting Scheme: Uncapped

An uncapped index reflects the real market capitalization of its components.
All components are ranked by their market capitalization without a capping. All weighting cap factors are fixed at 1.

Weighting Scheme: Equal Weighted

An equal weighting overweight smaller companies compared to a market capitalization weighted index.

Let "N" be the number of companies in the index. The weight for any single stock is 1/N.

3.2 Review Schedule

All indexes are rebalanced monthly (The "Monthly Rebalance Date"), except for MVDAMV, MVLEADV and MVSCLEV (quarterly) and BBR/EBR, which follows a semiannual review scheme.
The reviews for all Indexes are based on the opening data on the fourth but last business day in that month. If a security does not trade on a business day, then the last available price for this security will be used.
A "business day" means any day (other than a Saturday or Sunday) on which commercial banks and foreign exchange markets settle payments in Frankfurt.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.

Indexes are rebalanced after closing of the last trading day in each month.

3.3 Pricing Source

3.3.1 CCData

For each component price in the MarketVector™ Indexes, the respective CCCAGG by CCData (https://ccdata.io) is used. CCCAGG is a weighted average of the latest available trading price at each exchange covered. Exchanges can be added/removed by decision of CCData.
For clarification, 'respective CCCAGG' means

- Exchange selection might vary dependent on the respective index rules (see respective constraints per index).
- Exchanges may be excluded if they are not licensed to be added to an index.
- Exchanges are not immediately added/removed, but only on a monthly basis or if required following quality reviews from CCData.
- Values are not backadjusted.

3.3.2 DAR

For each component price in the MarketVector™ Indexes, the respective DAR pricing by DAR (https://www.digitalassetresearch.com/) is used. The DAR Close Price is a time-weighted average price (TWAP) derived from eligible, non-outlier trades that occur within a 30-minute window prior to the specified close time. Exchanges can be added/removed by decision of DAR.

For clarification, 'respective DAR' means

- Exchange selection might vary dependent on the respective index rules (see respective constraints per index).
- Exchanges may be excluded if they are not licensed to be added to an index.
- Exchanges are not immediately added or removed except for a case covered in Section 5.6. Exchange reviews are done on periodical basis by DAR.
- Values are not backadjusted.

3.4 Index Dissemination

The Indexes are calculated with the constituent prices converted to USD. Dissemination is in USD.
Real-time index values are calculated with the latest available CCCAGG prices.

4 Indexes

The following sections define all relevant index parameters, this includes

- Universe and selection lists,
- Review: selections and weightings,
- Dissemination: times, currencies and identifiers.

4 INDEXES

4.1 MarketVector™ Centralized Exchanges Index

The MarketVector™ Centralized Exchanges Index is designed to track the performance of assets classified as "Centralized Exchanges" by MarketVector Indexes and serve as a benchmark/universe for the respective market. A crypto exchange token is a digital asset that is native to a cryptocurrency exchange. Cryptocurrency exchanges are platforms for buying, selling, and exchanging cryptocurrencies. The weightings are uncapped as described in section 3.1.

Review procedure:

The index is derived from the MarketVector™ Digital Assets 100 Index (MVDA). Current and new components for the MarketVector™ Centralized Exchanges Index, which fulfil the following criteria, qualify for the index:

- new components of MarketVector™ Digital Assets 100 Index (MVDA).
- classified as "Centralized Exchanges" by MarketVector™ Indexes.

In case the number of components is below 10, additional assets classified as "Centralized Exchanges" are selected from the MVDA universe with an average-daily-trading value of at least 1,000,000 USD for the current month. These assets are sorted by market capitalization in descending order and selected top to bottom until the number of constituents equals 10.

If the number of eligible assets is still below 10, additional assets are added by the Index Owner's decision until the number of assets equals 10.

All qualified digital assets must not carry short term security risks (e.g. 51% attacks).

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Centralized Exchanges Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0GBL6	BP0V643	SL0GBL	MVCEX	.MVCEX

The index was launched on 01 June 2022 with a base index value of 100.00 as of 28 February 2021.

4.2 MarketVector™ Digital Assets 5 Index

The MarketVector™ Digital Assets 5 Index is designed to track the performance of the largest and most liquid 5 digital assets (with a 3-7 buffer). All assets on the selection list must be listed on at least one of the top 15 exchanges by CCData's Centralized Exchange Benchmark. The 35% capping scheme as described in section 3.1 is applied.

Review procedure:

1. The selection list contains all current components (which fulfil the listing criteria) with an average-daily-trading value of at least 600,000 USD for the current month. Components of the MarketVector™ Digital Assets 100 Index (see section 4.5), which have an average-daily-trading value of at least 1,000,000 USD for the current month, are added to the selection list by size (top to bottom), until a count of 10 is reached. If there are no sufficient non-components which fulfil the liquidity criteria, additional MarketVector™ Digital Assets 100 Index components are added to list by liquidity (average-daily-trading value for the current month, top to bottom) until it contains 10 digital assets.
2. The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
3. The selection list is now ranked by the sum of the two ranks in step 2 in ascending order. If two constituents have the same sum of ranks, then the larger constituent is placed on top.
4. The top 3 digital assets qualify for selection.
5. The remaining 2 components are selected from the highest ranked remaining index components ranked between 4 and 7.
6. If the number of selected components is still below 5, then the highest ranked digital assets are selected until the number of components equals 5.

For all events that result in a deletion from the index, the deleted component will be replaced with the highest ranked non-component at the latest review. The replacement will be added with the same weight as the deleted component. In case of a hard fork, which results in several active lines, rule 5.2.1 applies. If an event causes the number of components to be greater than 5, the smallest components by market capitalization will be removed one day after the increase is effective (when a price and the main net is available), until the number of components is 5 again.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day of each month.

The MarketVector™ Digital Assets 5 Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A2GGQM9	BYX8644	A2GGQM	MVDA5	.MVDA5

The index was launched on 23 October 2017 with a base index value of 100.00 as of 31 December 2014.

4.3 MarketVector™ Digital Assets 10 Index

The MarketVector™ Digital Assets 10 Index is designed to track the performance of the largest and most liquid 10 digital assets (with a 7-13 buffer). All assets on the selection list must be listed on at least one of the top 15 exchanges by CCData's Centralized Exchange Benchmark. The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

1. The selection list contains all current components (which fulfil the listing criteria) with an average-daily-trading value of at least 600,000 USD for the current month. Components of the MarketVector™ Digital Assets 100 Index (see section 4.5), which have an average-daily-trading value of at least 1,000,000 USD for the current month, are added to the selection list by size (top to bottom), until a count of 20 is reached. If there are no sufficient non-components which fulfil the liquidity criteria, additional MarketVector™ Digital Assets 100 Index components are added to list by liquidity (average-daily-trading value for the current month, top to bottom) until it contains 20 digital assets.
2. The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
3. The selection list is now ranked by the sum of the two ranks in step 2 in ascending order. If two constituents have the same sum of ranks, then the larger constituent is placed on top.
4. The top 7 digital assets qualify for selection.
5. The remaining 3 components are selected from the highest ranked remaining index components ranked between 8 and 13.
6. If the number of selected components is still below 10, then the highest ranked digital assets are selected until the number of components equals 10.

For all events that result in a deletion from the index, the deleted component will be replaced with the highest ranked non-component at the latest review. The replacement will be added with the same weight as the deleted component. In case of a hard fork, which results in several active lines, rule 5.2.1 applies. If an event causes the number of components to be greater than 10, the smallest components by market capitalization will be removed one day after the increase is effective (when a price and the main net is available), until the number of components is 10 again.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day of each month.

The MarketVector™ Digital Assets 10 Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A2GGQF3	BYX85Y7	A2GGQF	MVDA10	.MVDA10

The index was launched on 23 October 2017 with a base index value of 100.00 as of 31 December 2014.

4.4 MarketVector™ Digital Assets 25 Index

The MarketVector™ Digital Assets 25 Index is designed to track the performance of the largest and most liquid 25 digital assets (with a 20-30 buffer). All assets on the selection list must be listed on at least one of the top 15 exchanges by CCData's Centralized Exchange Benchmark. The 4.5%/20%/50% capping scheme as described in section 3.1 is applied.

Review procedure:

1. The selection list contains all current components (which fulfil the listing criteria) with an average-daily-trading value of at least 600,000 USD for the current month. Components of the MarketVector™ Digital Assets 100 Index (see section 4.5), which have an average-daily-trading value of at least 1,000,000 USD for the current month, are added to the selection list by size (top to bottom), until a count of 50 is reached. If there are no sufficient non-components which fulfil the liquidity criteria, additional MarketVector™ Digital Assets 100 Index components are added to list by liquidity (average-daily-trading value for the current month, top to bottom) until it contains 50 digital assets.
2. The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
3. The selection list is now ranked by the sum of the two ranks in step 2 in ascending order. If two constituents have the same sum of ranks, then the larger constituent is placed on top.
4. The top 20 digital assets qualify for selection.
5. The remaining 5 components are selected from the highest ranked remaining index components ranked between 21 and 30.
6. If the number of selected components is still below 25, then the highest ranked digital assets are selected until the number of components equals 25.

For all events that result in a deletion from the index, the deleted component will be replaced with the highest ranked non-component at the latest review. The replacement will be added with the same weight as the deleted component. In case of a hard fork, which results in several active lines, rule 5.2.1 applies. If an event causes the number of components to be greater than 25, the smallest components by market capitalization will be removed one day after the increase is effective (when a price and the main net is available), until the number of components is 25 again.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day of each month.

The MarketVector™ Digital Assets 25 Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A2GGQL1	BYX8633	A2GGQL	MVDA25	.MVDA25

The index was launched on 23 October 2017 with a base index value of 100.00 as of 31 December 2014.

4.5 MarketVector™ Digital Assets 100 Index

The MarketVector™ Digital Assets 100 Index is designed to track the performance of the largest 100 digital assets (with an 80-120 buffer) and serve as a benchmark/universe for the market. The weightings are uncapped as described in section 3.1.

Review procedure:

1. The selection list is defined as all digital assets with an average-daily-trading value of at least 1,000,000 USD for the current month, and current components with an average-daily-trading value of at least 600,000 USD. Stablecoins (also called 'price stable currencies') which are fiat collateralized, digital assets pegged to a currency or any other asset and wrapped tokens which are digital assets or cryptocurrency tokens that represent another token but exist on a different blockchain are not eligible for the selection list. It is sorted in terms of market capitalization in descending order.
2. The top 80 digital assets qualify for selection.
3. The remaining 20 components are selected from the highest ranked remaining index components ranked between 81 and 120.
4. If the number of selected components is still below 100, then the highest ranked digital assets are selected until the number of components equals 100.

From this composite index (MVDA), three sub-indexes are derived by size:

- A Large-Cap Index (MVDALC) with 20 components and a 15-25 buffer within the composite:
    1. The top 15 digital assets qualify for selection.
    2. The remaining 5 components are selected from the highest ranked remaining index components ranked between 16 and 25.
    3. If the number of selected components is still below 20, then the highest ranked digital assets are selected until the number of components equals 20.
- a Mid-Cap Index (MVDAMC) with 30 components and a 15-25 upper and a 40-60 lower buffer within the composite:
    1. The top 20 digital assets, which did not qualify for the Large-Cap Index, qualify for selection.
    2. The remaining 10 components are selected from the highest ranked remaining index components and current large-cap components ranked between 41 and 60.
    3. If the number of selected components is still below 30, then the highest ranked digital assets, which are not reclassified as large-caps, are selected until the number of components equals 30.
- a Small-Cap Index (MVDASC) with 50 components and a 40-60 buffer within the composite:
    1. All components of the composite index, which did neither qualify for the Large-Cap nor the Mid-Cap index, qualify for selection.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. For all events that result in a component number not being equal to 100, the index will be set back to 100 components at the next review.

4 INDEXES

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day of each month.

The MarketVector™ Digital Assets 100 Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A2GGQG1	BYX85Z8	A2GGQG	MVDA	.MVDA
Price Return Index	DE000A2GGQH9	BYX8600	A2GGQH	MVDALC	.MVDALC
Price Return Index	DE000A2GGQJ5	BYX8611	A2GGQJ	MVDAMC	.MVDAMC
Price Return Index	DE000A2GGQK3	BYX8622	A2GGQK	MVDASC	.MVDASC

The indexes were launched on 23 October 2017 with a base index value of 100.00 as of 31 December 2014.

