



Coin Metrics Prices Methodology

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Contents

1	Introduction	2
2	Other Documents	2
3	Data Inputs	2
3.1	Trusted Exchange Framework	3
3.2	Generation of Candidate Markets	4
3.3	Selection of Constituent Markets	5
4	Reference Rates Calculation Methodology	7
4.1	Coverage Universe	7
4.2	Calculation Algorithm for Daily and Hourly Frequencies	7
4.3	Data Contingency Rules for Daily and Hourly Frequencies	8
4.4	Calculation Algorithm for Real-Time Frequencies	8
4.5	Data Contingency Rules for Real-Time Frequencies	9
5	Principal Market Prices Calculation Methodology	10
5.1	Fair Market Valuation Background	10
5.2	Coverage Universe	11
5.3	Calculation Algorithm	11
6	Data Exclusion Rules	12
7	Appendix A	12
8	Appendix B	32
9	Change Log	34

1 Introduction

Coin Metrics publishes a collection of prices for a set of cryptocurrencies and fiat currencies consisting of the Coin Metrics Reference Rates (“CM Reference Rates”) and the Coin Metrics Principal Market Prices (“CM Principal Market Prices”), which are collectively referred to as the Coin Metrics Prices (“CM Prices”). This document describes the data inputs, calculation methodologies, and data exclusion rules for the CM Prices.

The CM Reference Rates are published once a day, once an hour, once a minute, once a second, and once every 200 milliseconds and utilize volume-weighted median, time-weighted average, and inverse price variance-weighted median techniques. Common use cases for the CM Reference Rates include research, back-testing, calculating net asset value for investment funds, serving as a data source for on-chain price oracles, risk management, and indicative intraday values.

The CM Principal Market Prices are published once a day, once an hour, once a minute, and once a second and adhere to the guidelines regarding fair value measurement issued by the International Financial Reporting Standards and the Association of International Certified Professional Accountants, specifically standards IFRS 13 and FASB ASC 820. The Principal Market Prices identify a principal market for each asset and utilize the most recent price from this market. Common use cases are for fair value measurement and preparing financial statements.

The CM Prices are designed to serve as a set of transparent and independent pricing sources that promote the functioning of efficient markets, reduce information asymmetries among market participants, facilitate trading in standardized contracts, and accelerate the adoption of cryptocurrencies as an asset class with the highest standards. The CM Prices are calculated using robust and resilient methodologies that are resistant to manipulation.

2 Other Documents

The CM Prices are collectively governed by policies described in [Coin Metrics Prices Policies](#) which describes the administration, conflicts of interest, material changes, recalculations, internal controls, complaints, record retention, and compliance policies.

3 Data Inputs

Coin Metrics evaluates markets traded on digital asset exchanges as input data sources for the CM Prices using a three step process. The first step relates to how to quantify an exchange’s trustworthiness to be used in subsequent steps.

The second step relates to how to generate a universe of candidate constituent markets that are eligible for selection as constituent markets. The third step relates to how to select a unique set of high-quality constituent markets for each instrument.

Coin Metrics produces a unique set of selected markets for each asset in the coverage universe on a quarterly basis and during interim periods if market conditions warrant. Such market conditions include, but are not limited to, material changes in an exchange’s solvency risk, material changes in the degree of free capital flows in and out of an exchange, the presence of long-lasting price differences from other exchanges, and times of market stress.

3.1 Trusted Exchange Framework

Trading in cryptocurrencies can occur at several hundred centralized or decentralized exchanges. The process of selecting constituent markets for calculating the price of a given cryptocurrency becomes highly challenging due to the large number of eligible exchanges. The difficulty is further compounded by the fact that some cryptocurrency exchanges engage in deceptive practices to manipulate their reported trading activity, such as facilitating or engaging in trades between the same party to artificially boost price, liquidity or interest (known as wash trading).

To address this issue, the CM Prices relies upon the Coin Metrics Trusted Exchange Framework to quantify the trustworthiness of an exchange. The Trusted Exchange Framework assesses exchanges using several criteria that represent the fundamental properties of exchange trustworthiness: transparency, resilience & security, data quality, regulatory compliance, and API quality. The criteria examine public information about an exchange such as incident history, financial statements, and license disclosure as well as market activity that can be derived from an exchange’s data.

The Coin Metrics Trusted Exchange Framework assigns a numerical rating ranging to an exchange for each category as well as an overall numerical rating for each exchange. The numerical rating ranges from 0.00 to 1.00. The numerical rating is transformed into a letter rating ranging from A to D. A letter rating of A indicates that the exchange excels in most or all of the factors assessed and a letter rating of D indicates that the exchange scores poorly across most of the factors assessed.

The CM Prices uses the overall numerical rating for each exchange in subsequent steps. If a centralized exchange is not evaluated in the Coin Metrics Trusted Exchange Framework, the numerical rating for the exchange defaults to 0.00. If a decentralized exchange is not evaluated in the Coin Metrics Trusted Exchange Framework, the numerical rating for the exchange defaults to 0.10.

