

CoinShares Gold and Cryptoassets Index Methodology

October 21, 2021

Version History

Readers can access other versions of the methodology for the CoinShares Gold and Cryptoassets Index online when they become available on The CoinShares Group website (www.coinshares.com) and on Compass Financial Technologies website (www.compassft.com).

Date	Version	Change	Author(s)
04/24/2020	1.0	Methodology Publication	Michael Petch (CoinShares), Guillaume Le Fur and Edouard Mouton (Compass Financial Technologies), Aikaterini Koutsouri and William J. Knottenbelt (Imperial College London)
28/09/2021	1.1	Add sub indices	Guillaume Le Fur and Edouard Mouton (Compass Financial Technologies), Aikaterini Koutsouri and William J. Knottenbelt (Imperial College London)
21/10/2021	1.2	Add merge mining criteria, change supply type	James Butterfill (CoinShares), Guillaume Le Fur and Edouard Mouton (Compass Financial Technologies), Aikaterini Koutsouri and William J. Knottenbelt (Imperial College London)

Changes versus previous version

1. Merge Mining and its associated risks for child chains

Merge mining is a process in which miners produce one proof-of-work that is valid on two or more chains. It's been known as a bootstrapping mechanism for early proof-of-work blockchains that aim to inherit the security assurances of an existing chain. In practice, miners run a hashing algorithm that is implemented on at least two chains, a parent and a child chain, where each block on the child contains a data element pointing to an output hash on the parent, which is considered a valid proof-of-work on the child.

There are several reasons why merge mining may introduce some form of security risk to a child chain. Firstly, child chains characteristically incur dependency risk, meaning they are susceptible to issues inherited from their parent chain(s) that may arise from bugs, reorgs etc. Further, centralising risk may be present in complex or resource intensive schemes (adding bandwidth, storage, and validation costs), increasing the capital costs or technical requirements for miners to maintain competitiveness on the child chain. In cases where competition is low, singular miners or mining pools can reach a threshold of hashing power that may be dangerous to a chain's security. Conversely, the ability to generate blocks for a child chain at almost no additional cost may enable misbehaving miners to carry out intentional or unintentional attacks without risking financial loss. Finally, merged mining is voluntary for miners of the parent chain. As a result, there is a high chance that only a few mining pools participate - resulting in less decentralization for the child chain. It has been observed that for some merge-mined child chains that they are controlled by a single mining pool.

For the reasons stated above we have decided to alter the eligibility criteria for the index to exclude merge-mined coins from consideration as of 21 October 2021.

paper: https://publications.sba-research.org/publications/201709%20-%20AJudmayer%20-%20CBT_Merged_Mining_camera_ready_final.pdf

2. Supply figures and market capitalisation

The Committee has decided to use circulating supply instead of liquid supply to compute market capitalisation. This change will be valid from the first crypto basket review date following the 21st of October 2021.

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1 Introduction

1.1 Overview

The CoinShares Gold and Cryptoassets Index (CGCI) is owned by CoinShares (Holdings) Limited. The Benchmark Administrator and Calculation Agent is Compass Financial Technologies.

The CGCI can be accessed online on The CoinShares Group website (www.coinshares.com) and on the Compass Financial Technologies website (www.compassft.com) along with additional information about the Index.

The CGCI is available on Bloomberg and Reuters under the ticker symbol COINCGCI and .COINCGCI, respectively.

1.2 Motivation

Two noteworthy characteristics of the returns of non-stablecoin cryptoassets are their high volatility, which brings with it a high level of risk, and their high intraclass correlation, which limits the benefits that can be had by diversifying across multiple cryptoassets. Yet cryptoassets exhibit no correlation with gold, a highly-liquid yet scarce asset which has proved to function as a safe haven during crises affecting traditional financial systems.

Although volatility poses challenges in terms of increased uncertainty, there are also benefits to be had from its proper management through diversification and regular rebalancing (Bouchey et al., 2012, *The Journal of Wealth Management*. Volatility harvesting: Why does diversifying and rebalancing create portfolio growth?). This is exemplified by the so-called Shannon's Demon approach in which two, ideally uncorrelated, assets – at least one of which is highly volatile – are periodically rebalanced to maintain an ideal target allocation. The resulting expected growth rate is greater than the arithmetic mean of the individual expected growth rates, while the variance of the returns is less than the mean of the individual variances (Poundstone, 2005. *Fortune's Formula*).