4.6 MarketVector™ Digital Asset Broad 100 Equal Weight Index

The MarketVector™ Digital Asset Broad 100 Equal Weight Index is designed to track the performance of the largest 100 digital assets (with an 80-120 buffer). All assets on the selection list must be listed on at least one of the vetted exchanges from the DAR Exchange Vetting. The weightings are equal weighted as described in section 3.1.

Review procedure:

1. The selection list is defined as all digital assets which are being traded on at least one of the vetted exchanges from the DAR Exchange Vetting.
2. The top 80 digital assets qualify for selection.
3. The remaining 20 components are selected from the highest ranked remaining index components ranked between 81 and 120.
4. If the number of selected components is still below 100, then the highest ranked digital assets are selected until the number of components equals 100.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies. For all events that result in a component number not being equal to 100, the index will be set back to 100 components at the next review.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 ET with fixed 16:00 ET exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 ET of the last trading day of each year.

The MarketVector™ Digital Asset Broad 100 Equal Weight Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A3ERU77	BM99ZY0	A3ERU7	MVB100EW	.MVB100EW

The indexes were launched on 14 July 2023 with a base index value of 100.00 as of 31 December 2021.

4.7 MarketVector™ Crypto Leaders VWAP Close Index

The MarketVector™ Crypto Leaders VWAP Close Index is designed to track the performance of the largest and most liquid digital assets. All assets must be listed on at least one of the top 15 exchanges by CC-Data's Centralized Exchange Benchmark and are screened for investability. The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

The index universe is defined as the components of the MarketVector™ Digital Assets 10 Index (MVDA10). The components of the MVDA10 are screened in accordance with the custodian specifications applicable to the client and the approvals by the relevant stock exchanges. (The index does not include crypto assets that are not accepted by the Swiss Stock Exchange (SIX) and Deutsche Börse AG as an underlying.) Information is provided by the respective 3rd party partners of the client. All constituents of the MVDA10 which pass these screens qualify as index components.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.

The components of this index are reviewed on a quarterly basis and rebalanced at 16:00:00 CET of the last trading day of February, May, August and November.

The MarketVector™ Crypto Leaders VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0EAN9	BMHYR29	SL0EAN	MVLEADV	.MVLEADV

The index was launched on 7 December 2021 with a base index value of 100.00 as of 31 December 2018.

4.8 MarketVector™ Decentralized Finance Index

The MarketVector™ Decentralized Finance Index is designed to track the performance of assets classified as "decentralized finance" by MarketVector Indexes and serve as a benchmark/universe for the respective market. This covers financial services built on top of distributed networks with no central intermediaries. The weightings are uncapped as described in section 3.1.

Review procedure:

The index is derived from the MarketVector™ Digital Assets 100 Index (MVDA). Current and new components for the MarketVector™ Decentralized Finance Index, which fulfil the following criteria, qualify for the index:

- new components of MarketVector™ Digital Assets 100 Index (MVDA).
- classified as "decentralized finance" by MarketVector™ Indexes.

In case the number of components is below 10, additional assets classified as "decentralized finance" are selected from the MVDA universe with an average-daily-trading value of at least 1,000,000 USD for the current month. These assets are sorted by market capitalization in descending order and selected top to bottom until the number of constituents equals 10.

If the number of eligible assets is still below 10, additional assets are added by the Index Owner's decision until the number of assets equals 10.

All qualified digital assets must not carry short term security risks (e.g. 51% attacks).

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Decentralized Finance Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7T5	BPG67B6	SL0D7T	MVDF	.MVDF

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 January 2021.

4.9 MarketVector™ Decentralized Finance Leaders Index

The MarketVector™ Decentralized Finance Leaders Index is designed to track the performance of the largest and most liquid decentralized finance assets, and is an investable subset of MarketVector™ Decentralized Finance Index (see section 4.8). The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

Components of the MarketVector™ Decentralized Finance Index (see section 4.8) with approved availability of custodians by the Index Owner qualify for the selection.

Afterwards, the selection for the index is as follows:

- The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
- The selection list is now ranked by the sum of the two ranks in ascending order. If two assets have the same sum of ranks, then the larger asset by market capitalization receives the higher rank.
- The target coverage of the selection is the lower whole rank of the 50th percentile of the number of assets in the eligible universe.
- Assets below the lower whole rank of the 40th percentile by final rank qualify for the index.
- The remaining assets are selected from the highest-ranked remaining index components ranked between the lower whole rank of the 40th percentile and the higher whole rank of the 60th percentile until the target coverage is reached.
- If the number of selected new components is still below the number of assets in the lower whole rank of the 50th percentile from the eligible universe, then the next highest-ranked digital assets are selected until the number of components reaches the target coverage.
- In case the number of new components is still below 5, the highest-ranked assets are added until the number of new components equals 5.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Decentralized Finance Leaders Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7U3	BPG67C7	SL0D7U	MVDFLE	.MVDFLE

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 January 2021.

4.10 MarketVector™ Digital Assets Max 10 VWAP Close Index

The MarketVector™ Digital Assets Max 10 VWAP Close Index is designed to track the performance of the largest and most liquid digital assets. All assets must be listed on at least one of the top 15 exchanges by CCData's Centralized Exchange Benchmark and are screened for investability. The weightings are uncapped as described in section 3.1.

Review procedure:

The index universe is defined as the components of the MarketVector™ Digital Assets 10 Index (MVDA10). The components of the MVDA10 are screened in accordance with the custodian specifications applicable to the client and the approvals by the relevant stock exchanges. All constituents of the MVDA10 which pass these screens qualify as index components.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 CET based on 1h volume weighted average prices (VWAPs) between 16:00 and 17:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.

The components of this index are reviewed on a quarterly basis and rebalanced at 17:00:00 CET of the last business day of February, May, August and November.

The MarketVector™ Digital Assets Max 10 VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0HD51		SL0HD5	MVDAMV	.MVDAMV

The index was launched on 11 May 2023 with a base index value of 100.00 as of 31 December 2018.

4.11 MarketVector™ Infrastructure Application Index

The MarketVector™ Infrastructure Application Index is designed to track the performance of assets classified as "infrastructure application" by MarketVector Indexes and serve as a benchmark/universe for the respective market. This covers decentralized computer programs designed to perform specific tasks. The weightings are uncapped as described in section 3.1.

Review procedure:

The index is derived from the MarketVector™ Digital Assets 100 Index (MVDA). Current and new components for the MarketVector™ Infrastructure Application Index, which fulfil the following criteria, qualify for the index:

- new components of MarketVector™ Digital Assets 100 Index (MVDA).
- classified as "infrastructure application" by MarketVector™ Indexes.

In case the number of components is below 10, additional assets classified as "infrastructure application" are selected from the MVDA universe with an average-daily-trading value of at least 1,000,000 USD for the current month. These assets are sorted by market capitalization in descending order and selected top to bottom until the number of constituents equals 10.

If the number of eligible assets is still below 10, additional assets are added by the Index Owner's decision until the number of assets equals 10.

All qualified digital assets must not carry short term security risks (e.g. 51% attacks).

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Infrastructure Application Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7V1	BPG67D8	SL0D7V	MVIAP	.MVIAP

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 December 2020.

4.12 MarketVector™ Infrastructure Application Leaders Index

The MarketVector™ Infrastructure Application Leaders Index is designed to track the performance of the largest and most liquid infrastructure application assets, and is an investable subset of MarketVector™ Infrastructure Application Index (see section 4.11). The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

Components of the MarketVector™ Infrastructure Application Index (see section 4.11) with approved availability of custodians by the Index Owner qualify for the selection.

Afterwards, the selection for the index is as follows:

- The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
- The selection list is now ranked by the sum of the two ranks in ascending order. If two assets have the same sum of ranks, then the larger asset by market capitalization receives the higher rank.
- The target coverage of the selection is the lower whole rank of the 50th percentile of the number of assets in the eligible universe.
- Assets below the lower whole rank of the 40th percentile by final rank qualify for the index.
- The remaining assets are selected from the highest-ranked remaining index components ranked between the lower whole rank of the 40th percentile and the higher whole rank of the 60th percentile until the target coverage is reached.
- If the number of selected new components is still below the number of assets in the lower whole rank of the 50th percentile from the eligible universe, then the next highest-ranked digital assets are selected until the number of components reaches the target coverage.
- In case the number of new components is still below 5, the highest-ranked assets are added until the number of new components equals 5.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Infrastructure Application Leaders Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7W9	BPG67F0	SL0D7W	MVIALE	.MVIALE

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 December 2020.

4.13 MarketVector™ Media & Entertainment Index

The MarketVector™ Media and Entertainment Index is designed to track the performance of assets classified as "media & entertainment" by MarketVector Indexes and serve as a benchmark/universe for the respective market. This covers coins used to reward users for content, games, gambling or social media. The weightings are uncapped as described in section 3.1.

Review procedure:

The index is derived from the MarketVector™ Digital Assets 100 Index (MVDA). Current and new components for the MarketVector™ Media and Entertainment Index, which fulfil the following criteria, qualify for the index:

- new components of MarketVector™ Digital Assets 100 Index (MVDA).
- classified as "media & entertainment" by MarketVector™ Indexes.

In case the number of components is below 10, additional assets classified as "media & entertainment" are selected from the MVDA universe with an average-daily-trading value of at least 1,000,000 USD for the current month. These assets are sorted by market capitalization in descending order and selected top to bottom until the number of constituents equals 10.

If the number of eligible assets is still below 10, additional assets are added by the Index Owner's decision until the number of assets equals 10.

All qualified digital assets must not carry short term security risks (e.g. 51% attacks).

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Media and Entertainment Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7X7	BPG67G1	SL0D7X	MVME	.MVME

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 March 2021.

4.14 MarketVector™ Media & Entertainment Leaders Index

The MarketVector™ Media and Entertainment Leaders Index is designed to track the performance of the largest and most liquid media & entertainment assets, and is an investable subset of MarketVector™ Media & Entertainment Index (see section 4.13). The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

Components of the MarketVector™ Media & Entertainment Index (see section 4.13) with approved availability of custodians by the Index Owner qualify for the selection.

Afterwards, the selection for the index is as follows:

- The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
- The selection list is now ranked by the sum of the two ranks in ascending order. If two assets have the same sum of ranks, then the larger asset by market capitalization receives the higher rank.
- The target coverage of the selection is the lower whole rank of the 50th percentile of the number of assets in the eligible universe.
- Assets below the lower whole rank of the 40th percentile by final rank qualify for the index.
- The remaining assets are selected from the highest-ranked remaining index components ranked between the lower whole rank of the 40th percentile and the higher whole rank of the 60th percentile until the target coverage is reached.
- If the number of selected new components is still below the number of assets in the lower whole rank of the 50th percentile from the eligible universe, then the next highest-ranked digital assets are selected until the number of components reaches the target coverage.
- In case the number of new components is still below 5, the highest-ranked assets are added until the number of new components equals 5.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Media and Entertainment Leaders Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7Y5	BPG67H2	SL0D7Y	MVMELE	.MVMELE

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 March 2021.

4.15 MarketVector™ Media & Entertainment Leaders Brazil Index

The MarketVector™ Media and Entertainment Leaders Brazil Index is designed to track the performance of the largest and most liquid media & entertainment assets, and is an investable subset of MarketVector™ Media & Entertainment Index (see section 4.13). The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

Components of the MarketVector™ Media & Entertainment Index (see section 4.13) with approved availability of custodians by the Index Owner qualify for the selection.

Afterwards, the selection for the index is as follows:

- The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
- The selection list is now ranked by the sum of the two ranks in ascending order. If two assets have the same sum of ranks, then the larger asset by market capitalization receives the higher rank.
- The target coverage of the selection is the lower whole rank of the 50th percentile of the number of assets in the eligible universe.
- Assets below the lower whole rank of the 40th percentile by final rank qualify for the index.
- The remaining assets are selected from the highest-ranked remaining index components ranked between the lower whole rank of the 40th percentile and the higher whole rank of the 60th percentile until the target coverage is reached.
- If the number of selected new components is still below the number of assets in the lower whole rank of the 50th percentile from the eligible universe, then the next highest-ranked digital assets are selected until the number of components reaches the target coverage.
- In case the number of new components is still below 5, the highest-ranked assets are added until the number of new components equals 5.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 ET with fixed 16:00 ET exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 ET of the last business day in Brazil in each month.