3.2 Generation of Candidate Markets

The set of candidate markets for each asset in the coverage universe is determined by the following set of rules:

1. If the asset is Bitcoin or Ethereum, the candidate markets are spot markets on Coin Metrics' exchange coverage universe where the base asset is Bitcoin or Ethereum, respectively, and the quote asset is U.S. dollars.
2. If the asset is Tether or USD Coin, the candidate markets are (1) spot markets on Coin Metrics' exchange coverage universe where the base asset is Tether or USD Coin, respectively, and the quote asset is U.S. dollars, and (2) spot markets on Coin Metrics' exchange coverage universe where the base asset is Bitcoin or Ethereum and the quote asset is Tether or USD Coin, respectively. The logic to generate candidate markets for Tether differs from other assets because market convention sets Tether as the quote asset for the majority of active markets.
3. If the asset is a cryptocurrency that is not a stablecoin, the candidate markets are spot markets on Coin Metrics' exchange coverage universe where the base asset is the given cryptocurrency and the quote asset is either U.S. dollars, Bitcoin, Ethereum, Tether, USD Coin, or Wrapped Ether.
4. If the asset is a stablecoin, the candidate markets are (1) spot markets on Coin Metrics' exchange coverage universe where the base asset is the stablecoin and the quote asset is U.S. dollars, Tether, USD Coin, or Wrapped Ether and (2) spot markets on Coin Metrics' exchange coverage universe where the base asset is Bitcoin or Ethereum and the quote asset is the stablecoin. The logic to generate candidate markets for stablecoins differs from other spot assets because market convention sets stablecoins as the quote asset for the majority of active markets. The following assets in the coverage universe are considered to be stablecoins:

Name	Ticker
Tether	usdt
TrueUSD	tusd
USD Coin	usdc
Paxos Standard	pax
Gemini Dollar	gusd
Binance USD	busd
Dai	dai
BIDR	bidr
sUSD	susd
Wrapped Ether	weth

Name	Ticker
Brazilian Digital Token	brz
TerraClassicUSD	ust
Pax Dollar	usdp
USDD	usdd
EURC	euroc
Lido Staked ETH	steth
poundtoken	gbpt
Terra 2.0	luna2
First Digital USD	fdusd

5. If the asset is a fiat currency, the candidate markets are (1) spot markets on Coin Metrics’ exchange coverage universe where the base asset is the fiat currency and the quote asset is U.S. dollars, Tether, USD Coin, or Wrapped Ether and (2) spot markets on Coin Metrics’ exchange coverage universe where the base asset is Bitcoin or Ethereum and the quote asset is the fiat currency. The logic to generate candidate markets for fiat currencies differs from other spot assets because market convention sets fiat currencies as the quote asset for the majority of active markets. The following assets in the coverage universe are considered to be fiat currencies:

Name	Ticker
Euro	eur
British Pound	gbp
Japanese Yen	jpy
Canadian Dollar	cad
Korean won	krw
Russian Ruble	rub
Ukrainian Hryvnia	uah
Turkish Lira	try
Australian Dollar	aud
Brazilian Real	brl
Swiss Franc	chf
Singapore Dollar	sgd

3.3 Selection of Constituent Markets

For each asset in the coverage universe, a unique set of constituent markets are selected from the set of candidate markets. The set of constituent markets are determined by the following set of rules:

1. For each candidate market, calculate the average daily volume in U.S. dollars for the previous 90 days. If the constituent market is quoted in an asset other than U.S. dollars, the average daily volume is converted to U.S. dollars using the Coin Metrics Reference Rate.
2. If a candidate market is on a centralized exchange, exclude the candidate market if it has a volume market share of less than 1 percent, where the volume market share is calculated as the average daily volume in U.S. dollars described above.
3. If a candidate market is on a decentralized exchange, exclude the candidate market if it has a volume market of less than 5 percent, where the volume market share is calculated as the average daily volume in U.S. dollars described above.
4. For each candidate market, calculate the volume-weighted average price in U.S. dollars using the most recent 24 hour period beginning at 00:00:00.000000 UTC time and ending at 23:59:59.999999 UTC. If the constituent market is quoted in an asset other than U.S. dollars, the volume-weighted average price is converted to U.S. dollars using the Coin Metrics Reference Rate.
5. Exclude the candidate market if the absolute value of the volume-weighted average price in U.S. dollars exceeds 3 percent from the median volume-weighted average price in U.S. dollars, where the median is calculated using the volume-weighted average price in U.S. dollars for all candidate markets for the asset.
6. Sort the remaining candidate markets by quote asset using the following order: U.S. dollars, Bitcoin, Ethereum, USD Coin, Tether, Wrapped Ether. All other quote assets, if they exist, are sorted at the end. Within each grouping of quote asset, sort in descending order the candidate markets by each candidate market's exchange score from the Coin Metrics Trusted Exchange Framework.
7. Select a candidate market as a constituent market if the candidate market is ranked within the top six according to the sorting described above.
8. Also select a candidate market as a constituent market if the candidate market meets the following criteria: (1) the candidate market is ranked within the top 10 according to the sorting described above, and (2) the candidate market has a volume market share greater than 20 percent.
9. If the above rules result in zero constituent markets, then the constituent markets are selected using expert judgment.

4 Reference Rates Calculation Methodology

The CM Reference Rates represent the reference rate of one unit of the asset quoted in U.S. dollars or other currency. The CM Reference Rates supports multiple frequencies. The daily and hourly frequencies utilize one calculation methodology and the minute, second, and 200 millisecond frequencies (“real-time frequencies”) utilize a separate calculation methodology. The daily and hourly frequencies are calculated at the end of every hour and day, respectively, (the “Calculation Time”) and are published within 5 minutes (the “Publication Time”). The real-time frequencies are published in real-time with no delay.

4.1 Coverage Universe

The set of assets included in the CM Reference Rates coverage universe are included in Appendix A.

4.2 Calculation Algorithm for Daily and Hourly Frequencies

The calculation algorithm of the CM Reference Rates for daily and hourly frequencies is described below.