The CoinShares Gold and Cryptoassets Index is a low-volatility index that utilises the concept of volatility harvesting through (a) forming a basket of cryptoassets and (b) combining it with gold using weighted-risk contribution as a rebalancing mechanism. By decreasing volatility levels, it seeks to yield superior risk-adjusted returns when compared to a number of alternative strategies, including holding cryptoassets or gold alone. Further, it presents a moderate turnover, which should translate into moderate operating costs.

1.3 Primary Objective and Constraints

The CGCI is designed with the aim of providing diversified exposure to the alternative asset space in a way that yields a superior risk-return profile when compared to holding such assets in isolation while being orthogonal to traditional financial markets. Accordingly, the Index must:

1. Be comprised of a small number of liquid, investable constituent assets
2. Exhibit a relatively stable composition in terms of constituents with asset weights that do not vary dramatically between rebalancing periods, leading to low turnover
3. Utilise some means of principled risk control leading to lower volatility
4. Be specified in a clear and unambiguous manner to facilitate validation and reproducibility
5. Hold constituent assets on a long basis only
6. Not make use of leverage

2 Index Design

2.1 Constituent Eligibility and Selection

The CGCI is composed of a fixed number of constituents including five cryptoassets and physical gold. The cryptoasset constituents of the Index are the top five eligible cryptoassets based on the 6-month rolling mean market capitalisation. By restricting the Index to the top five cryptoassets we are less likely to encounter liquidity issues. Selection of constituents occurs on a monthly basis.

We determine whether a cryptoasset is eligible to be selected, based on the following requirements:

1. Trades in USD
2. Is not linked to the value of a fiat currency (or a fiat stablecoin)
3. Has at least a 6-month history of trading on a reputable exchange
4. Is not an ERC-20 Token
5. Has been on its native blockchain for at least 6 months
6. Is not a Privacy-focused coin (e.g. Monero, ZCash)
7. Has not suffered a major chain reorganisation in the last 6 months, and is not subject to a forthcoming contentious hard fork before the next selection is due to take place
8. Is not a merge-mined coin

2.2 Constituent Weighting

Given weighting $x = (x_1, x_2)$ in a case of two assets with standard deviation of returns σ_1 and σ_2 respectively, and correlation ρ , the vector of risk contributions is:

$$\frac{1}{\sigma(x)} \begin{pmatrix} x_1^2 \sigma_1^2 + x_1 x_2 \rho \sigma_1 \sigma_2 \\ x_2^2 \sigma_2^2 + x_1 x_2 \rho \sigma_1 \sigma_2 \end{pmatrix}$$

Considering the case of uncorrelated assets ($\rho = 0$), and supposing that we desire the risk contribution of asset 1 to be α times the risk contribution of asset 2, we need to solve for x_1 in:

$$x_1^2 \sigma_1^2 = \alpha (x_2^2 \sigma_2^2)$$

Given $x_i \in [0, 1]$ and $\sum_{i=1}^2 x_i = 1$ this yields:

$$x_1 = \frac{\sqrt{\alpha} \sigma_1^{-1}}{\sqrt{\alpha} \sigma_1^{-1} + \sigma_2^{-1}} \quad (1)$$

For the CoinShares Gold and Cryptoassets Index constituent weighting, we choose a bi-level approach that involves studying the historical volatilities of the crypto-basket and gold separately in order to inform the crypto-gold asset allocation decision.

Regarding the formation of the crypto-basket, due to the persistent levels of correlation between non-stablecoin cryptoassets, any Risk Parity approach is expected to lean towards an Equally Weighted allocation whose risk level is not significantly improved. Therefore, due to its much more convenient reproducibility compared to Risk Parity portfolios and their fragility when the Covariance Matrix is barely positive semi-definite, an Equally Weighted scheme is employed within the crypto-basket.