The MarketVector™ Media and Entertainment Leaders Brazil Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0FEM0	BPSJLG6	SL0FEM	MVMEBR	.MVMEBR

The index was launched on 03 March 2022 with a base index value of 100.00 as of 31 March 2021.

4.16 MarketVector™ Optimum Global Cryptoasset Index

The MarketVector™ Optimum Global Cryptoasset Index is designed to track the performance of a fixed list of digital assets. The index includes the following digital assets:

Crypto-Asset	**Ticker**
Bitcoin	BTC
Ethereum	ETH
Polkadot	DOT
Solana	SOL
Avalanche	AVAX
Cardano	ADA
Polygon	MATIC
Tezos	XTZ
Stellar	XLM
Algorand	ALGO
ChainLink	LINK

A special capping scheme is applied for this index: At each rebalance, Bitcoin weight is fixed at 40%, Ethereum weight is fixed at 25% and the rest weight is distributed among all other components on a proportional basis based on market capitalization.

The index universe includes the following exchanges:

- Binance,
- Bitflyer,
- Bitstamp,
- Coinbase,
- Gemini,
- itBit,
- Kraken.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (ET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 ET with fixed 16:00 ET exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.

The Index is rebalanced at 16:00:00 ET of the last business day of each month. For this index, a "business day" for the purposes of the rebalance means any day (other than a Saturday or Sunday) on which commercial banks and foreign exchange markets settle payments in Toronto.

The MarketVector™ Optimum Global Cryptoasset Index has the following identifiers:

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Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0FCU7	BPLFDY3	SL0FCU	MVGCFI	.MVGCFI

The index was launched on 18 February 2022 with a base index value of 100.00 as of 31 December 2020.

4.17 MarketVector™ Smart Contract Index

The MarketVector™ Smart Contract Index is designed to track the performance of assets classified as "smart contract" by MarketVector Indexes and serve as a benchmark/universe for the respective market. This covers blockchain protocols designed to host variety of self-developed and 3rd party applications. The weightings are uncapped as described in section 3.1.

Review procedure:

The index is derived from the MarketVector™ Digital Assets 100 Index (MVDA). Current and new components for the MarketVector™ Smart Contract Index, which fulfil the following criteria, qualify for the index:

- new components of MarketVector™ Digital Assets 100 Index (MVDA).
- classified as "smart contract" by MarketVector™ Indexes.

In case the number of components is below 10, additional assets classified as "smart contract" are selected from the MVDA universe with an average-daily-trading value of at least 1,000,000 USD for the current month. These assets are sorted by market capitalization in descending order and selected top to bottom until the number of constituents equals 10.

If the number of eligible assets is still below 10, additional assets are added by the Index Owner's decision until the number of assets equals 10.

All qualified digital assets must not carry short term security risks (e.g. 51% attacks).

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Smart Contract Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D7Z2	BPG67J4	SL0D7Z	MVSC	.MVSC

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 December 2017.

4.18 MarketVector™ Smart Contract Leaders Index

The MarketVector™ Smart Contract Leaders Index is designed to track the performance of the largest and most liquid smart contract assets, and is an investable subset of MarketVector™ Smart Contract Index (see section 4.17). The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

Components of the MarketVector™ Smart Contract Index (see section 4.17) with approved availability of custodians by the Index Owner qualify for the selection.

Afterwards, the selection for the index is as follows:

- The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
- The selection list is now ranked by the sum of the two ranks in ascending order. If two assets have the same sum of ranks, then the larger asset by market capitalization receives the higher rank.
- The target coverage of the selection is the lower whole rank of the 50th percentile of the number of assets in the eligible universe.
- Assets below the lower whole rank of the 40th percentile by final rank qualify for the index.
- The remaining assets are selected from the highest-ranked remaining index components ranked between the lower whole rank of the 40th percentile and the higher whole rank of the 60th percentile until the target coverage is reached.
- If the number of selected new components is still below the number of assets in the lower whole rank of the 50th percentile from the eligible universe, then the next highest-ranked digital assets are selected until the number of components reaches the target coverage.
- In case the number of new components is still below 5, the highest-ranked assets are added until the number of new components equals 5.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day in each month.

The MarketVector™ Smart Contract Leaders Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D703	BPG67K5	SL0D70	MVSCLE	.MVSCLE

The index was launched on 8 October 2021 with a base index value of 100.00 as of 31 December 2017.

4.19 MarketVector™ Smart Contract Leaders Brazil Index

The MarketVector™ Smart Contract Leaders Brazil Index is designed to track the performance of the largest and most liquid smart contract assets, and is an investable subset of MarketVector™ Smart Contract Index (see section 4.17). The 30% capping scheme as described in section 3.1 is applied.

Review procedure:

Components of the MarketVector™ Smart Contract Index (see section 4.17) with approved availability of custodians by the Index Owner qualify for the selection.

Afterwards, the selection for the index is as follows:

- The selection list is ranked in two different ways - by market capitalization in descending order (the largest constituent receives rank "1") and then by one-month average-daily-trading value in descending order (the most liquid constituent receives rank "1"). These two ranks are added up.
- The selection list is now ranked by the sum of the two ranks in ascending order. If two assets have the same sum of ranks, then the larger asset by market capitalization receives the higher rank.
- The target coverage of the selection is the lower whole rank of the 50th percentile of the number of assets in the eligible universe.
- Assets below the lower whole rank of the 40th percentile by final rank qualify for the index.
- The remaining assets are selected from the highest-ranked remaining index components ranked between the lower whole rank of the 40th percentile and the higher whole rank of the 60th percentile until the target coverage is reached.
- If the number of selected new components is still below the number of assets in the lower whole rank of the 50th percentile from the eligible universe, then the next highest-ranked digital assets are selected until the number of components reaches the target coverage.
- In case the number of new components is still below 5, the highest-ranked assets are added until the number of new components equals 5.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 ET with fixed 16:00 ET exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 ET of the last business day in Brazil in each month.

The MarketVector™ Smart Contract Leaders Brazil Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0FEN8	BPSJLH7	SL0FEN	MVSCBR	.MVSCBR

The index was launched on 03 March 2022 with a base index value of 100.00 as of 31 December 2017.

4.20 MarketVector™ Smart Contract Leaders VWAP Close Index

The MarketVector™ Smart Contract Leaders VWAP Close Index is designed to track the performance of the largest and most liquid smart contract assets, and is an investable subset of MarketVector™ Smart Contract Index (see section 4.17). All assets on the selection list must be listed on at least one of the top 15 exchanges by CCData's Centralized Exchange Benchmark. The 30% capping scheme as described in section 3.1 is applied.

The components of the MarketVector™ Smart Contract Index (see section 4.17) are screened in accordance with the custodian specifications applicable to the client and the index does not include crypto assets that are not accepted by Deutsche Börse AG as an underlying. Information is provided by the respective 3rd party partners of the client.

Current components, which fulfill the listing criteria, qualify for the selection list with:

- a market capitalization of at least 800,000,000 USD,
- an average daily-trading value of at least 20,000,000 USD.

Components of the MarketVector™ Smart Contract Index qualify for the selection list with:

- a market capitalization of at least 1,000,000,000 USD,
- an average-daily-trading value of at least 25,000,000 USD,
- Approved availability of custodians by the Index Owner.

Review procedure:

1. The selection list contains all current components and components of the MarketVector™ Smart Contract Index (see section 4.17), which fulfill listing criteria as described above. Stablecoins (also called 'price stable currencies') which are fiat collateralized and digital assets pegged to a currency or any other asset are not eligible for the selection list. If there are no sufficient non-components which fulfill the custodian specifications, market capitalization and liquidity criteria, then only the components that fulfill these criteria will be considered.
2. The selection list is ranked by market capitalization in descending order (the largest constituent receives rank "1").
3. The top 7 digital assets qualify for selection.
4. The remaining 3 components are selected from the highest ranked remaining index components ranked between 8 and 13.
5. If the number of selected components is below 10, then the highest ranked digital assets are selected until the number of components equals 10. If there are no sufficient non-components which fulfill the custodian specifications, market capitalization and liquidity criteria, then only the components that fulfill these criteria will be considered. In this case, number of components can be less than 10.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.

4 INDEXES

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.

The components of this index are reviewed on a quarterly basis and rebalanced at 16:00:00 CET of the last trading day of February, May, August and November.

The MarketVector™ Smart Contract Leaders VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0FCY9	BPLFDZ4	SL0FCY	MVSCLEV	.MVSCLEV

The index was launched on 07 March 2022 with a base index value of 100.00 as of 31 December 2018.

4.21 MarketVector™ Coinbase Bitcoin Benchmark Rate

The MarketVector™ Coinbase Bitcoin Benchmark Rate is designed to be a robust price for Bitcoin in USD traded in the exchange Coinbase. There is no component other than Bitcoin in the index and no other exchange is included other than Coinbase.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.
In the unlikely event a spun-off coin is larger than Bitcoin (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 London time (BST/GMT) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 London time (BST/GMT) with fixed 16:00 London time (BST/GMT) exchange rates.

The MarketVector™ Coinbase Bitcoin Benchmark Rate has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0F971	BN7TB18	SL0F97	CBBR	.CBBR

The index was launched on 16 May 2022 with a base index value of 425.31 as of 31 December 2015.

4.22 MarketVector™ Coinbase Ethereum Benchmark Rate

The MarketVector™ Coinbase Ethereum Benchmark Rate is designed to be a robust price for Ethereum in USD traded in the exchange Coinbase. There is no component other than Ethereum in the index and no other exchange is included other than Coinbase.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.
In the unlikely event a spun-off coin is larger than Ethereum (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 London time (BST/GMT) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 London time (BST/GMT) with fixed 16:00 London time (BST/GMT) exchange rates.

The MarketVector™ Coinbase Ethereum Benchmark Rate has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0GAV7	BMH6394	SL0GAV	CETBR	.CETBR

The index was launched on 16 May 2022 with a base index value of 724.49 as of 31 December 2017.

4.23 MarketVector™ Coinbase Benchmark Rate

The MarketVector™ Coinbase XRP Benchmark Rate is designed to be a robust price for XRP in USD traded in the exchange Coinbase. There is no component other than XRP in the index and no other exchange is included other than Coinbase.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.
In the unlikely event a spun-off coin is larger than XRP (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 London time (BST/GMT) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 London time (BST/GMT) with fixed 16:00 London time (BST/GMT) exchange rates.

The MarketVector™ Coinbase XRP Benchmark Rate has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0HPJ8		SL0HPJ	CXBR	.CXBR

The index was launched on 19 July 2023 with a base index value of 0.76 as of 18 July 2023.

4.24 MarketVector™ Algorand VWAP Close Index

The MarketVector™ Algorand VWAP Close Index is designed to track the performance of a Algorand digital asset. There is no component other than Algorand in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Algorand (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Algorand VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0EYV2	BNZHQL9	SL0EYV	MVALGOV	.MVALGOV

The index was launched on 22 December 2021 with a base index value of 100.00 as of 30 June 2019.

4.25 MarketVector™ Avalanche VWAP Close Index

The MarketVector™ Avalanche VWAP Close Index is designed to track the performance of an Avalanche digital asset. There is no component other than Avalanche in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Avalanche (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Avalanche VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D976	BLH3DH6	SL0D97	MVAVAXV	.MVAVAXV

The index was launched on 18 November 2021 with a base index value of 10.00 as of 30 September 2020.

4.26 MarketVector™ Bitcoin Index

The MarketVector™ Bitcoin Index is designed to track the performance of a Bitcoin digital asset. There is no component other than Bitcoin in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Bitcoin (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds.The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day of each month.

The MarketVector™ Bitcoin Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A2GGQD8	BYX85W5	A2GGQD	MVBTC	.MVBTC

The index was launched on 23 October 2017 with a base index value of 10.00 as of 31 January 2012.

4.27 MarketVector™ Bitcoin VWAP Close Index

The MarketVector™ Bitcoin VWAP Close Index is designed to track the performance of a Bitcoin digital asset. There is no component other than Bitcoin in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Bitcoin (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Bitcoin VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0BER8	BLD0Z19	SL0BER	MVBTCV	.MVBTCV

The index was launched on 06 August 2020 with a base index value of 100.00 as of 31 December 2014.

4.28 MarketVector™ Bitcoin Benchmark Rate

The MarketVector™ Bitcoin Benchmark Rate is designed to be a robust price for Bitcoin in USD (see section 6.1.2). There is no component other than Bitcoin in the index.