1. All observable transactions from Constituent Markets are combined and partitioned into time intervals, with each time interval spanning a period of one minute. The first one-minute time interval begins 60 minutes before the Calculation Time and the last one-minute time interval begins at the Calculation and ends one minute after the Calculation Time. In total, the calculation period spans a period of 61 minutes (the “Observation Window”). A total of 61 one-minute time intervals are created.
2. The price of each observable transaction for one unit of the given asset is converted to U.S. dollars if necessary using the Reference Rates calculated for Bitcoin (BTC), Ethereum (ETH), USD Coin (USDC), or Tether (USDT).
3. The volume-weighted median price (VWMP) of each time interval is calculated. The volume-weighted median rate is calculated by ordering the transactions from lowest to highest price, taking the cumulative sum of volumes of these transactions, and identifying the price associated with the trades at the 50th percentile of volume measured in native units.
4. The time-weighted average price (TWAP) of the 61 time intervals is calculated using a custom weight function. The weight function assigns a weight of 0 percent to the first time interval, subsequent time intervals are

assigned a weight that increases linearly, and the last two time intervals are assigned a weight of 5 percent such that the sum of all weights equals 100 percent. The weight function assigns more weight to time slices that are closer to the Calculation Time. The resulting figure is the published reference rate.

The weights for each time interval are listed in Appendix B:

4.3 Data Contingency Rules for Daily and Hourly Frequencies

The following contingency rules are followed to address situations where data is delayed, missing, or unavailable due to periods of illiquidity, extraordinary market circumstances, or outside factors beyond the control of Coin Metrics.

1. If observable transactions from a constituent market are unable to be collected due to technical problems specific to the constituent market's exchange during the calculation of a reference rate, the observable transactions from the constituent market are not included in the calculation of the specific instance of the given reference rate.
2. If no observable transactions from constituent markets occur during the first one-minute time interval, the next one-minute time interval's volume-weighted median price is used as the volume-weighted median price. This contingency rule is applied recursively if necessary.
3. If no observable transactions from constituent markets occur during any one-minute time intervals, excluding the first and last one-minute time intervals in the Calculation Window, the next one-minute time interval's volume-weighted median price is used as the volume-weighted median price. This contingency rule is applied recursively if necessary.
4. If no observable transactions from constituent markets occur during the last one-minute time interval, the previous time interval's volume-weighted median price is used as the volume-weighted median price. This contingency rule is applied recursively if necessary.
5. If no observable transactions from constituent markets exist during the Calculation Period for a reference rate, the reference rate will be determined to equal the previous hourly reference rate in which there were trades during that hour's Observation Window.

4.4 Calculation Algorithm for Real-Time Frequencies

The calculation algorithm of the CM Reference Rates for the real-time frequencies is described below.

1. Calculate the volume denominated in units of the given asset from observable transactions that occurred over the trailing 60 minutes for each of the Constituent Markets. Calculate the volume weight for each of the Constituent Markets by dividing the volume figure for each of the Constituent Markets by the total volume across all Constituent Markets. The resulting figure is referred to as the volume weight.
2. Convert the trade price of all observable transactions over the trailing 60 minutes for each of the Constituent Markets to U.S. dollars if necessary using the Real-Time Reference Rate calculated for Bitcoin (BTC), Ethereum (ETH), USD Coin (USDC), or Tether (USDT). Calculate the inverse variance of the trade price converted to U.S. dollars for each of the Constituent Markets using the population mean in the calculation of variance, where the population mean is defined as the mean price of all trades from Constituent Markets over the trailing 60 minutes. If a Constituent Market has an infinite or undefined inverse price variance, the inverse price variance for that Constituent Market is set to zero. Calculate the inverse price variance weight for each of the Constituent Markets by dividing the inverse price variance by the total inverse price variance across all Constituent Markets. The resulting figure is referred to as the inverse price variance weight.
3. Calculate the final weight for each of the Constituent Markets by taking a mean of the volume weight and the inverse price variance weight.
4. Extract the most recent observable transaction from each of the Constituent Markets. Convert the trade price of the most recent observable transactions to U.S. dollars if necessary using the Reference Rate calculated for Bitcoin (BTC), Ethereum (ETH), USD Coin (USDC), or Tether (USDT).
5. Calculate the weighted median price of the most recent observable transactions using the prices calculated in step 4 and the final weights calculated in step 3. The weighted median price is calculated by ordering the transactions from lowest to highest price, and identifying the price associated with the trades at the 50th percentile of final weight. The resulting figure is the published reference rate for the given asset.

4.5 Data Contingency Rules for Real-Time Frequencies

The following contingency rules are followed to address situations where data is delayed, missing, or unavailable due to periods of illiquidity, extraordinary market circumstances, or outside factors beyond the control of Coin Metrics.

1. If observable transactions from a constituent market are unable to be collected due to technical problems specific to the constituent market's

exchange during the calculation of a real-time reference rate, the observable transactions from the constituent market are not included in the calculation of the specific instance of the given real-time reference rate.

2. If no observable transactions from constituent markets exist during the trailing 60 minutes, the value of the real-time reference rate will be determined to equal the value calculated during the previous second.

5 Principal Market Prices Calculation Methodology

The Principal Market Prices are published once per second, every day of the year, and represent the price of one unit of the asset quoted in U.S. dollars.

5.1 Fair Market Valuation Background

The Principal Market Prices were developed taking into account the requirements of IFRS 13 and FASB ASC 820 accounting guidelines defining what a Principal Market is and how it should be selected. These guidelines also allow for additional controls to verify the market is active and trades are orderly.