Taking into consideration the former, and the lack of a significant correlation between gold and cryptoassets, the Index is calculated following a two-stage allocation scheme that involves:

1. Computation of the historical volatility of (a) the Equally weighted crypto-basket, and (b) gold;
2. Asset allocation among the crypto-basket and gold expressed as the bivariate weighted risk contribution problem presented in Equation 1. The risk contribution ratio is set as $\alpha = 4$, indicating that 80% of the total risk emanates from the crypto-basket.

2.3 Rebalancing Schedule

In order to fully capture the diversification benefits of the time varying correlations between gold and the cryptoasset class, a monthly rebalancing frequency is employed. Index constituents are calculated and announced three business days prior to the end of the running month. Constituent weights are announced on the last business day of the running month. The rebalancing is employed on the first business day of the following month.

2.4 Index Calculation

In the CGCI, the crypto-basket is formulated as an Equally Weighted basket of 5 cryptoassets, each with a weight of 0.2. The crypto-basket price base level is set on 100 on July 1st, 2015:

$$EW_0 = 100 \quad (2)$$

The crypto-basket price level on day t from January 2nd, 2016 onwards is calculated as:

$$EW_t = \left(1 + \sum_{i \in N_{c,t}} x_{i,R(t)} \times \left(\frac{P_{i,t}}{P_{i,R(t)}} - 1 \right) \right) \times EW_{R(t)} \quad (3)$$

Where,

- $N_{c,t}$ is the set of the 5 cryptoasset constituents on day t
- $R(t)$ is the most recent CGCI rebalancing date preceding t
- $P_{i,t}$ is the closing price for cryptoasset i on day t , expressed in USD
- $P_{i,R(t)}$ is the closing price for cryptoasset i on the last rebalancing date preceding t , expressed in USD
- $x_{i,R(t)}$ is the weight of cryptoasset i on the last rebalancing date preceding t , equal to 0.2
- EW_t is the crypto-basket price level on t

The weighting among the crypto-basket and gold in the CGCI is computed through:

$$x_c = \frac{\sqrt{\alpha} \sigma_c^{-1}}{\sqrt{\alpha} \sigma_c^{-1} + \sigma_g^{-1}}, \quad x_g = 1 - x_c \quad (4)$$

The risk contribution ratio is set to $\alpha = 4$, x_c and x_g are the weights for the crypto-basket and gold and σ_c and σ_g the historical volatilities of the crypto-basket and gold logarithmic returns.

The Index base level is set on 1 000 on January 1st, 2016:

$$\text{Index}_0 = 1\,000 \quad (5)$$

The Index level on day t from January 2nd, 2016 onwards is calculated as:

$$\text{Index}_t = \left(1 + \sum_{i \in N_t} x_{i,R(t)} \times \left(\frac{P_{i,t}}{P_{i,R(t)}} - 1 \right) \right) \times \text{Index}_{R(t)} \quad (6)$$

Where,

- N_t is the set of the 2 CGCI components (crypto-basket and gold) on day t
- $R(t)$ is the most recent CGCI rebalancing date preceding t
- $P_{i,t}$ is the closing price for constituent i on day t , expressed in USD
- $P_{i,R(t)}$ is the closing price for constituent i on the last rebalancing date preceding t , expressed in USD
- $x_{i,R(t)}$ is the weight of constituent i on the last rebalancing date preceding t , equal to the WRC allocation result
- Index_t is the CGCI price level on t

2.5 Market Disruption Adjustments

A Market Disruption event occurs when the trading activity of an Index constituent is disrupted or the fair determination of its price is obstructed. Such scenarios take place when:

- An Index constituent listed on an eligible exchange is not open for trading on the specific day
- An Index constituent listed on an eligible exchange that suspends its trading at a time prior to the published closing time with no prior notice
- The published gold closing price does not reflect properly, in the opinion of the CGCI Steering Committee, the fair price of the constituent

The occurrence of a Market Disruption Event is determined by the CGCI Steering Committee.

If a Market Disruption Event occurs during a rebalancing date, the constituents involved are not rebalanced and their respective weights are equal to those they had on the first business day preceding the Market Disruption Event. The rebalancing period for the involved constituents will be postponed until the next available business day upon which no Market Disruption Event occurs them.