Review procedure (for eligible exchanges with USD pair/agreement):

- If an eligible exchange is in the top 5 by rank based on the CCData's Centralized Exchange Benchmark table for two consecutive semiannual reviews, it replaces the lowest ranked exchange.
- If an eligible exchange is downgraded by two or more notches in a semiannual review and is not in the top 5 by rank anymore, it is replaced by the highest ranked non-component exchange.

Adjustments to exchange coverage will be announced four business days prior to the first business day of June/December at 23:00 CET; the indexes are rebalanced at 16:00:00 ET on the last business day of May/November.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.
In the unlikely event a spun-off coin is larger than Bitcoin (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (ET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 ET with fixed 16:00 ET exchange rates.

The MarketVector™ Bitcoin Benchmark Rate has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0A0E5	BMFXWZ6	SL0A0E	BBR	.BBR

The index was launched on 3 June 2020 with a base index value of 425.23 as of 31 December 2015. The list below summarises the exchange composition up to the launch.

- Bitstamp,
- Coinbase,
- Gemini,
- itBit,
- Kraken.

In addition, the BBR London Settlement Price is calculated at 16:00:00 London time and has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0HDJ4	BMBR2R4	SL0HDJ	BBRLDN	.BBRLDN

In addition, the BBR Hong Kong Settlement Price is calculated at 17:00:00 Hong Kong time and has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0HDT3	BPK5QZ6	SL0HDT	BBRHKG	.BBRHKG

4.29 MarketVector™ Chainlink VWAP Close Index

The MarketVector™ Chainlink VWAP Close Index is designed to track the performance of a Chainlink digital asset. There is no component other than Chainlink in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Chainlink (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Chainlink VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0FCZ6	BPLFF03	SL0FCZ	MVLINKV	.MVLINKV

The index was launched on 07 March 2022 with a base index value of 100.00 as of 31 October 2019.

4.30 MarketVector™ Ethereum Index

The MarketVector™ Ethereum Index is designed to track the performance of an Ethereum digital asset. There is no component other than Ethereum in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Ethereum (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 17:00:00 GMT with fixed 17:00 GMT exchange rates.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 17:00:00 GMT of the last trading day of each month.

The MarketVector™ Ethereum Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000A2GGQP2	BYX8666	A2GGQP	MVETH	.MVETH

The index was launched on 23 October 2017 with a base index value of 10.00 as of 31 August 2015.

4.31 MarketVector™ Ethereum VWAP Close Index

The MarketVector™ Ethereum VWAP Close Index is designed to track the performance of an Ethereum digital asset. There is no component other than Ethereum in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Ethereum (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Ethereum VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0CAC6	BN6HR93	SL0CAC	MVETHV	.MVETHV

The index was launched on 13 January 2021 with a base index value of 10.00 as of 31 December 2015.

4.32 MarketVector™ Ethereum Benchmark Rate

The MarketVector™ Ethereum Benchmark Rate is designed to be a robust price for Ethereum in USD (see section 6.1.2). There is no component other than Ethereum in the index.

Review procedure (for eligible exchanges with USD pair/agreement):

- If an eligible exchange is in the top 5 by rank based on the CCData's Centralized Exchange Benchmark table for two consecutive semiannual reviews, it replaces the lowest ranked exchange.
- If an eligible exchange is downgraded by two or more notches in a semiannual review and is not in the top 5 by rank anymore, it is replaced by the highest ranked non-component exchange.

Adjustments to exchange coverage will be announced four business days prior to the first business day of June/December at 23:00 CET; the indexes are rebalanced at 16:00:00 ET on the last business day of May/November.

In case of a hard fork, which results in several active lines, rule 5.2.2 applies.
In the unlikely event a spun-off coin is larger than Ethereum (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (ET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 ET with fixed 16:00 ET exchange rates.

The MarketVector™ Ethereum Benchmark Rate has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0C7Q2	BNTJBB6	SL0C7Q	EBR	.EBR

The index was launched on 24 March 2021 with a base index value of 745.36 as of 31 December 2017. The list below summarises the exchange composition up to the launch.

- Bitstamp,
- Coinbase,
- Gemini,
- itBit,
- Kraken.

In addition, the EBR London Settlement Price is calculated at 16:00:00 London time and has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0HDK2	BMBR2S5	SL0HDK	EBRLDN	.EBRLDN

In addition, the EBR Hong Kong Settlement Price is calculated at 17:00:00 Hong Kong time and has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0HDU1	BPK5R20	SL0HDU	EBRHKG	.EBRHKG

4.33 MarketVector™ FTX Token VWAP Close Index

The MarketVector™ FTX Token VWAP Close Index is designed to track the performance of the FTX Token digital asset. There is no component other than the FTX Token in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than the FTX Token (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ FTX Token VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0EYW0	BNZHQN1	SL0EYW	MVFTTV	.MVFTTV

The index was launched on 22 December 2021 with a base index value of 100.00 as of 29 February 2020.

4.34 MarketVector™ Polkadot VWAP Close Index

The MarketVector™ Polkadot VWAP Close Index is designed to track the performance of a Polkadot digital asset. There is no component other than Polkadot in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Polkadot (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Polkadot VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0DMZ0	BMC2PJ1	SL0DMZ	MVDOTV	.MVDOTV

The index was launched on 30 June 2021 with a base index value of 100.00 as of 30 September 2020.

4.35 MarketVector™ Polygon VWAP Close Index

The MarketVector™ Polygon VWAP Close Index is designed to track the performance of a Polygon digital asset. There is no component other than Polygon in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Polygon (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Polygon VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0D984	BLH3DM1	SL0D98	MVMATICV	.MVMATICV

The index was launched on 18 November 2021 with a base index value of 100.00 as of 30 September 2020.

4.36 MarketVector™ Solana VWAP Close Index

The MarketVector™ Solana VWAP Close Index is designed to track the performance of a Solana digital asset. There is no component other than Solana in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than Solana (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ Solana VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0DMY3	BMC2P79	SL0DMY	MVSOLV	.MVSOLV

The index was launched on 30 June 2021 with a base index value of 10.00 as of 31 July 2020.

4.37 MarketVector™ TRON VWAP Close Index

The MarketVector™ TRON VWAP Close Index is designed to track the performance of a TRON digital asset. There is no component other than TRON in the index.

In case of a hard fork, which results in several active lines, rule 5.2.1 applies. The spun-off coin will be removed one day after the effective date (when a price and the main net is available) until the number of components is 1 again. In the unlikely event a spun-off coin is larger than TRON (by market capitalization) and is in general accepted as the successor of the original chain, the index owner might decide to keep it as the only index component.

The index is calculated daily between 00:00 and 24:00 (CET) and the index values are disseminated to data vendors every 15 seconds. The index is disseminated in USD and the closing value is calculated at 16:00:00 CET based on 1h volume weighted average prices (VWAPs) between 15:00 and 16:00 CET. The VWAPs are calculated with CCCAGG prices.

Adjustments to constituents will be announced four business days prior to the first business day of the next month at 23:00 CET.
The Index is rebalanced at 16:00:00 CET of the last trading day of each month.

The MarketVector™ TRON VWAP Close Index has the following identifiers:

Index Type	ISIN	SEDOL	WKN	Bloomberg	Reuters
Price Return Index	DE000SL0DM05	BMC2PK2	SL0DM0	MVTRXV	.MVTRXV

The index was launched on 30 June 2021 with a base index value of 100.00 as of 31 December 2018.

5 Ongoing Maintenance

Events are announced at least four days prior to implementation.

5.1 Changes in Amount Outstanding

Changes in the amount outstanding will not be adjusted during the month, but with the next monthly review.

5.2 Changes due to Forks

A hard fork occurs when a blockchain protocol is radically changed, such that it becomes incompatible with older versions. In effect, participants taking part in transactions on the old blockchain must upgrade to the new one in order to continue validating transactions. However, participants that do not upgrade may continue to support and validate transactions on the older blockchain protocol separately.
The result of this is that a blockchain splits into two - hence the name 'hard fork'. If there are nodes permanently supporting the new chain, then the two chains will co-exist.
Users that once held digital assets on an older blockchain before the protocol change at a pre-specified blockchain length will now also hold an amount of new coins on the altered blockchain. This new asset has essentially been derived from an older token as well as its associated blockchain's transaction history.

5.2.1 Addition of Forks

Where a constituent blockchain undergoes a hard fork, the newly created coin will be added to the index, as long as it is available for trading on one or more of eligible top tier exchanges (as defined by CCData's Centralized Exchange Benchmark: must be rated AA or A / eligible exchanges for respective index or DAR exchange vetting), such available price(s) contributing to the CCCAGG/DAR pricing, prior to the following review announcement. In addition to the exchange classification, the following criteria are taken into account if the forked coin is added to the index:

- Twitter followers: qualitative and quantitative measure of the community support level for the forked chain,
- Public developer: indicates that there are people that can be held accountable for any liability,
- Open source code: makes code auditing and vulnerability check possible,
- Premine: transparency in terms of the total supply of the Forked Coin and intentions,
- Announcement: the forked Chain will have to be announced a significant time prior to its activation, in doing so this would demonstrate the seriousness of the intended fork.

Each additional component resulting from a fork is immediately added to the index at least for one day according to the terms, if traded. In case it does not trade, it will be kept with a 0 price until the first price is retrieved (it will then be kept in the index for at least one day) or the next review becomes effective. Implementation is effective with the change in the respective block.
The same treatment applies to soft forks if the process results in a division or split into multiple non-fungible assets.

5.2.2 No Addition of Forks

In case of a hard fork, the forked coin is not added to the index. Only in case it is significant enough to replace the old line in terms of market capitalization and acceptance, MarketVector Indexes may decide for a different treatment.

5.3 Initial Coin Offerings (ICOs)

An ICO coin is eligible for fast-track addition to the investable index universe even if there is no full month of traded values. In order to be added to the index the ICO coin has to meet the liquidity requirements:

- the ICO must have an average-daily-trading volume of at least 1.0m USD, and
- must have traded for at least 10 days.

This rule is applicable for newly forked non-component coins as well.

5.4 Changes to Pricing (CCCAGG)

In case an exchange is added to CCCAGG or removed from it, the index divisor will not be adjusted.

5.5 Changes to the Index Guide

Any changes to the Index Guide will be reviewed and approved by the Legal and Compliance Department. Legal and Compliance may also request a conclusive description and further information on any change and may consult the operations department on such changes. The key elements to be analysed in this phase of the change process are robustness, transparency, reliability and integrity. The result of the review will be communicated to the operations department. The email will be archived by the operations department.

In case of changes that might immediately change the composition of an index or must be considered material for any other reason also need to be approved by the Independent Oversight Function ("IOF") prior to their publication and implementation.

In case of material changes an advance notice will be published and provided to users. MarketVector Indexes will generally disseminate a notification related to an Index Guide change 30 days prior to the change. A shorter period of time may be applied at MarketVector Indexes's discretion if the relevant index has not been licensed for a financial product to a third party. The notice will describe a clear time frame that gives the opportunity to analyse and comment upon the impact of such proposed material change. Any material comments received in relation to the Index Guide change and MarketVector Indexes's response to those comments will be made publicly accessible after any consultation, except where confidentiality has been requested by the originator of the comments.

5.6 Discretion regarding the Use of Input Data and Extraordinary Events

Pursuant to Art. 12 No.1. (b), MarketVector Indexes has established the following rules identifying how and when discretion may be exercised in the administration of an index.
In case input data are or appear to be qualitatively inferior or different sources provide different data, an extraordinary event, or a situation is not covered by the index rules, MarketVector Indexes may use or change data/index composition at its own discretion according to the following discretion policy after a plausibility check. Regarding input data, this may include:

- Liquidity and size data,
- Event information,
- Other secondary data.

Regarding extraordinary events, this may include:

- Trading stops,
- Regulatory actions (depending on the applicable jurisdiction),
- Hacks,
- Detection of fraud,
- Changes in custodian coverage,
- Etc.

Any changes must subject to reasonable discretion. The decision on any change must be required, appropriate, commensurable and in line with the respective index scope and objective and must reasonably consider in a balance weight the interest of Users, investors in related products and the integrity of the market.

Index operations ensures consistency in the use of discretion in its judgement and decision. Employees involved in the operations team must have shown the respective experience and skills. Significant decisions are subject to sign-off by a supervisor. In case of material changes to data the relevant situation will be analyzed in detail, described and presented to the IOF and discussed and reviewed with the IOF.