As Coin Metrics already provides the CM Reference Rates methodology to price cryptocurrencies which we believe to be robust and stable, it is worth briefly describing the philosophy behind producing the Principal Market Prices to supplement the reference rates. The first and most significant criteria is that certain regulatory agencies require a methodology consistent with the aforementioned accounting principles. These principles clearly describe the preferred “fair market value” calculation as one which identifies a Principal Market by trade volume and tracks executed trades in that market.

Beyond external requirements, the benefits for a Principal Market Prices methodology are that it is clearly defined and auditable. The price is always taken from a single market, which tends to remain constant, and can easily be traced and verified for a given time stamp. We minimize computations being done on the price, which reduces the likelihood of unforeseen behavior. Additionally, the trades are always taken from the exchange where the most of the activity occurs, which is a characteristic users are interested in.

Like all things in life, this comes with some trade offs. Our CM Reference Rates look for a central tendency among several markets. In some cases this can avoid volatility and the presence of outliers if the Principal Market Prices deviate from the global average, but it also means that the final price may be taken from comparatively insignificant market where the price is between the prices of markets of larger volume. With these trade-offs in mind, our methodology

seeks to err on the side of trusting the largest market by volume of trades and only excludes a market in extreme situations.

We also attempt to avoid numerical comparisons of the price between markets in the methodology, in order to minimize the possibility that a price anomaly in another market could affect the calculation. Our CM Reference Rates by contrast choose to combine multiple markets to identify a more stable price representative of the global environment.

5.2 Coverage Universe

The set of assets included in the Principal Market Prices coverage universe are included in Appendix A.

5.3 Calculation Algorithm

The calculation algorithm of the Principal Market Prices is described below.

1. Consider the list of Constituent Markets selected by the Market Selection Framework.
2. Identify any inactive markets, and exclude all trades associated with the inactive market. A market is considered inactive if it meets the following conditions: (1) The last trade was more than 1-minute ago and the last trade was either: longer than 10 minutes from the calculation time or longer than $100 * [\text{mean trade interval}]$, (2) The mean trade interval is defined as the the average of all intervals between sequential trades in the window 0 to 60 minutes before the calculation time. For example, if trades occur at timestamps [00:02, 00:12, 00:37, 01:15], the mean trade interval will be `mean([10 seconds, 25 seconds, 38 seconds]) = 23.3 seconds`.
3. If there are no active markets, then the Principal Market Price will forward-fill the last non-null value available.
4. Check if any trades in the markets are not considered orderly (IFRS 13.B37-B38). Exclude any non-orderly trades from the calculation. This is accomplished by examining the window 60 to 120 minutes before the calculation time to calculate a reference standard deviation of prices in each market separately. If there are insufficient trades to calculate a standard deviation, then all trades are considered orderly (i.e. no trades are dropped if there is sparse data).
5. We then partition the calculation window 0 to 60 minutes before the calculation time into 60 one-minute time intervals and calculate how far each trade is from the mean price of trades from that market in the one-minute time interval the trade resides in.

6. Finally, we exclude trades that occur more than three reference standard deviations from the mean price of trades within a particular one-minute time interval. We require at least five trades occur in a particular one-minute time interval in order to exclude trades. The two parameters (3 reference deviations and 5 trades) may be adjusted in the future.
7. Identify the active market with the largest volume of orderly trades in the calculation window 0 to 60 minutes before the calculation time. This will serve as the Principal Market (IFRS 13.16, FASB ASC 820-35-5).
8. Use the most recent orderly trade from the Principal Market and publish its price as the Principal Market Price.

6 Data Exclusion Rules

All observable transactions from constituent markets are evaluated using a systematic data quality control process. If potential errors or anomalies in the data are detected, the exercise of expert judgment will be applied to determine if the potentially erroneous data is included in the calculation of the price. The exercise of expert judgment in this circumstance is used to determine if the potentially erroneous data reflects observable transactions that are entered into at arm's length between buyers and sellers and constitute an active market in the underlying asset, whether the observable transactions in question are formed by the competitive forces of supply and demand, and whether the observable transactions in question are a credible indicator of executable prices in the underlying asset. The exercise of expert judgment may include adding or removing markets from the set of constituent markets for a particular asset.

An investigation into the causes of the potential error, including whether any price deviations are specific to the exchange itself, is conducted. Any exercise of expert judgment is subject to dual approval by staff members, and is logged and reported to the Oversight Committee which periodically reviews the application of expert judgment to ensure consistency.

7 Appendix A

The following table lists the current coverage universe:

Name	Ticker
Bitcoin	btc
Bitcoin Cash	bch
Litecoin	ltc
Euro	eur

Name	Ticker
XRP	xrp
Ethereum	eth
Ethereum Classic	etc
British Pound	gbp
Zcash	zec
Monero	xmr
Dash	dash
Japanese Yen	jpy
IOTA	miota
EOS	eos
OMG Network	omg
Neo	neo
Metaverse ETP	etp
Qtum	qtum
Aventus	avt
Bitcoin Gold	btg
Streamr	data
QASH	qash
Status	snt
Basic Attention Token	bat
Decentraland	mana
FUNToken	fun
0x	zrx
TRON	trx
iExec RLC	rlc
Augur	rep
aelf	elf
IOST	iost
Request	req
Loopring	lrc
WAX	waxp
Aragon	ant
Mithril	mith
Storj	storj
Stellar	xlm
Verge	xvg
Lympo	lym
Maker	mkr
VeChain	vet
Kyber Network Crystal	knc
xMoney	utk
Ripio Credit Network	rcn_ripiocreditnetwork
Polymath	poly
Fusion	fsn