If a Market Disruption Event occurs on any other date, the affected weights are calculated as expressed in 7:

$$x_i(t) = \begin{cases} x_{i,\text{WFD}(t)} & \text{if } R_i(t) = R(t) \\ x_{i,R(t)} \times \frac{P_{i,R(t)} \times \text{Index}_{R(R(t))}}{P_{i,R(R(t))} \times \text{Index}_{R(t)}} & \text{if } R_i(t) < R(t) \end{cases} \quad (7)$$

Where,

- $\text{WFD}(t)$ is the Weight Fixing Date with respect to date t , i.e. the first weekday preceding or equal to the 4th calendar day before the end of the month
- $x_{i,\text{WFD}(t)}$ is the weight of asset i on date t , determined on $\text{WFD}(t)$
- $R(t)$ is the most recent CGCI rebalancing date preceding t
- $R(R(t))$ is the second most recent CGCI rebalancing date preceding t
- $R_i(t)$ is with respect to constituent i and date t , the first calculation date equal to or following $R(t)$, but strictly preceding date t on which the constituent i is unaffected by a Market Disruption Event. If such a date does not exist, $R_i(t)$ is the first date equal to or following $R(R(t))$ but strictly preceding date t on which on which the constituent i is unaffected by a Market Disruption Event
- $P_{i,t}$ is the price of constituent i at date t
- Index_t is the CGCI value at date t

If, after a period of five business days, no settlement price has been made available by the exchange, the CGCI Steering Committee will determine, in good faith, the settlement prices necessary for the rolling of the contracts and for the calculation of the Index.

2.6 Calculation Frequency

The CGCI closing level is calculated and monitored by Compass Financial Technologies and is announced on each business day at 16:00 BST.

2.7 Index Distribution

The Index is published on The CoinShares Group website (www.coinshares.com) and the Compass Financial Technologies website (www.compassft.com) and is distributed to Bloomberg and Reuters under the ticker symbols COINCGCI and .COINCGCI, respectively.

2.8 Hard Fork and Airdrop Policy

Hard Fork Policy: A hard fork occurs when a change is made to the transaction validation rules of a cryptoasset’s underlying blockchain protocol in a way that is not compatible with its earlier version. Nodes that wish to continue to participate are expected to upgrade to the new version of the protocol’s software. Usually such a fork is planned and accepted by the overwhelming majority of nodes. However, where the fork is contentious enough that a non-negligible number of nodes continue to run the old version of the software, a chain split occurs.

The CGCI Steering Committee (as defined in Section 4.2) will evaluate all upcoming hard forks, especially in light of Rule 8 of Section 2.1. Treatment of hard forks will be led by decisions of exchanges with respect to the ticker symbols used to represent the resulting cryptoassets and the markets that they maintain. Concretely, suppose some cryptoasset traded under ticker symbol T is expected to undergo (or undergoes) a hard fork resulting in an original chain C with cryptoasset C_a and a modified chain C' with cryptoasset C'_a . There are a few scenarios to consider:

- C_a continues to trade under ticker symbol T while C'_a starts trading under a newly-created ticker symbol T' . The BTC–BCH fork is an example of this scenario. In this case, C_a continues as a constituent of the Index. C'_a is not eligible to become a constituent of the Index (lacking as it does the necessary pricing history), and does not contribute to the Index value. C'_a may be sold by funds tracking the Index as an excess return; the precise decision of when (or whether) to sell will be a matter of judgment for the tracking funds.
- C'_a now trades under ticker symbol T while C_a starts trading under a new ticker symbol T' . The ETH–ETC fork is an example of this scenario. In this case, C'_a replaces C_a as a constituent of the Index. The pricing history for C'_a is taken as being that of C_a prior to the fork. C_a is no longer a constituent of the Index, does not contribute to the Index value, and may be sold by funds tracking the Index as an excess return.
- C'_a now trades under ticker symbol T while trading in C_a is (largely) abandoned. Hard forks to upgrade the consensus mechanism of Monero usually follow this pattern. In this case, C'_a replaces C_a as a constituent of the Index and the pricing history for C'_a is taken as being that of C_a prior to the fork.
- There is substantial disagreement amongst exchanges as to the ticker symbols that C'_a and C_a should trade under. Usually this scenario would arise as the result of a contentious hard fork. Since cryptoassets due to undergo contentious hard forks before the next selection date are not eligible for selection, it is expected that this situation would apply to Index constituents only in very rare circumstances. In this case, an extraordinary meeting of the CGCI Steering Committee will be convened in order to decide on an appropriate course of action which may include replacing C_a by the next eligible cryptoasset, or rebalancing across the remaining constituent cryptoassets.