The broad range of possible data quality problems does not allow to define specific steps for each possible instance. MarketVector Indexes will always weight the different interest of the index users, the integrity of the market and other involved parties and determine the least disadvantageous measure that equally considers the relevant interests best.

In order to avoid individual decisions in similar cases for the future an update of the index rules can be taken into consideration if applicable. Regarding the use of data, other possible mitigation measures are the change of input data sources or providers and/or own data research where possible and reasonable.

Records are kept about material judgement or discretion by MarketVector Indexes and will include the reasoning for said judgement or discretion.

5.7 Input Data and Contributor Selection

According to the input data requirements under Art. 11 of the Benchmark Regulation, the following shall apply with regard to the input data used for the management and provision of an index and the relevant input data providers ("Contributors"):

- the input data shall be sufficient to represent accurately and reliably the market or economic reality that the benchmark is intended to measure;
- the input data shall be transaction data, if available and appropriate. If transaction data is not sufficient or is not appropriate to represent accurately and reliably the market or economic reality that the index is intended to measure, input data which is not transaction data may be used, including estimated prices, quotes and committed quotes, or other values;

5 ONGOING MAINTENANCE

- the input data shall be verifiable;
- clear guidelines regarding the types of input data, the priority of use of the different types of input data and the exercise of expert judgement, to ensure compliance with the Index Guide and index methodology and the aforementioned requirements are defined in the Code of Conduct for Contributors; and
- where an index is based on input data from Contributors, MarketVector Indexes will obtain, where appropriate, the input data from a reliable and representative panel or sample of Contributors so as to ensure that the resulting index is reliable and representative of the market or economic reality that the index is intended to measure.

In order to control the quality of contributors, MarketVector Indexes will conduct the following controls:

- Evaluate market share, reputation, quality and cost of possible input data sources and providers before selecting them on the basis of the gathered information and data;
- Compare the input data of one Contributor with the input data from one or more other Contributors in order to ensure the integrity and accuracy of the input data and in case of bad quality replace a Contributor with another Contributor.

MarketVector Indexes will not use input data from a contributor if it has any indication that the Contributor does not adhere to its Code of Conduct for Contributors and in such a case shall obtain representative publicly available data.

6 Calculation

6.1 Index Formula

6.1.1 Standard Indexes

The Indexes are calculated using the Laspeyres' formula:

$$Index\ Value = \frac{\sum_{i=1}^{n} p_i * q_i * cf_i * fx_i}{D} = \frac{M}{D}.$$

Where (for all tokens (i) in the Index):

p_i = price,
q_i = amount outstanding,
cf_i = weighting cap factor (if applicable, otherwise set to 1),
fx_i = exchange rate (index currency to USD),
M = market capitalization of the index,
D = divisor.

6.1.2 MarketVector™ Benchmark Rates

This section applies to the BBR, EBR. The indexes are calculated as an average of 1-hour quantity weighted median prices, which are calculated for 20 3-minute intervals.

$$Index\ Value = \frac{1}{n}\sum_{i=1}^{n} M(i).$$

where the quantity weighted median price for each interval i is

$$M(i) = \begin{cases} p_{i,k} & \text{if } k \text{ satisfies } \sum_{j=1}^{k-1} q_{i,j} < \frac{1}{2}\sum_{j=1}^{J_i} q_{i,j} \text{ and } \sum_{j=k+1}^{J_i} q_{i,j} < \frac{1}{2}\sum_{j=1}^{J_i} q_{i,j}, \\ p_{i,1} & \text{if } q_{i,1} > \frac{1}{2}\sum_{j=1}^{J_i} q_{i,j}, \\ \frac{p_{i,k}+p_{i,k+1}}{2} & \text{if } \sum_{j=k+1}^{J_i} q_{i,j} = \frac{1}{2}\sum_{j=1}^{J_i} q_{i,j}, \end{cases}$$

with the number of intervals calculated as the total index time window divided by the interval window:

$$n = \frac{T}{b},$$

and

$p_{i,j}$ = jth price in ith interval,
$q_{i,j}$ = jth quantity/volume traded in ith interval,
J_i = number of trades in ith interval,
b = interval window for the calculation of the median prices,
n = number of intervals,
T = total index time window for the calculation of an index price.

The set of trades for the total index calculation consists of transactions occurring within the total index time window as follows:

$$\theta_t = \{a_{i,j}(s_{i,j}, p_{i,j}, q_{i,j}) | t - T \leq s < t\},$$

with

θ_t = set of trades for the calculation of the index price at time t,
$a_{i,j}$ = trade j in trade set A_i,
$s_{i,j}$ = time of trade $a_{i,j}$.
Each interval consists of a subset of trades of θ_t:

$$A_i \subset \theta_t$$

A_i being the set of trades for the calculation of the median price in interval i, where each trade $a_{i,j}$ within A_i is sorted by price $p_{i,j}$ in ascending order and it holds that trades occur within the interval window as follows:

$$A_i = \{a_{i,j}(s_{i,j}, p_{i,j}, q_{i,j}) | (t-T) + (i-1)b \leq s < (t-T) + ib\}.$$

Index Parameters

Parameter	Value
Total time window of index (T)	1 hour
Interval window (b)	3 minutes
Number of intervals (n)	20 (given available transactions)

6.2 Input Data

The following rounding procedures are used for the index calculation:

- Rounding to 2 decimal places:
  - index values,
- Rounding to 6 decimal places:
  - divisors (D),
- Rounding to 18 decimal places:
  - prices (p_i),
  - exchange rates (fx_i),
  - weighting cap factors (cf_i).

6.3 Divisor Adjustments

Index maintenance - reflecting changes in amount outstanding, events, addition or deletion of tokens to the Index - should not change the level of the index. This is accomplished with an adjustment to the divisor. Any change to the tokens in the index that alters the total market value of the index while holding token prices constant will require a divisor adjustment.

$$Divisor_{new} = Divisor_{old} * \frac{\sum_{i=1}^{n} p_i * q_i * cf_i * fx_i \pm \Delta MC}{\sum_{i=1}^{n} p_i * q_i * cf_i * fx_i}.$$

$\Delta MC =$ Difference between closing and adjusted closing market capitalization of the index.

6.4 Event Related Adjustments

Events range widely from routine coin issuances to unusual events like forks. These are listed on the table below with notes about the necessary changes and whether the divisor will be adjusted.
p_i = token price.

- *Hard Fork* Divisor change: No.

  Investors receive 'B' new coins for every 'A' coin held.

  $p_{(i,adjusted)} = ((p_i * A) - (price\ of\ forked\ coin * B))/A$

  Coin B is added to the index according to the terms.

- *Addition/Deletion of a component* Divisor change: Yes.

  Net change in market value determines the divisor adjustment.

- *Other* Divisor change: TBD.

  Net change in market value determines the divisor adjustment. In case of no change, the divisor change is 0.

6.5 Data Correction and Disruptions

MarketVector Indexes will usually receive information about errors or disruption from calculation agent, client, internal systems (IT) or by monitoring the respective output.
The following list of errors does not affect the indexes, as data are not considered in the calculation process:

- Bad data such as non-numerical price, volume or timestamp,
- Late/delayed transactions,
- Non-reporting exchanges.
- For BBR/EBR only: Full exchange exclusion when weighted median price of an exchange within the total index window deviates more than 10% from the median of the rest of the exchanges' median price.

Incorrect or missing input data will be corrected immediately:

- The error is immediately communicated to the calculation agent, if applicable.
- Calculation agent will be asked to investigate the reason for the error.
- An email will be sent to all affected clients to inform them about the error; this includes the reason for the issue and an estimate on when the issue will be solved.
- MarketVector Indexes recalculates missing EOD data points and disseminates to vendors and clients.

In case of a material error,

- Legal and Compliance to check the relevant agreements for liability of the calculation agent.
- If MarketVector Indexes identifies any conduct that may involve manipulation or attempted manipulation of an index by calculation agent it will report this to the regulator.

6 CALCULATION

- Where possible and economically reasonable MarketVector Indexes will try to use another calculation agent.

Investigations and communication regarding disruptions with calculation agents will be handled by Compliance and Senior Management. They are either caused by disruptions in calculation or dissemination, which might affect different servicers.

- The disruption is immediately communicated to the calculation/dissemination agent, if applicable.
- Calculation/dissemination agent will be asked to investigate the reason for the disruption.
- An email will be sent to all affected clients to inform them about the disruption; this includes the reason for the issue and an estimate on when the issue will be solved.
- MarketVector Indexes prompts calculation agent to make all efforts to restart index calculation.
- MarketVector Indexes prompts Dissemination agent to make all efforts to restart index dissemination.
- MarketVector Indexes recalculates missing EOD data points and disseminates to vendors and clients.
- Legal and Compliance to check the relevant agreements for liability of the calculation/dissemination agent.
- If MarketVector Indexes identifies any conduct that may involve manipulation or attempted manipulation of an index by calculation/dissemination agent it will report this to BaFin.
- Where possible and economically reasonable MarketVector Indexes will try use another calculation and/or dissemination agent.

7 Appendix

7.1 Names and Tickers

Long Name	Short Name	Symbol
MarketVector™ Centralized Exchanges Index	MV Cen Exc Idx	MVCEX
MarketVector™ Digital Assets 5 Index	MV Dig Assets 5 Idx	MVDA5
MarketVector™ Digital Assets 10 Index	MV Dig Assets 10 Idx	MVDA10
MarketVector™ Digital Assets 25 Index	MV Dig Assets 25 Idx	MVDA25
MarketVector™ Digital Assets 100 Index	MV Dig Assets 100 Idx	MVDA
MarketVector™ Digital Assets 100 Large-Cap Index	MV Dig Assets 100 Lrg Idx	MVDALC
MarketVector™ Digital Assets 100 Mid-Cap Index	MV Dig Assets 100 Mid Idx	MVDAMC
MarketVector™ Digital Assets 100 Small-Cap Index	MV Dig Assets 100 Sml Idx	MVDASC
MarketVector™ Digital Asset Broad 100 Equal Weight Index	MV Dig Assets 100 Broad EW Idx	MVB100EW
MarketVector™ Crypto Leaders VWAP Close Index	MV Crypto Leaders Idx	MVLEADV
MarketVector™ Decentralized Finance Index	MV DeFi Idx	MVDF
MarketVector™ Decentralized Finance Leaders Index	MV DeFi Lead Idx	MVDFLE
MarketVector™ Digital Assets Max 10 VWAP Close Index	MV DA MAX10 Idx	MVDAMV
MarketVector™ Infrastructure Application Index	MV Infra Idx	MVIAP
MarketVector™ Infrastructure Application Leaders Index	MV Infra Lead Idx	MVIALE
MarketVector™ Media and Entertainment Index	MV Meta Idx	MVME
MarketVector™ Media and Entertainment Leaders Index	MV Meta Lead Idx	MVMELE
MarketVector™ Media and Entertainment Leaders Brazil Index	MV Meta Lead Bra Idx	MVMEBR
MarketVector™ Optimum Global Cryptoasset Index	MV Opt Glb Cryptoasset Idx	MVGCFI
MarketVector™ Smart Contract Index	MV Smart Idx	MVSC
MarketVector™ Smart Contract Leaders Index	MV Smart Lead Idx	MVSCLE
MarketVector™ Smart Contract Leaders Brazil Index	MV Smart Lead Bra Idx	MVSCBR
MarketVector™ Smart Contract Leaders VWAP Close Index	MV Smart Lead VWAP Idx	MVSCLEV
MarketVector™ Coinbase Bitcoin Benchmark Rate	MV Coinbase Bitcoin BR	CBBR
MarketVector™ Coinbase Ethereum Benchmark Rate	MV Coinbase Ethereum BR	CETBR
MarketVector™ Coinbase XRP Benchmark Rate	MV Coinbase XRP BR	CXBR
MarketVector™ Algorand VWAP Close Index	MV Algorand VWAP Idx	MVALGOV
MarketVector™ Avalanche VWAP Close Index	MV Avalanche VWAP Idx	MVAVAXV
MarketVector™ Bitcoin Index	MV Bitcoin Idx	MVBTC
MarketVector™ Bitcoin VWAP Close Index	MV Bitcoin VWAP Idx	MVBTCV
MarketVector™ Bitcoin Benchmark Rate	MV Bitcoin BR	BBR
MarketVector™ Chainlink VWAP Close Index	MV Chainlink VWAP idx	MVLINKV
MarketVector™ Ethereum Index	MV Ethereum Idx	MVETH
MarketVector™ Ethereum VWAP Close Index	MV Ethereum VWAP Idx	MVETHV
MarketVector™ Ethereum Benchmark Rate	MV Ethereum BR	EBR
MarketVector™ FTX Token VWAP Close Index	MV FTX VWAP Idx	MVFTTV
MarketVector™ Polkadot VWAP Close Index	MV Polkadot VWAP Idx	MVDOTV
MarketVector™ Polygon VWAP Close Index	MV Polygon VWAP Idx	MVMATICV
MarketVector™ Solana VWAP Close Index	MV Solana VWAP Idx	MVSOLV
MarketVector™ TRON VWAP Close Index	MV TRON VWAP Idx	MVTRXV