Name	Ticker
Cortex	ctxc
Zilliqa	zil
Bancor	bnt
MonaCoin	mona
NEM	xem
BNB	bnb
Gas	gas
Tether	usdt
OAX	oax
district0x	dnt
Waltonchain	wtc
SONM	snm
Chainlink	link
Moeda Loyalty Points	mda
Metal DAO	mtl_metal
AirSwap	ast
Viberate	vib
Powerledger	powr
Ark	ark
Enjin Coin	enj
Komodo	kmd
NULS	nuls
AirDAO	amb
Quantstamp	qsp
BitShares	bts
Lisk	lsk
Etherparty	fuel
Bitcoin Diamond	bcd
AdEx	adx
Cardano	ada
Waves	waves
ICON	icx
PIVX	pivx
OST	ost
Civic	cvc
Steem	steem
Nano (New)	nano
Bluzelle	blz
Aeternity	ae
Ontology	ont
Wanchain	wan
Syscoin	sys
Ardor	ardr
Holo	hot_holo

Name	Ticker
Loom Network	loom
Bytecoin	bcn
TrueUSD	tusd
Horizen	zen
Theta Network	theta
IoTeX	iotx
QuarkChain	qkc
SelfKey	key
Siacoin	sc
Nebulas	nas
Dent	dent
Dock	dock
Gnosis	gno
Canadian Dollar	cad
Enzyme	mln
Dogecoin	doge
Bytom	btm
BitKan	kan
Arcblock	abt
ACENT	ace
Achain	act
Auto	auto
CyberVein	cvt
Decred	dcr
DigiByte	dgb
InsurAce	insur
Cred	lba
Measurable Data Token	mdt
NAGA	ngc
TenX	pay
Revain	rev
Ren	ren
SwiftCoin	swftc
TokenClub	tct
Nxt	nxt
VITE	vite
Odyssey	ocn
Huobi Token	ht
Elastos	ela
WaykiChain	wicc
SIRIN LABS Token	srn
DeepBrain Chain	dbc
Propy	pro
Open Campus	edu

Name	Ticker
Bibox Token	bix
HyperCash	hc_hypercash
MaidSafeCoin	maid
Amp	amp
Chrono.tech	time
Pluton	plu
Tezos	xtz
Stacks	stx
Ignis	ignis
Atletico De Madrid Fan Token	atm
PolySwarm	nct
Kin	kin
IndiGG	indi
Wilder World	wild
OriginTrail	trac
Nexo	nexo
Telcoin	tel
Cryptex Finance	ctx
Berry	berry
Crypterium	crpt
IHT Real Estate Protocol	iht
VeThor Token	vtho
DxChain Token	dx
CEEK VR	ceek
Carry	cre
Oxygen	oxy
UNUS SED LEO	leo
Vertcoin	vtc
Game.com	gtc_gamecom
MediBloc	med
Creditcoin	ctc
NKN	nkn
Callisto Network	clo
Uquid Coin	uqc
Korean won	krw
IQ	iq
Ravencoin	rvn
LBRY Credits	lbc
ReddCoin	rdd
Unbound	unb
Memecoin	meme
Numeraire	nmr
Russian Ruble	rub
Ukrainian Hryvnia	uah

Name	Ticker
Turkish Lira	try
Australian Dollar	aud
BOB	bob
Brazilian Real	brl
Swiss Franc	chf
Ethernity	ern
Mantle	mnt
Ronin	ron
Singapore Dollar	sgd
OpenDAO	sos
Dragonchain	drgn
Kleros	pnk
USD Coin	usdc
KuCoin Token	kcs
Paxos Standard	pax
Gemini Dollar	gusd
Constellation	dag
Nimiq	nim
GoChain	go
Electroneum	etn
Bitcoin SV	bsv
Artificial Liquid Intelligence	ali
MXC	mxo
Livepeer	lpt
RSK Infrastructure Framework	rif
v.systems	vsys
Grin	grin
Lambda	lamb
Dora Factory	dora
Beam	beam
Unibright	ubt
Only1	like
FTX Token	ftt
Kryll	krl
Fetch.ai	fet
Ontology Gas	ong__ontologygas
Ankr	ankr
Quant	qnt
SOLVE	solve
Aergo	aergo
Circuits of Value	coval
Cronos	cro
Cosmos	atom
Orbs	orbs

Name	Ticker
Theta Fuel	tfuel
BORA	bora
Function X	fx
IRISnet	iris
Celer Network	celr
ABBC Coin	abbc
Verasity	vra
Wrapped Bitcoin	wbtc
Polygon	matic
Litentry	lit
Fantom	ftm
Algorand	algo
Dusk	dusk
XYO	xyo
Ocean Protocol	ocean
Celsius	cel
RFOX	rfox
Synthetix	snx
ThunderCore	tt
MovieBloc	mb1
Reserve Rights	rsr
STP	stpt
Harmony	one_harmony
ARPA	arpa
Phoenix	phb
WINKLink	win_wink
Binance USD	busd
Dai	dai
Tether Gold	xaut
PAX Gold	paxg
OKB	okb
Hedera	hbar
Nervos Network	ckb
Solar	sxp
Terra Classic	luna
Chiliz	chz
ROOBEE	roobee
Orchid	oxt
LCX	lcx
Nahmii	nii
WazirX	wrx
Band Protocol	band
Kusama	ksm
Hive	hive