Airdrop Policy: An ‘airdrop’ occurs when a blockchain project distributes free cryptoassets to investors in the hopes of attracting more people to use their platform. Occasionally some projects offer more established cryptoassets to do an airdrop but most of the time, the project airdrops their own native token or cryptocurrency. Requirements to qualify for an airdrop vary as well; in some cases the participant has to hold the cryptoasset in their wallet while other times they have to promote the project on an online forum.

Airdropped cryptoassets will not be included in the Index. Fund managers tracking the Index may sell these at their earliest convenience, thus contributing to excess returns over the base Index.

3 Data Source and Handling

3.1 Data Sources

The daily price levels of the crypto-constituents in the Index are calculated using historical tick-by-tick trade data provided by Kaiko (www.kaiko.com).

Kaiko is an independent digital assets market data provider based in Paris since 2014. Kaiko collects, normalizes, stores, and delivers raw, normalized trade and quote data on 74 exchanges and more than 9,000 pairs. Kaiko has worked with over 300 customers globally, including, funds, institutions, regulators, academics and crypto start-ups. Kaiko's methodology is fully public and can be found on their website. Their data collection runs on multiple redundant global centers, which ensures the consistency of data delivery and their data is versioned to avoid being impacted by breaking changes.

The 6-month rolling mean market capitalisation is computed through the daily market capitalisation figures, calculated by multiplying the daily price of each constituent by its daily circulating supply. Circulating supply data is provided by Messari (www.messari.io), and prices are obtained through the process explained in Section 3.3. We define an asset's circulating supply as the number of units that currently exist on-chain and which are not known to be encumbered by any contracts. Note that an encumbering contract could be both an on-chain smart-contract, or a traditional human-space legal contract. Thus, this figure takes into account both on-chain-lockups and founder/investor vesting and lockup periods.

Messari, Inc. is a market intelligence company focused on the digital asset ecosystem. The company's tools and research provide customers with actionable insights to confidently make decisions in a fast moving space.

The daily price levels of the gold basket in the Index is calculated using the LBMA Gold Price PM data provided by ICE Benchmark Administration (IBA). IBA provides the auction platform, methodology as well as overall independent administration and governance for the LBMA Gold Price, with the LBMA holding the intellectual property rights. The PM price is set at 15:00 BST in US dollars.

3.2 Eligible Exchanges

The CGCI constituent pricing methodology is performed through tracking a subset of exchanges provided by the Kaiko pricing source. Eligible exchanges must offer XYZ/USD markets for at least one current Index constituent XYZ and be approved by the CGCI Steering Committee. The current list of eligible exchanges used in the CGCI calculations is composed of the following exchanges:

- Bitfinex
- bitFlyer
- Bitstamp
- Bittrex
- Gemini
- itBit
- Kraken

3.3 Constituent Pricing Methodology

The CGCI constituent reference rates are calculated based on the collection of tick-by-tick data of all eligible exchanges, provided by Kaiko. On the Index calculation days, the pricing methodology for each constituent includes the following steps:

1. For the time-period of 14.00-15.00 BST, all trades across eligible exchanges for USD denominated markets are aggregated in a dataset categorized in rows by variables shown in Table 1.

2. The aggregated dataset is divided in 6 partitions of trade records that are equally sized in terms of time duration.
3. The volume-weighted median of trade prices is calculated for each sub-dataset.
4. The final constituent reference rate is given by the average of the computed medians of all the sub-datasets.