7.2 Launch Dates and Base Values

Name	Launch Date	Base Value	Base Date
MarketVector™ Centralized Exchanges Index	01 June 2022	100.00	28 February 2021
MarketVector™ Digital Assets 5 Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Assets 10 Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Assets 25 Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Assets 100 Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Assets 100 Large-Cap Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Assets 100 Mid-Cap Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Assets 100 Small-Cap Index	23 October 2017	100.00	31 December 2014
MarketVector™ Digital Asset Broad 100 Equal Weight Index	14 July 2023	100.00	31 December 2021
MarketVector™ Crypto Leaders VWAP Close Index	07 December 2021	100.00	31 December 2021
MarketVector™ Decentralized Finance Index	08 October 2021	100.00	31 January 2021
MarketVector™ Decentralized Finance Leaders Index	08 October 2021	100.00	31 January 2021
MarketVector™ Digital Assets Max 10 VWAP Close Index	11 May 2023	100.00	31 December 2018
MarketVector™ Infrastructure Application Index	08 October 2021	100.00	31 December 2020

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MarketVector™ Infrastructure Application Leaders Index	08 October 2021	100.00	31 December 2020
MarketVector™ Media and Entertainment Index	08 October 2021	100.00	31 March 2021
MarketVector™ Media and Entertainment Leaders Index	08 October 2021	100.00	31 March 2021
MarketVector™ Media and Entertainment Leaders Brazil Index	03 March 2022	100.00	31 March 2021
MarketVector™ Optimum Global Cryptoasset Index	18 February 2022	100.00	31 December 2021
MarketVector™ Smart Contract Index	08 October 2021	100.00	31 December 2017
MarketVector™ Smart Contract Leaders Index	08 October 2021	100.00	31 December 2017
MarketVector™ Smart Contract Leaders Brazil Index	03 March 2022	100.00	31 December 2017
MarketVector™ Smart Contract Leaders VWAP Close Index	07 March 2022	100.00	31 December 2018
MarketVector™ Coinbase Bitcoin Benchmark Rate	16 May 2022	8777.91	01 May 2020
MarketVector™ Coinbase Ethereum Benchmark Rate	16 May 2022	211.19	01 May 2020
MarketVector™ Coinbase XRP Benchmark Rate	19 July 2023	0.76	18 July 2023
MarketVector™ Algorand VWAP Close Index	22 December 2021	100.00	30 June 2019
MarketVector™ Avalanche Close Index	18 November 2021	100.00	30 September 2020
MarketVector™ Bitcoin Index	23 October 2017	10.00	31 January 2012
MarketVector™ Bitcoin VWAP Close Index	06 August 2020	100.00	31 December 2014
MarketVector™ Bitcoin Benchmark Rate	3 June 2020	425.23	31 December 2015
MarketVector™ Chainlink VWAP Close Index	07 March 2022	10.00	31 October 2019
MarketVector™ Ethereum Index	23 October 2017	10.00	31 August 2015
MarketVector™ Ethereum VWAP Close Index	13 January 2021	10.00	31 December 2015
MarketVector™ Ethereum Benchmark Rate	24 March 2021	745.363	31 December 2017
MarketVector™ FTX Token VWAP Close Index	22 December 2021	100.00	29 February 2020
MarketVector™ Polkadot Close Index	30 June 2021	100.00	30 September 2020
MarketVector™ Polygon Close Index	18 November 2021	100.00	30 September 2020
MarketVector™ Solana Close Index	30 June 2021	10.00	31 July 2020
MarketVector™ TRON Close Index	30 June 2021	100.00	31 December 2018

7.3 Changes to the Index Guide

This table contains all changes to the index guide after 1 January 2018, when the European Benchmark Regulation became effective.

Date	IG Version	Change
12 September 2018	1.25	Inclusion of additional chapters to comply with BMR
18 October 2018	1.26	Inclusion of MVQBTC, MVSBTC, MVQETH, MVSETH, rename MVXRP
20 November 2018	1.27	Inclusion of MVBTCO
12 July 2019	1.28	Update of top tier exchanges in fork treatment
2 September 2019	1.29	Clarification of eligibility (security tokens, financial instruments and pegged assets)
27 September 2019	1.30	Exclusion of MVQETH, MVSETH
25 November 2019	1.31	Inclusion of MVIBTC
16 March 2020	1.32	Replacement of Circle with XBTO in MVBTCO
03 June 2020	1.33	Inclusion of BBR, updated data correction process
06 August 2020	1.34	Inclusion of MVBTCV and MVIETH, clarification of pricing methodology
07 August 2020	1.35	Conversion of MVIETH to a spot price index
15 September 2020	1.36	Exclusion of MVQBTC, MVSBTC
16 December 2020	1.37	Inclusion of MVWTAR
13 January 2021	1.38	Inclusion of MVETHV
08 March 2021	1.39	New closing time for BBR
24 March 2021	1.40	Inclusion of EBR
31 March 2021	1.41	Discretion in case of extraordinary events, Real-time calculation for BBR and EBR
12 May 2021	1.42	Removal of MVBTCO, inclusion of MVDEFI
30 June 2021	1.43	Inclusion of MVDOTV, MVSOLV, MVTRXV
2 August 2021	1.44	30 days announcement period for Index Guide changes
1 September 2021	1.45	Exchange screening for MVDA5, MVDA10 and MVDA25
8 October 2021	1.46	Inclusion of MVDF, MVDFLE, MVIAP, MVIALE, MVME, MVMELE, MVSC, MVSCLE
18 November 2021	1.47	Inclusion of MVAVAXV, MVMATICV
23 November 2021	1.48	Inclusion of GBBRA, GEBRA
7 December 2021	1.49	Inclusion of MVLEADV
22 December 2021	1.50	Inclusion of MVALGOV, MVFTTV, MVLUNAV
31 January 2021	1.51	Removal of MVBCH, MVDASH, MVETC, MVIOT, MVLTC, MVXMR, MVXEM, MVNEO, MVZEC
18 February 2022	1.52	Inclusion of MVDAS, MVGCFI
03 March 2022	1.53	Inclusion of MVMEBR, MVSCBR
07 March 2022	1.54	Inclusion of MVSCLEV, MVLINKV, MVNEARV
16 May 2022	1.55	Inclusion of CBBR, CETBR
24 May 2022	1.56	Higher liquidity needed for MVDA, Minimum component count (5) for category indexes
01 June 2022	1.57	Inclusion of MVCEX
15 June 2022	1.58	Removal of MVIBTC, MVIETH

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31 August 2022	1.59	Changed definition of el. exchanges in case of forks, move exchange review back to November (BBR/EBR)
25 November 2022	1.60	Removal of FTT from MVGCFI
31 January 2023	1.61	Removal of MVDEFI
01 March 2023	1.62	Removal of MVNEARV, "MVIS® / CryptoCompare" name changed to "MarketVector™"
01 April 2023	1.63	Removal of MVLUNAV, Inclusion of BBRLDN, EBRLDN, BBRHKG, EBRHKG, "Cryptocompare" name changed to "CCData", Rule change for MVDA regarding inclusion of stablecoins, pegged coins and wrapped coins
01 May 2023	1.64	Additional rules regarding client's jurisdictions (chapters 2.1 and 5.6), Removal of GBBRA, GEBRA
11 May 2023	1.65	Inclusion of MVDAMV
1 June 2023	1.66	Removal of MVDAS
19 June 2023	1.67	New closing time for BBRHKG and EBRHKG
14 July 2023	1.68	Rule Changes for the following indexes: MVDF, MVDFLE, MVIAP, MVIALE, MVSC, MVSCLE, MVSCBR, MVME, MVMELE, MVMEBR, MVCEX, Inclusion of MVB100EW
19 July 2023	1.69	Inclusion CXBR
31 July 2023	1.70	MVXRP and MVWTAR removed.

8 Disclaimer

It is not possible to invest directly in an index. Exposure to an asset class represented by an index is available through investable instruments or products based on that index. MarketVector Indexes™ does not sponsor, endorse, sell, promote or manage any investment fund or other investment vehicle that is offered by third parties and that seeks to provide an investment return based on the performance of any MarketVector™ Index ('Financial Product'). MarketVector Indexes™ makes no assurance that investment products based on any MarketVector™ Index will accurately track index performance or provide positive investment returns. MarketVector Indexes™ is not an investment advisor, and it makes no representation regarding the advisability of investing in any Financial Product. A decision to invest in any Financial Product should not be made in reliance on any of the statements set forth in this document.

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Anexo II

CCCAGG Index Methodology

(*restante da página intencionalmente deixada em branco*)

CCCAGG Methodology

CC Data Limited

March 2023

Contact: index@ccdata.io

Published by CC Data Limited trading as CCData

ccdata.io

29 March 2023

CCData

Contents

1 Version History

Version	Date	Details
1	01-Jul-2017	Initial version
2	20-Nov-2017	Added review process description
3	26-Feb-2018	Outlier methodology
4	30-Aug-2018	Amendment
5	12-Sep-2019	Outlier methodology update
6	27-Sep-2019	Constituent exchanges selection methodology
7	16-Dec-2019	Mathematical representation amendments
8	20-Jul-2020	Static and Dynamic Index definitions
9	18-Sep-2020	Amendment
10	26-Oct-2020	Merge constituent methodology with CCCAGG methodology
11	28-Jan-2021	Backtesting additions
12	12-Jan-2022	Improved mathematical notation
13	18-Mar-2022	LaTeX conversion, non-material amendments to section 3, subsubsection 5.3.4 and section 6, and other minor amendments
14	21-Feb-2023	Top-Tier Exchange definition update in section 3, subsubsection 6.3.3 "Top-Tier Liquid Pairs" methodology addition, and Disclaimer update
15	29-Mar-2023	CryptoCompare to CCData brand update

2 Introduction

2.1 Index Description

CCData's Aggregated Index ("CCCAGG") for a given Currency Pair refers to the real-time index calculation methodology, the purpose of which is to show the best price estimation for cryptocurrency traders and investors to value their portfolio at any time. CCCAGG is CCData's proprietary index calculation methodology for digital assets, based on 24-hour volume-weighted average calculation, time-penalty factor and outlier methodology. It aggregates transaction data of more than 250 Exchanges, using a 24-hour volume-weighted average. The CCCAGG is calculated for each cryptocurrency in each market it is trading in (example: CCCAGG BTC-USD). A detailed list of available cryptocurrencies is available on request.

Cryptocurrencies such as Bitcoin, Ethereum, Monero, etc. are traded at various markets against multiple currencies including fiat currencies (USD, JPY, GBP, etc.) and other cryptocurrencies. Depending on the market type (exchange or OTC), liquidity level, trading volume, transaction fees, and many other factors, a coin can be traded at different prices across different markets, and therefore making it difficult to know the value of a coin at a certain time.

2.2 Index Properties

Calculation agent	CC Data Limited
Dissemination	Real-time and historical
Day close	12:00 am UTC
Methodology	24-hour volume-weighted average with time penalty and outlier adjustment
Calculation days	Every day of the week including business holidays
Markets	All cryptocurrency markets

3 Definitions

24 Hour Volume means, with respect to a Currency Pair, an Exchange and a point in time, the sum of the volume of such Currency Pair on such Exchange over the last 23 calendar hours and the cumulative volume of the current calendar hour.

API stands for Application Programming Interface.

Average Daily Volume means, with respect to a Currency Pair, an Exchange and a calendar day, the average daily trading volume in USD over the past 30 calendar days calculated as follows:

$$ADV_d^{USD} = \frac{1}{30} \sum_{i=1}^{30} DailyVolume_{d-i}^{USD} \tag{1}$$

Where:

d denotes a calendar day in UTC timezone;

i denotes a positive integer; and

$d - i$ denotes i calendar days prior to d

Each day's trading volume is converted into USD using the day's CCCAGG of the Currency Pair's base or quote currency, as the case may be, against USD.