Name	Ticker
GateToken	gt
Kava	kava
MX TOKEN	mx
Arweave	ar
Compound	comp
Keep Network	keep
Origin Protocol	ogn
Render Token	rndr
Contentos	cos
PERL.eco	perl
TROY	troy
DREP	drep
LTO Network	lto
COTI	coti
Solana	sol
Cartesi	ctsi
Chromia	chr
StormX	stmx
BIDR	bidr
Polkadot	dot
Celo	celo
Filecoin	fil
XCAD Network Play	play
sUSD	susd
AVA	ava
Wirex Token	wxt
Syntropy	noia
VIDT DAO	vidt
Akropolis	akro
Ampleforth	ampl
Newscrypto	nwc
Bepro	bepro
SENSO	senso
XDB CHAIN	xdb
Sylo	sylo
WOM Protocol	wom
KardiaChain	kai
Energy Web Token	ewt
Wrapped Ether	weth
yearn.finance	yfi
UMA	uma
Avalanche	avax
BOSagora	boa
JUST	jst

Name	Ticker
Bifrost	bfc
Brazilian Digital Token	brz
DEAPcoin	dep
DIA	dia
FIO Protocol	fio
ForTube	for
Green Satoshi Token	gst
Helium	hnt
IDEX	idex
Kadena	kda
Klaytn	klay
MUX Protocol	mcb
MiL.k	mlk
mStable Governance Token: Meta (MTA)	mta
Meter Stable	mtr
Meter Governance	mtrg
NEST Protocol	nest
MANTRA	om
Orion	orn
Polygon Ecosystem Token	pol
Prom	prom
PARSIQ	prq
Rocket Pool	rpl
THORChain	rune
ShareToken	shr
Sologenic	solo
Sperax	spa
Serum	srn
SUKU	suku
tBTC	tbtc
Polytrade	trade
Tellor	trb
BiLira	tryb
UFO Gaming	ufo
Curve DAO Token	crv
Velas	vlx
Wrapped NXM	wnxm
XPR Network	xpr
DFI.Money	yfi
Balancer	bal
SushiSwap	sushi
Swerve	swrv
Cream Finance	cream
Sun Token	sun

Name	Ticker
MultiversX	egld
Uniswap	uni
Alchemy Pay	ach
Aleph.im	aleph
Bella Protocol	bel
dForce	df
Frontier	front
Klever	klv
TrustSwap	swap
Toncoin	ton
TerraClassicUSD	ust
Handshake	hns
Ultra	uos
BakeryToken	bake
BurgerCities	burger
Aavegotchi	ghst
New BitShares	nbs
Rarible	rari
Velo	velo
Aave	aave
PancakeSwap	cake
DODO	dodo
Harvest Finance	farm
Polkastarter	pols
RioDeFi	rfuel
Secret	scrt
Venus	xvs
Core	core
Dego Finance	dego
Ergo	erg
MATH	math
NEAR Protocol	near
DeFiChain	dfi
Audius	audio
Axie Infinity	axs
Conflux	cfx
Shentu	ctk
Celo Dollar	cusd
Kava Lend	hard
Hyve	hyve
Injective	inj
Keep3rV1	kp3r
Oasys	oas
Smooth Love Potion	slp

Name	Ticker
StaFi	fis
Flamingo	flm
Oasis Network	rose
TrueFi	tru
Unifi Protocol DAO	unfi
Golem	glm
Hegic	hegic
API3	api3
Badger DAO	badger
COVER Protocol	cover
Firo	firo
MobileCoin	mob
Synapse	syn
Virtua	tvk
The Graph	grt
1inch	1inch
Stella	alpha
OctoFi	octo
saffron.finance	sfi
Perpetual Protocol	perp
AS Roma Fan Token	asr
BarnBridge	bond
CUDOS	cudos
DeXe	dexe
Bonfida	fida
Frax	frax
Frax Share	fxs
Hydra	hydra
Juventus Fan Token	juv
Linear	lina
Mdex	mdx
Mirror Protocol	mir
OG Fan Token	og
OKT Chain	okt
Marlin	pond
Paris Saint-Germain Fan Token	psg
REVV	revv
Rook	rook
Trust Wallet Token	twt
ZKSpace	zks
Huobi BTC	hbtc
Flow	flow
Stratis	strax
VAIOT	vai

Name	Ticker
Reef	reef
Bitcoin Standard Hashrate Token	btctst
The Sandbox	sand
SafePal	sfp
SKALE	skl
Phala Network	pha
WOO Network	woo
Raydium	ray
AC Milan Fan Token	acm
Akash Network	akt
Alchemix	alcx
Alpha Quark Token	aqt
Forj	bondly
DAO Maker	dao
Dypius	dyp
Inverse Finance	inv
MAPS	maps
Mask Network	mask
Muse	muse
NFTX	nftx
Oraichain	orai
Pando	pando
PolkaBridge	pbr
Prosper	pros
BENQI	qi
Radworks	rad
Rally	rly
SuperVerse	super
Tornado Cash	torn
AIOZ Network	aioz
Alpaca Finance	alpaca
Anchor Protocol	anc
Boson Protocol	boson
Convergence	conv
DSLAs Protocol	dsla
Fei USD	fei
Fire Protocol	fire
Flux	flux
Franklin	fly
Galxe	gal
Illuvium	ilv
JasmyCoin	jasmy
Konomi Network	kono
Polkacity	polc