Variable	Description
Exchange	Unique exchange symbol
Symbol	Currency pair
Date	Epoch timestamp in milliseconds
Price	Price of asset sold or bought, displayed in the quote currency
Amount	Quantity of asset sold or bought, displayed in the base currency

Table 1: Reference Rate Input Dataset Variables

Mathematically, given a set of N partitions of the executed trades dataset in day t , the reference rate for a constituent i ($P_{i,t}$) is expressed as:

$$P_{i,t} = \frac{\sum_{n=1}^6 m_n}{6} \quad (8)$$

Where,

- t is the time of the reference rate calculation
- m_n is the volume-weighted median of partition n , equal to the price of trade pair k in partition n , $p_{k,n}$, that satisfies:

$$\sum_{i=1}^{k-1} V_{n,i} \leq \frac{\sum_{i=1}^{T_n} V_{n,i}}{2} \quad \text{and} \quad \sum_{i=k+1}^{T_n} V_{n,i} < \frac{\sum_{i=1}^{T_n} V_{n,i}}{2}, \quad (9)$$

- T_n in (9) is the number of executed trades in partition n

3.4 Data Filters

Data is identified as erroneous and therefore discarded when reported in the wrong format (trade price or trade size that are non-numeric, non-positive, or in a format that deviates from the expected one). The range of possible data problems may extend beyond the mentioned cases.

With regard to the determination of the constituents' reference rates, for each constituent we further filter the input data according to the following procedure:

- If the constituent is traded in at least 3 eligible exchanges, for each partition we compute the volume-based median prices of each exchange. If the absolute percentage deviation of the median price of an exchange from the median price of the rest of all the exchanges is above 20%, the data of that exchange is considered anomalous and disregarded from the calculation.
- Constituents that are traded in fewer than 3 eligible exchanges, are subject to expert judgment in order to determine whether the market is sufficiently liquid and active, in order to prevent price manipulation.

The price associated to each partition will be calculated as the volume-based median price of all exchanges, except those excluded, through 8. The exclusion of data arising from any filter is reported to the CGCI Steering Committee.

3.5 Delayed and Missing Data

The transactions that cannot be retrieved by the Index calculation time are disregarded. If, for any cryptoasset, for any of the N partitions no transactions occur or can be retrieved for any exchange, that partition is disregarded for the calculation of the cryptoasset reference rate on that day and in formula 8 N diminishes by the number of partitions that are disregarded on that day. Any delay or absence of trade data is reported to the CGCI Steering Committee and the selected course of action is formally announced.

3.6 Delisted Constituents

Any cryptoasset that is expected to be suspended from the eligible exchanges is not considered eligible for selection in the next rebalancing date. There is typically a long notice for such events. However, in the unforeseen event of coin suspension before the rebalancing date, the constituent price does not contribute to the Index value. The coin is removed in the next available rebalancing date and fund managers tracking the Index may sell the remaining amount at their earliest convenience, contributing to excess returns over the base Index.

3.7 Stress Events

The calculation of the CGCI level is obstructed when there are no reported transactions or all transactions are rejected as suspicious on all of the eligible cryptoasset exchanges, or when no data is provided from the data provider, or due to any other unforeseen events.

In the event of failure of the data provider to deliver relevant data, the CGCI Steering Committee will do its best effort to determine relevant component prices from alternative providers that are readily available.

In this scenario, the CGCI price level will be based on the constituent prices determined by the CGCI Steering Committee.

If, for any cryptoasset, no transactions occur or can be retrieved for more than 3 consecutive business days, a Committee meeting will be called to determine the most appropriate action.

3.8 Rounding of Data

The following rounding of data are used for the Index calculation and publication:

- Prices are rounded to eight significant figures
- Weights are rounded to four decimal places
- Index levels are rounded to two decimal places

4 Index Governance

4.1 Administrator

Compass Financial Technologies is the Administrator of the Index ("the Index Administrator"). The Index Administrator is responsible for the day-to-day management of the Index and is also responsible for decisions regarding the interpretation of these rules.

4.2 Index Committees – Supervisor

Compass Financial Technologies has established governance functions to review and provide challenges on all aspects of the Index determination process. Governance functions are managed by the Compass Oversight Committee and by the CGCI Steering Committee.

Compass Oversight Committee:

The Compass Oversight Committee oversees all areas of the benchmark determination processes. It is responsible for supervising and controlling the Index operations team on all Compass Indices. It is also responsible for:

1. Periodic review of incidents
2. Making final decisions in case the Index operations team are not capable or allowed to take decisions
3. Defining and implementing organisation procedures for the Index operations team
4. Defining and overseeing measures that allow for mitigation of operational risks
5. Supervising internal or external audit results
6. The implementation and supervision of the potential codes of conduct that have to be implemented

The Committee is comprised of senior representatives of Compass Financial Technologies and external industry experts.