Calculation Date means any day for which a CCCAGG is published.

CCCAGG means, with respect to a Currency Pair, the Crypto Coin Comparison Aggregate Index.

Constituent Exchange means, with respect to a Currency Pair, an Exchange that is selected to contribute to the respective CCCAGG as of the previous Constituent Exchange Selection and Review.

Constituent Exchange Selection and Review means the monthly qualitative and quantitative review process to determine which Exchanges should be included or excluded for each CCCAGG based on eligibility and inclusion/exclusion criteria.

Currency Pair means a pair of:

- cryptocurrencies, or
- a cryptocurrency and a fiat currency

Dynamic Index means the version of CCCAGG that is subject to retrospective backfilling in the event of a failure to retrieve exchange data in a timely manner.

Exchange means an exchange that trades cryptocurrencies and is part of our constituent exchange universe.

Exchange Benchmark means CCData's proprietary methodology for assessing exchange quality published on a semi-annual basis.

Illiquid Pair means any Currency Pair that does not meet the criteria for Liquid Pairs, and hence is not classified as a Liquid Pair.

Liquid Pair means a Currency Pair with both base and quote markets trading above 1 million USD a day on average for the last 30 days aggregated across CCCAGG markets, or above 5 million USD a day aggregated across all markets.

Liquidity Factor means, with respect to a Currency Pair, an Exchange and a calendar day, the ratio of the Average Daily Volume of such Currency Pair on such Exchange compared to the aggregate Average Daily Volume of all Constituent Exchanges that contribute to the respective CCCAGG, calculated as follows:

$$LiquidityFactor = \frac{ExchangeADV}{\sum_{e \in E} ADV_c} \tag{2}$$

Where:

e denotes an Exchange in set E; and

E is, with respect to the Currency Pair and calendar day, the set of all Constituent Exchanges that contribute to the respective CCCAGG

Non Top-Tier Exchange means an Exchange with grade B, C, D, E or F or an ungraded Exchange based on the Exchange Benchmark results. For the avoidance of doubt, it is any Exchange that is not a Top-Tier Exchange.

Outlier Detection Factor means a factor used for penalising a price deemed to be an outlier in the CCCAGG calculation and is determined in accordance with Equation 7.

Price Difference means, with respect to a Currency Pair, an Exchange and a calendar day, the price difference of such Currency Pair on such Exchange compared to the median price of such Currency Pair across all relevant Exchanges, calculated as follows:

$$PriceDifference = \frac{ExchangePrice - MedianPrice}{MedianPrice} \tag{3}$$

The assumption is that for a Currency Pair trading on multiple Exchanges, the price on the most liquid Exchanges will cluster around the median. This metric is preferred over a simple average as it can detect outliers without skewing the metric for the whole sample.

Price Impact means, with respect to a Currency Pair, an Exchange and a calendar day, a valuation metric used to assess how much of the Price Difference would materialise when added to the CCCAGG. For a given Currency Pair and Exchange, it is the volume-weighted Price Difference calculated as follows:

$$PriceImpact = PriceDifference \cdot LiquidityFactor \tag{4}$$

This is an important metric as a higher Price Difference on a low-volume Exchange would materialise less, in certain cases, than a lower Price Difference on a high-volume Exchange. This is due to the fact that CCCAGG uses a 24 Hour Volume-weighted average calculation.

Static Index means the immutable version of CCCAGG, which does not account for missed trades.

Time Penalty Factor means a factor used for penalising outdated prices in the CCCAGG calculation and is determined in accordance with Equation 10.

Top-Tier Exchange means an Exchange with grade AA, A or BB based on the Exchange Benchmark results. Grades can be found here.

UTC stands for Coordinated Universal Time.

4 Data Collection

4.1 Data Source

Transactional data (historical trades) is collected from each Exchange via public REST API polled every 2-5 seconds or websocket endpoints. All collected data will be standardized internally, stored and backed up in servers.

Exchanges and markets are added on an ongoing basis based on research or user request. Exchanges that do not meet the technical requirements (available API for transactional data) cannot be added to the data collection. Unlike many data providers, who use snapshot data, CCCAGG approach of using transactional data enables auditability and replicability.

4.2 Data Format

The collected data consists of:

- Trade ID: string or numerical
- Timestamp: Unix timestamp in seconds
- Price: numerical
- Amount: numerical
- Position: buy/sell

4.3 Data Validation

Each trade is validated for the following:

- Each field has the correct data format
- Price and amount is positive
- Timestamp is not in the future
- Trades are not duplicated

4.4 Failure of Data Retrieval

In the event of a failure to retrieve data from an Exchange (due to service outage of the Exchange API service), per design of the CCCAGG, the last price of the respective Exchange will expire over time (its weighting will decrease to close to zero). As long as the Currency Pair is trading on other Exchanges, the CCCAGG calculation is uninterrupted.

If the missed data is recoverable, CCData makes its best effort to retrospectively backfill the data for historical accuracy. This might result in recalculation of certain CCCAGG pairs, therefore CCData publishes two sets of indices: the

Static Index, which is immutable, and the Dynamic Index, which can be adjusted retrospectively. The default index price retrieved from the CCData API is the Dynamic Index. The real-time index dissemination is also the Dynamic Index.

5 Index Calculation Methodology

5.1 Input Data

CCCAGG is calculated every time a new transaction is received. The following input data is needed from each transaction:

- Trade price
- Trade amount
- Trade timestamp
- Exchange where the transaction was executed

Input data sources are also reviewed via the qualitative review method, the Exchange Benchmark. More details can be found in subsection 6.2.

5.2 Constituent Exchanges

Constituent Exchanges are selected based on the Constituent Exchange Selection and Review process. More details can be found in section 6.

5.3 Index Calculation

5.3.1 24 Hour Volume

CCCAGG uses a 24 Hour Volume-weighted average, as defined in this document, to calculate prices. 24 Hour Volumes are calculated solely based on transactional data. This ensures CCCAGG gives greater weight to liquid market prices, and the Price Impact of illiquid (and therefore more volatile) markets is reduced.

5.3.2 Time Penalty Factor

The Time Penalty Factor is added to ensure that Exchanges that suspend trading have an expiring Price Impact. An example of a case where this methodology was particularly advantageous was the Bitfinex hack in 2016.

Bitfinex had one of the highest trading volumes in Bitcoin, and therefore had a significant weight in most price indices. As a result, when trading was suddenly suspended on Bitfinex, causing a crash on all other markets, most indices still showed a Bitcoin price close to the last price on Bitfinex, although markets had already moved on.

CCCAGG takes last trade time into account, therefore the last Bitfinex price expired with time and the index could move with the market.

5.3.3 Aggregation over Trading Currency

CCCAGG only takes direct trading pairs into consideration for calculation. For example CCCAGG BTC-USD only accepts trades from Exchanges trading

BTC-USD directly, therefore no currency conversion is needed for the aggregated index calculation.

The reason for this methodology is that a coin can trade on multiple currency markets with a significant Price Difference (premium or discount), therefore aggregating across all markets would result in an average price that is not useful for a trader or investor who holds a crypto position in a certain currency and most likely trades in that currency.

5.3.4 Mathematical Representation

We use the notation $|\cdot|$ to reprsent size of sets. What follows is the calculation of each relevant variable.

For a pre-specified Currency Pair, the CCCAGG is a volume-weighted average (last trade) price calculated as follows:

$$P_t = \sum_{e \in E_t} w_t^e \cdot p_t^e \tag{5}$$

Where:

t denotes a point in time, where the integer value represents seconds in unix timestamps [1]

P_t is the CCCAGG price at time t

e denotes an Exchange in set E_t

E_t is the set of all Exchanges used in the calculation of CCCAGG at time t

w_t^e is the weight assigned to Exchange e at time t and is calculated in accordance with Equation 6

p_t^e is, with respect to Exchange e and time t, the price of the last trade to contribute to CCCAGG [2]

The weight of Exchange e at time t is calculated as follows:

$$w_t^e = \frac{\mathbb{1}_t^e \cdot V_t^e \cdot \gamma_t^e}{\sum_{x \in E_t} \mathbb{1}_t^x \cdot V_t^x \cdot \gamma_t^x} \tag{6}$$

Where:

x denotes an Exchange (including Exchange e) in set E_t

[1] Therefore 0 represents 00:00:00 on January 1st, 1970 UTC.

[2] For a trade from an Exchange to contribute to CCCAGG, it should have taken place after the Exchange was last added as a constituent of CCCAGG.

$\mathbb{1}_t^e$ is, with respect to Exchange e and time t, the Outlier Detection Factor determined in accordance with Equation 7

V_t^e is, with respect to Exchange e and time t, the 24 Hour Volume calculated in accordance with Equation 8

γ_t^e is, with respect to Exchange e and time t, the Time Penalty Factor determined in accordance with Equation 10

The Outlier Detection Factor, with respect to Exchange e and time t, is determined as follows:

$$\mathbb{1}_t^e = \begin{cases} 0 & \text{if } |E_t| > 2 \text{ and } (p_t^e > A \cdot P_{l_t} \text{ or } A \cdot p_t^e < P_{l_t}) \\ 1 & \text{otherwise} \end{cases} \tag{7}$$

Where:

E_t and p_t^e are as defined above

A is a constant that denotes the price deviation threshold; it is currently set to 4

l_t is, with respect to t, the time of the last trade from any Exchange to contribute to CCCAGG [3]

P_{l_t} is the CCCAGG price at time l_t

The 24 Hour Volume, as defined in this document, with respect to Exchange e and time t, is calculated as follows:

$$V_t^e = \sum_{h_t \leq s < t} v_s^e \tag{8}$$

Where:

h_t is, with respect to time t, the timestamp of the last calendar hour in UTC in the previous 24-hour period determined as follows:

$$h_t = t - (23 \cdot 3600 + c) \tag{9}$$

Where:

c is the number of seconds past in the current hour

s denotes a point in time between h_t (inclusive) and t (exclusive) for which there was a trade on Exchange e

v_s^e is the quantity traded on Exchange e at time s [4]

[3] This would be the last time that the CCCAGG was calculated.
[4] Note we include the volumes of trades deemed to be outliers.

The Time Penalty Factor, with respect to Exchange e and time t, is determined as follows:

$$\gamma_t^e = \begin{cases} 1 & \text{if } \tau_t^e < 5 \\ 0.8 & \text{if } 5 \leq \tau_t^e < 10 \\ 0.6 & \text{if } 10 \leq \tau_t^e < 15 \\ 0.4 & \text{if } 15 \leq \tau_t^e < 20 \\ 0.2 & \text{if } 20 \leq \tau_t^e < 25 \\ 0.001 & \text{otherwise} \end{cases} \tag{10}$$

Where:

τ_t^e is, with respect to Exchange e and time t, the length of time in minutes since the last trade on Exchange e calculated as follows:

$$\tau_t^e = \frac{t - l_t^e}{60} \tag{11}$$

Where:

l_t^e is, with respect to Exchange e and time t, the time of the last trade on such Exchange e to contribute to CCCAGG

5.3.5 Outlier Detection

Along with the real-time outlier detection dictated by $\mathbb{1}_t^e$ in Equation 7, CCData will manually remove trades that are deemed outliers for other reasons, such as exchange errors.

5.4 Auditability and Replicability

CCCAGG is auditable and replicable since its calculation is based on transaction data retrieved from Exchanges via public API. Anyone who has access to this data can recreate the CCCAGG.

6 Constituent Exchange Selection and Review Methodology

6.1 Introduction

CCData has integrated with a list of Exchanges, but only a subset of them count towards the calculation of CCCAGG.

While CCData strives to include as many Exchanges as possible after a testing period, exclusion generally happens in the following cases:

- Volatile prices compared to market average (OTC markets excluded)
- Exchange suspends trading activity
- Malfunctioning API (from a Constituent Exchange)
- Exclusion due to risk factors identified in the Exchange Benchmark

The Constituent Exchange Selection and Review methodology consists of a qualitative component, using the CCData Exchange Benchmark (see more information in subsection 6.2), and a quantitative component, looking at historical price movements and liquidity (see more information in subsection 6.3).

Review component	**Method**	**Frequency**
Exchange Benchmark	Qualitative	Semi-annual
Monthly Constituent Selection	Quantitative + using Exchange Benchmark results	Monthly

The Exchange Benchmark is conducted as a due diligence process on Exchanges, it is updated semi-annually and its results are used in the quantitative part of the Constituent Exchange Selection and Review process. The Constituent Exchange Selection and Review, as described in this section, is conducted to decide whether an Exchange should be included or excluded from the CCCAGG of each Currency Pair in scope.