Name	Ticker
Pastel	psl
Rai Reflex Index	rai
Strike	strk
Alien Worlds	tlm
Tribe	tribe
Curate	xcur
Symbol	xym
Internet Computer	icp
Shiba Inu	shib
FC Barcelona Fan Token	bar
SpookySwap	boo
Somnium Space Cubes	cube
Dogelon Mars	elon
EasyFi	ez
Ampleforth Governance Token	forth
Gitcoin	gtc
Hot Cross	hotcross
Ispolink	isp
Kishu Inu	kishu
Liquity	lqty
Media Network	media
APENFT	nft
Origin Dollar	ousd
QuickSwap (Old)	quick
Songbird	sgb
Step Finance	step
Standard	stnd
Telos	tlos
Persistence	xprt
Liquity USD	lud
Lido DAO	ldo
Baby Doge Coin	babydoge
BitDAO	bit
Coin98	c98
Ternoa	caps
Celo Euro	ceur
Centrifuge	cfg
Tranchess	chess
CLV	clv
Covalent	cqt
Cratos	crt
Convex Finance	cvx
DeRace	derc
Dvision Network	dvi

Name	Ticker
EPIK Prime	epik
Gala	gala
Goldfinch	gfi
GAMEE	gmee
Metahero	hero
IAGON	iag
Karura	kar
Lithium	lith
MOBOX	mbox
Mango	mngo
Moonriver	movr
Orbit Chain	orc
PlayDapp	pla
Pangolin	png
Qredo	qrdo
RadioCaca	raca
SuperRare	rare
Router Protocol	route
Saitama	saitama
SingularityDAO	sdao
Shiden Network	sdn
Seedify.fund	sfund
Solanium	slim
SOMESING	ssx
StarLink	starl
Wing Finance	wing
Wrapped NCG	wncg
Avalaunch	xava
XCAD Network	xcad
eCash	xec
Yield Guild Games	ygg
Yield App	yld
Unizen	zcx
Pax Dollar	usdp
My Neighbor Alice	alice
ASD	asd
XDC Network	xdc
Mina	mina
Adventure Gold	agld
Star Atlas DAO	polis
dYdX	dydx
Spell Token	spell
Angle	angle
Ariva	arv

Name	Ticker
Assemble Protocol	asm
AstroSwap	astro
Star Atlas	atlas
Aurory	aury
Beta Finance	beta
Bloktopia	blok
BinaryX	bnx
Braintrust	btrst
Manchester City Fan Token	city
Clearpool	cpool
DOSE	dose
EQIFI	eqx
FLOKI	floki
Gods Unchained	gods
GooseFX	gofx
Highstreet	high
Popsicle Finance	ice
JOE	joe
S.S. Lazio Fan Token	lazio
Doge Killer	leash
Moss Carbon Credit	mco2
Marinade Staked SOL	msol
Nakamoto Games	naka
Opulous	opul
Orca	orca
Pendle	pendle
Port Finance	port
Ribbon Finance	rbn
Samoyedcoin	samo
Saber	sbr
ssv.network	ssv
Strips Finance	strp
Tokemak	toke
Vega Protocol	vega
VEMP	vemp
Wrapped Centrifuge	wcfg
X World Games	xwg
Cere Network	cere
Mines of Dalarnia	dar
Ethereum Name Service	ens
GM Wagmi	gm
GYEN	gyen
Immutable	imx
Jet Protocol	jet

Name	Ticker
KOK	kok
Magic Internet Money	mim
O3 Swap	o3
FC Porto Fan Token	porto
ParaSwap	psp
SHILL Token	shill
Alkimi	ads
Aurora	aurora
Binance Beacon ETH	beth
Boba Network	boba
Everscale	ever
Merit Circle	mc
Maple	mpl
Connex Network	next
Numbers Protocol	num
ConstitutionDAO	people
Santos FC Fan Token	santos
Symbiosis	sis
TRVL	trvl
Wrapped liquid staked Ether 2.0	wsteth
BitTorrent (new)	bttc
Vulcan Forged PYR	pyr
Radix	xrd
Tether EURt	eurt
SPACE ID	id
Casper	cspr
Automata Network	ata
PlatON	lat
ApeCoin	ape
LooksRare	looks
Moonbeam	glmr
Tulip Protocol	tulip
Osmosis	osmo
STEPN	gmt
Biconomy	bico
Alpine F1 Team Fan Token	alpine
Astar	astr
Biswap	bsw
PowerPool	cvp
Decentralized Social	deso
Gari Network	gari
Index Cooperative	index
UNKJD	mbs
Multichain	multi

Name	Ticker
Optimism	op
REI Network	rei
SHPING	shping
Stargate Finance	stg
Umee	umee
Voxies	voxel
Zebec	zbc
Acala Token	aca
Bounce Token	auction
Eden	eden
Ellipsis	epx
Shapeshift FOX Token	fox
Geojam Token	jam_geojam
League of Kingdoms Arena	loka
MetisDAO	metis
Ooki Protocol	ooki
Pundi X	pundix
Threshold	t
Toko Token	tko
UniLend	uft
Voyager Token	vgx
USDD	usdd
Chia	xch
EURC	euroc
Beefy	bifi_beef
Lido Staked ETH	steth
poundtoken	gbpt
Terra 2.0	luna2
Nano	xno
Onyxcoin	xcn
NYM	nym
WEMIX	wemix
Step App	fitfi
Sweat Economy	sweat
FirmaChain	fct2
Tokenlon Network Token	lon
pSTAKE Finance	pstake
Vesper	vsp
Walken	wlkn
GuildFi	gf
LeverFi	lever
Euler	eul
Bifrost Native Coin	bnc
GensoKishi Metaverse	mv