CGCI Steering Committee:

The CGCI Steering Committee is responsible for:

1. Determining the calculation methodology and the rules governing the publication of Index levels
2. Making periodic reviews of the Index to validate the robustness of the methodology and to analyse the impact of methodology changes
3. Organising consultation with Index stakeholders if necessary
4. Ensuring that the Index offers a reliable and representative view of the market

The CGCI Steering Committee is composed of members from CoinShares, Compass Financial Technologies and Imperial College London. The Committee may include individuals or representatives of companies, academics, external counsels, or market participants.

The CGCI Steering Committee assembles once a year in November. However, at the request of a member of the committee, the Index Committee may meet on any other day of the year to discuss potential "market emergency" and "force majeure" events or any other situation, which makes an extraordinary meeting necessary.

All Index Committee decisions will be published without delay following the Index Committee decision.

Index Committee members as of September 2021:

- James Butterfill, CoinShares
- Pierre Porthaux, CoinShares
- Guillaume Le Fur, Compass Financial Technologies
- Edouard Mouton, Compass Financial Technologies
- William J. Knottenbelt, Imperial College London

As of September 2021, James Butterfill chairs the Steering Committee.

4.3 Cases Not Covered in Rules

In cases which are not expressly covered in these rules, operational adjustments will take place along the lines of the aim of the Index. Operational adjustments may also take place if, in the opinion of the Index Administrator, it is desirable to do so to maintain a fair and orderly market in derivatives on this Index and/or this is in the best interests of the investors in products based on the Index and/or the proper functioning of the markets. The Index Administrator will report to the Supervisor if it took a decision about a case which is not specifically covered in the rules for comments and review.

5 Methodology Review and Changes

This methodology may be supplemented, amended in whole or in part, revised or withdrawn at any time. Supplements, amendments, revisions and withdrawals may also lead to changes in the way the Index is compiled or calculated or affect the Index in another way.

In the absence of exceptional circumstances affecting the Index calculation or methodology, the Index is reviewed annually in November to ensure that:

1. The Index continues to measure the market interest under consideration
2. The methodology and computation are in line with the original purpose of the Index
3. The quality and quantity of the input data remain sufficient

Changes will be subject to the review and approval of the CGCI Steering Committee which will receive all the information related to the change. In case of material changes, a notice will be provided at least two weeks in advance.

A change is considered material on the basis of its economic and financial impact and of its consistency with the original purpose of the Index and the market interest the Index measures. Changes made to the Index methodology or with computation parameters decided during the annual review are published after the review date and implemented on the first rebalancing date following the review.

The results of the CGCI Steering Committee will be published in a press release on Compass Financial Technologies and The CoinShares Group websites and distributed in a timely manner to data vendors and news sources.

6 Expert Judgment

The Index is based on written and transparent rules and procedures with the purpose of minimising as much as possible the exercise of discretion and expert judgment. The Index is built from input data that is not interpolated, extrapolated or adjusted. In case of lack of data, the last available data is employed.

Nevertheless, the exercise of expert judgment may become necessary in case of errors and Index restatements, delayed and missing data, hard forks, airdrops, or unexpected situations arising from market stress.

In the event that expert judgment is exercised, this will be done by resorting to the written procedures reported in the methodology and by communicating the decisions taken to the CGCI Steering Committee and the Internal Compliance Function in order to prevent conflicts of interest and to protect the integrity and the independence of the Index determinations. In addition, the interest of the Index users and the market integrity will be taken into account.

7 Errors and Index Restatements

Even though the process of Index calculation is completely automated and pre-defined, an error can be discovered after the publication of the Index.

In case of a material error the Index will be redetermined, and the Index clients will be notified about the error and the date of the publication of the redetermined Index. An error is considered material on the basis of its size, the dates of its discovery and of its occurrence, and the impact of the Index redetermination on the users. The discovery of any error is reported to The Committee.

In case a material error is discovered and The Administrator recognises a manipulation or an attempted manipulation of the Index level or the input data it will be reported to the regulator.

8 Limits

The issues presented in the following non-exhaustive list may limit the ability of the Index to represent the market it is intended to measure, the ease of replication by investors, and more generally the usefulness of the Index to users.