When assessing the eligibility of an Exchange to be included/excluded in each CCCAGG, CCData differentiates between the most liquid pairs (Liquid Pairs) and other pairs. This is because, for Liquid Pairs, the main goal is to maintain price integrity, while for Illiquid Pairs, the goal is to give the best price discovery. The difference in incentives means that the eligibility rules also differ.

While the review takes the Exchange Benchmark grades into consideration, a top grade does not automatically imply inclusion. Historical prices are used to assess the Price Differences for each trading pair. Moreover, further metrics are used for assessment, such as Price Impact and Liquidity Factors.

Each case for exclusion is reviewed by the Technical Committee with sign-off by the Oversight Function. This process occurs every calendar month, and on an ad-hoc basis when necessary. An excluded Exchange can be re-included if the Technical Committee finds that the problem causing the market disturbance has been solved. Changes in Constituent Exchanges are communicated via a published report on the second Tuesday of the calendar month on ccdata.io, and implemented on the third Tuesday of the calendar month (adjusted if not a business day).

6.2 Qualitative Reivew: Exchange Benchmark

The CCData Exchange Benchmark seeks to bring clarity to the digital asset exchange sector by providing a framework for assessing risk, bringing transparency and accountability to a complex and rapidly evolving market. This is approached in several dimensions using a comprehensive data set, covering over 160 Exchanges across 8 categories of evaluation:

- Legal/Regulation
- Data Provision
- Security
- Team/Exchange
- Investment
- Trade Monitoring
- Market Quality
- Negative Events Penalty

The output of the Exchange Benchmark framework is a rating system, whereby each Exchange receives a grade from AA (best quality) to E (lowest quality). This framework is used as a qualitative assessment for the eligibility review.

Benchmark results are updated semi-annually and published on ccdata.io. The full methodology can be found here: ccdata.io/research.

For the purposes of constituent selection, Top-Tier Exchanges are those that receive an AA, A or BB grade in the Exchange Benchmark and Non Top-Tier Exchanges are those receiving a B, C, D, E or F grade or are non-graded. Top-Tier Exchanges meet our minimum threshold for acceptable risk.

With the exception of 'dry pairs' (as defined in Section 6.3.3.2), Exchanges with grade F or non-graded Exchanges are automatically excluded from the CCCAGG calculation for all other Currency Pairs.

The Exchange Benchmark is updated and published semi-annually.

The Exchange Benchmark results are used in the quantitative part of the Constituent Exchange Selection and Review process as described in subsection 6.3.

6.3 Quantitative Review: Monthly Constituent Selection

6.3.1 Overview

Constituent selection is divided into two main components: review of Liquid Pairs and review of Illiquid Pairs. This is an important distinction, as the incentives of review for the two groups are different. For Liquid Pairs, the review prioritizes price integrity, so Top-Tier Exchanges are preferred with strict rules for inclusion. For other pairs, the incentive is to provide the best price discovery, therefore eligibility rules are more relaxed.

This process is conducted once every calendar month, aggregating the data of the last 30 days.

The following metrics are calculated for each Currency Pair for each Exchange before conducting the selection process:

- Price Difference
- Price Impact
- Liquidity Factor
- Average Daily Volume

6.3.2 Liquid Pairs

Liquid Pairs are determined based on Average Daily Volumes of each base and quote asset that may form a Currency Pair.

For each Liquid Pair, the following reviews are done: Top-Tier Exchanges to include, all Exchanges to exclude and other Exchanges to include.

6.3.2.1 Top-Tier Exchanges to Include

For inclusion review of Top-tier Exchanges that have not been included in certain markets, CCData uses 30-day average Price Difference and 30-day average Price Impact. Exchanges with low Price Difference and low Price Impact are added to the CCCAGG. Both of the conditions in the table below need to be met for a Top-Tier Exchange to be eligible for inclusion:

Metric	Threshold	Condition
30-day average Price Difference (absolute)	2%	Less
30-day average Price Impact (absolute)	10%	Less

6.3.2.2 Exchanges to Exclude

Certain exclusion tests are done with all Exchanges including Top-Tier Exchanges. This is important for Liquid Pairs as the goal is to maintain price integrity. The metrics used for the exclusion test are 30-day average Price Difference and 30-day average Price Impact. Exchanges with high Price Difference or high Price Impact are excluded from the CCCAGG. Either of the conditions in the table below need to be met for an Exchange to be eligible for exclusion:

Metric	Threshold	Condition
30-day average Price Difference (absolute)	10%	Greater
30-day average Price Impact (absolute)	50%	Greater

Exclusion thresholds are higher than inclusion thresholds as we need to account for periodical differences due to the overall market liquidity seasonalities.

6.3.2.3 Non Top-Tier Exchanges To Include

Non Top-Tier Exchanges are also reviewed for inclusion. The metrics used for this review are 30-day average Price Difference, Liquidity Factor and Daily Average Volume. First, Currency Pairs need to meet a minimum trading activity threshold to avoid stale prices. Once that is met, the 30-day average Price Difference needs to meet a certain level. It is also important that the liquidity ratio is reasonably high, adding price liquidity to the CCCAGG. Exchanges graded D or below, or non-graded are not included. All of the conditions in the table below need to be met for a Non Top-Tier Exchange to be eligible for inclusion:

Metric	Threshold	Condition
30-day average Price Difference (absolute)	10%	Less
30-day Average Daily Volume	5 million USD	Greater
Liquidity Factor	50%	Greater

6.3.3 Top-Tier Liquid Pairs

Liquid Pairs with four or more Top-Tier Exchanges included in the CCCAGG calculation are called “top-tier liquid pairs”. Once a Liquid Pair has four or more Top-Tier Exchanges eligible for inclusion, all Non Top-Tier Exchanges are removed from CCCAGG for that pair, and only Top-Tier Exchanges are considered for inclusion from then on. Any pairs falling into the “top-tier liquid”

category following a monthly review are considered eligible for inclusion in the CCCAGG Benchmark Family.

6.3.4 Illiquid Pairs

Any pair that is not in the list of Liquid Pairs is reviewed as an 'Illiquid Pair'. The main motivation for this review is to provide the best price discovery possible. As such pairs are less liquid, data sources are scarce. As of writing this version of the methodology, there are around fourteen thousand (14,000) other pairs from thirty thousand (30,000) Exchanges. This means, on average, an Illiquid Pair is listed on 2 Exchanges.

6.3.4.1 Top-Tier Exchanges to Include

All Top-Tier Exchanges are reviewed for Illiquid Pairs that are not dry pairs (see subsubsection 6.3.5 below). Although Top-tier Exchanges are trusted for their data quality, they may have illiquid markets too as they launch new products. The following Price Difference and Liquidity Ratio conditions need to be met for a Top-Tier Exchange to be eligible for inclusion:

Metric	Threshold	Condition
30-day average Price Difference (absolute)	5%	Less
Liquidity Factor	50%	Greater

6.3.4.2 Non Top-Tier Exchanges To Include

Non Top-Tier Exchanges are also reviewed for inclusion. The metrics used for this review are 30-day average Price Difference, Liquidity Factor and Daily Average Volume. First, Currency Pairs need to meet a minimum trading activity threshold to avoid stale prices. Once that is met, the 30-day average Price Difference needs to meet a certain level. It is also important that the liquidity ratio is reasonably high, adding price liquidity to the CCCAGG. Exchanges graded D or below, or non-graded are not included. All of the conditions in the table below need to be met for a Non Top-Tier Exchange to be eligible for inclusion:

Metric	Threshold	Condition
30-day average Price Difference (absolute)	10%	Less
30-day Average Daily Volume	5 million USD	Greater
Liquidity Factor	50%	Greater

6.3.5 Dry Pairs (Less than 4 Exchanges)

Pairs with less than 4 Exchanges are called "dry pairs", and will allow all price feeds to be included (up to 3 Exchanges), unless the Price Difference with respect to an Exchange is significantly high (10x magnitude). A minimum of 3 Exchanges is required for the outlier detection methodology, described in Equation 7 and subsubsection 5.3.5, to work.

7 Ongoing Maintenance

7.1 Methodology Review and any Changes to Methodology

The methodology is reviewed at least every quarter by the Technical Committee to ensure that it remains representative of the relevant market or economic reality that it is intended to measure. If the Technical Committee requires any material changes to the methodology, any change must be signed off by the Oversight Function before entering a period of public consultation of no less than thirty (30) days. The Oversight Function shall undertake an internal review of the methodology at least annually.

In accordance with Article 13(1)(c) of the Benchmark Regulation (BMR), the consultation exercise provides notification to users, at a minimum, of the key elements of the methodology that would be affected by the proposed material change. CCCAGG consumers will be notified of the methodology consultation and proposed changes via the API newsletter and other direct client communication channels, and benchmark users will be invited to review the proposed changes and submit feedback.

7.2 Backtesting and Benchmarking

In order to maintain confidence that the CCCAGG for a Currency Pair is representative and replicable, each quarter the following tests are conducted:

- Compare daily CCCAGG values for the last 3 months with the median price of the Constituent Exchanges. It is expected that CCCAGG follows the market median closely.
- Compare daily CCCAGG volatility to Constituent Exchange volatility over the last 3 months. It is expected that CCCAGG is less volatile than each individual Constituent Exchange.
- Recalculate daily CCCAGG values using raw trade data for the last 3 months. This ensures that the index is replicable and transparent.

7.3 Constituent Exchange Review

Constituent Exchange selection is reviewed by the Technical Committee at least once every calendar month or on an ad-hoc basis, when market or technical events require. Market or technical events may include:

- Suspended Trading
- False Data Provision
- Service Outage

The Exchange Benchmark, which forms the qualitative aspect of the Constituent Exchange Selection and Review process occurs on a semi-annual basis and is reviewed and updated no less than twice annually.

The Constituent Exchange Selection and Review methodology, outlined in section 6 of this document, describes the complete process and criteria by which Constituent Exchanges are selected and considered towards the calculation of a CCCAGG.

7.4 Discretion Regarding the Use of Input Data

Pursuant to Art. 12 No.1. (b) of the BMR, CCData has established the following rules identifying how and when discretion may be exercised in the administration of CCCAGG.

In cases where input data is or appears to be qualitatively inferior or different sources provide different data, or a situation is not covered by this index methodology document, CCData may use or change the data at its own discretion according to the following discretion policy after a plausibility check. This may include:

- Liquidity and size data
- Event information
- Classifications and other secondary data

Any changes to input data that CCData intends to apply because of missing data, different data from different sources, or other information concluding the inappropriateness or incorrectness of data must be subject to reasonable discretion. The decision on any change must be required, appropriate, commensurable, and in line with the respective index scope and objective and must reasonably consider in a balance weight the interest of users, investors in related products and the integrity of the market.

The Technical Committee ensures consistency in the use of discretion in its judgement and decision. Employees involved in the Technical Committee must have shown the respective experience and skills. Significant decisions are subject to sign-off by a supervisor. In case of material changes to data, the relevant situation will be analysed in detail, described and presented to the Oversight Function and discussed and reviewed with the Oversight Function.

The broad range of possible data quality problems does not allow to define specific steps for each possible instance. CCData will always weigh the different interests of CCCAGG users, the integrity of the market and other involved parties, and determine the least disadvantageous measure that equally considers the relevant interests best.

In order to avoid individual decisions on the use of data in similar cases for the future, an update of the index rules can be taken into consideration, if applicable.

Other possible mitigation measures may include the change of input data sources or providers and/or own data research where possible and reasonable.

Records are kept about material judgement or discretion and will include the reasoning for said judgement or discretion.

7.5 Potential Limitation

The CCCAGG methodology works best for liquid markets where multiple Exchanges provide data sources for the index calculation. For a given CCCAGG, if the number of Exchanges eligible for inclusion is low or each individual Exchange is illiquid, then the volume-weighted average price will give an indicative value that might not sufficiently reflect the market.

CCCAGG also relies on frequent trade updates. If no trading occurs on a market for more than 24 hours, then the index will become stale.

8 Dissemination

CCCAGG is disseminated via REST API and Websocket API. The relevant API endpoint can be found here: https://min-api.cryptocompare.com/documentation?key=Historicalcat=dataHistohour.

9 Disclaimer

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