The Index level is computed following the rules outlined in this methodology, and these rules may limit the ability of the Index to represent the market it measures.

Different users may have different aims, and the Index is not necessarily suitable for the aim of each user.

The market the Index is meant to measure is volatile. In particular, cryptocurrencies may be subject to market movements much more than traditional asset classes such as stocks and bonds as a consequence of illiquidity, market trends and changes to market structure. Gold, despite being characterised by a volatility much lower than that of cryptocurrencies, may be subject to market movements as well.

The input data provider may fail to provide accurate and timely data.

Cryptocurrencies reference rates are derived from several trading venues, each of which is characterised by a different market structure, and the price of a cryptocurrency may sometimes be different across different trading venues.

In addition, cryptocurrency exchanges may suffer problems that usually do not affect regulated equity, bond and commodity exchanges, such as distributed denial-of-service, trading halt, hacking of private keys, lack of standards comparable to those of regulated exchanges, rapidly evolving technology, and uncertain legal frameworks.

The Index is computed only on business days, but cryptocurrencies are traded 24/7 every day of the year.

There may be uncertainty about the primary chain in case a hard fork takes place.

The present methodology may change and some users may not be reachable for notification before a change takes place.

Only USD prices and selected exchanges are employed, but cryptocurrencies are also traded with other currencies, with other cryptocurrencies, and across other exchanges.

Certain circumstances may require the exercise of discretion and expert judgment.

Finally, the publication of the Index may cease. Should this occur, the regulation regarding user transitions will be followed, but the existence of a suitable substitute is not assured.

9 Appendix 1 - CoinShares Gold and Bitcoin Index - (CGBI)

The CoinShares Gold and Bitcoin Index is a sub index of the CGCI. It follows exactly the same construction mechanisms as the CGCI except that the crypto-basket defined in section 2.4 is composed of Bitcoin only.

9.1 Calculation Frequency

The CGBI closing level is calculated and monitored by Compass Financial Technologies and is announced on each business day at 16:00 BST.

9.2 Index Distribution

The Index is published on The CoinShares Group website (www.coinshares.com) and the Compass Financial Technologies website (www.compassft.com) and is distributed to Bloomberg and Reuters under the ticker symbols COINCGBI and .COINCGBI, respectively.

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Glossary

Chain Reorganisation: A situation where a client discovers a new difficulty wise longest well-formed blockchain which excludes one or more blocks that the client previously thought were part of the canonical blockchain. When the network reaches global consensus, a reorganisation happens the nodes of the out-dated chain rid the recent and no-longer canonical blocks..

Covariance Matrix: A square, symmetric matrix whose element in the i, j position is the covariance between the i -th and j -th elements of an input vector.

Cryptoasset Constituent: A cryptoasset that is included in the Index selection of the crypto basket.

Cryptoassets: Cryptographically secured digital representations of value that can be transferred, stored or traded electronically.

Equally Weighted: A type of weighting that gives the same weight, or importance, to each stock in a portfolio or index fund.

ERC-20 Token: A technical standard used for smart contracts on the Ethereum blockchain for implementing tokens. ERC-20 tokens are issued on the Ethereum blockchain that are ERC-20 compliant.

Exchange: Platforms that allow customers to trade cryptoassets for other assets, such as conventional fiat money or other digital currencies.

Fiat Stablecoin: Cryptoassets pegged to a cryptocurrency, fiat money, or to exchange-traded commodities.

Hard Fork: A hard fork occurs when a change is made to the transaction validation rules of a cryptoasset's underlying blockchain protocol in a way that is not compatible with its earlier version.

Market Capitalisation: Calculated by multiplying the daily price of each cryptoasset constituent by its daily liquid supply.

Node: Any active device that maintains a copy of a blockchain and in some cases processes transactions. Each cryptoassets has its own nodes, maintaining the transaction records of that particular token.

Privacy-focused Coin: A type of cryptoasset that aims to ensure the privacy and anonymity of its users by concealing information about senders and receivers of transactions.

Risk Parity: A portfolio allocation strategy that focuses on allocation of risk rather than allocation of capital, typically subject to the constraint that each asset contributes equally to the portfolio overall volatility.