Name	Ticker
EthereumPoW	ethw
DappRadar	radar
ParagonsDAO	pdt
Reflexer Ungovernance Token	flx
JUNO	juno
Altered State Token	asto
BreederDAO	breed
Arsenal Fan Token	afc
Aptos	apt
Axelar	axl
Bubblefong	bbf
Bitcicoin	bitci
Cult DAO	cult
Coinweb	cweb
Forta	fort
GMX	gmx
Hashflow	hft
LABEL Foundation	lbl
Marinade	mnde
Metaplex	mplx
NEOPIN	npt
Polymesh	polyx
SIDUS	sidus
XEN Crypto	xen
XPLA	xpla
Agoric	bld
Avocado DAO Token	avg
ECOX	ecox
Evmos	evmos
Stader	sd
Tribal Finance	tribl
Argentine Football Association Fan Token	arg
Bonk	bonk
Hooked Protocol	hook
SpaceMine	mine
Vita Inu	vinu
Volt Inu	volt
Dogechain	dc
Flare	flr
Hifi Finance	hifi
PREMA	prmx
Friends With Benefits Pro	fwb
Mythos	myth
StakeWise	swise

Name	Ticker
Access Protocol	acs
Blur	blur
Dimitra	dmtr
DeFi Kingdoms	jewel
Dopex	dpx
Angle Protocol	ageur_eth
Magic	magic
Arbitrum	arb
Bone ShibaSwap	bone
Bitgert	brise
Gifto	gft
Gains Network	gns
Onomy Protocol	nom
Echelon Prime	prime
Radiant Capital	rdnt
SingularityNET	agix
Wrapped Axelar	waxl
XANA	xeta
Blockchain Brawlers	brwl
IguVerse	igu
KCAL	kcal
MOVEZ	movez
Push Protocol	push
RSS3	rss3
Aleph Zero	azero
Amazy	azy
BoringDAO	boring
Caduceus	cmp
Cryowar	cwar
Everdome	dome
Ertha	ertha
TopGoal	goal
Camelot Token	grail
GetKicks	kicks
MagicCraft	mcrt
Morpheus.Network	mnw
Gold Fever	ngl
Nodle	nodl
Origin DeFi Governance	ogv
OpenLeverage	ole
Orbcity	orb
Pocket Network	pokt
PUMLx	pumlx
RankerDAO	ranker

Name	Ticker
Skeb Coin	skeb
Splintershards	sps
Bit.Store	store
StreamCoin	strm
Victoria VR	vr
Moonwell	well
WeWay	wwy
XDEFI	xdefi
LayerAI	lai
Pepe	pepe
ArbDoge AI	aidoge
ASTRA Protocol	astra
Beldex	bdx
CANTO	canto
Cetus Protocol	cetus
ChainGPT	cgpt
FINSCHIA	fnsa
Fuse	fuse
Izumi Finance	izi
Karate Combat	karate
Kaspa	kas
Milady Meme Coin	ladys
MongCoin	mong
Myria	myria
Superpower Squad	squad
Sui	sui
SUIA	suia
Tamadoge	tama
TENET	tenet
tomiNet	tomi
TomTomCoin	toms
Turbo	turbo
Turbos Finance	turbos
VVS Finance	vvs
WiFi Map	wifi
World Mobile Token	wmt
Wojak	wojak
COMBO	combo_combo
Lybra Finance	lbr
Maverick Protocol	mav
Rollbit Coin	rlb
Tortuga Finance Aptos	tapt
Shimmer	smr
Vela Exchange	vela

Name	Ticker
Bitget Token	bgb
Quickswap	quick_new
Arkham	arkm
UniBot	unibot
Worldcoin	wld
Neon EVM	neon
First Digital USD	fdusd
Sei	sei
Wombat Exchange	wom_wombatexchange
ORDI	ordi
r/CryptoCurrency Moons	moon
Big Time	bigtime
r/FortNiteBR Bricks	brick
CyberConnect	cyber
LimeWire	lmwr
MARBLEX	mbx
Neutron	ntrn
Celestia	tia
Wall Street Memes	wsm
ZELIX	zelix
ZTX	ztx_ztx

8 Appendix B

The following table lists the weights applied to each one-minute time interval described in Section 5.4 Calculation Algorithm.

Time Interval	Weight
0	0.000000
1	0.000526
2	0.001052
3	0.001578
4	0.002104
5	0.002630
6	0.003156
7	0.003682
8	0.004208
9	0.004734
10	0.005260
11	0.005786
12	0.006312

Time Interval	Weight
13	0.006838
14	0.007364
15	0.007890
16	0.008416
17	0.008942
18	0.009468
19	0.009994
20	0.010520
21	0.011046
22	0.011572
23	0.012098
24	0.012624
25	0.013150
26	0.013676
27	0.014202
28	0.014728
29	0.015254
30	0.015780
31	0.016306
32	0.016832
33	0.017358
34	0.017884
35	0.018410
36	0.018936
37	0.019462
38	0.019988
39	0.020514
40	0.021040
41	0.021566
42	0.022092
43	0.022618
44	0.023144
45	0.023670
46	0.024196
47	0.024722
48	0.025248
49	0.025774
50	0.026300
51	0.026826
52	0.027352
53	0.027878
54	0.028404
55	0.028930
56	0.029456

Time Interval	Weight
57	0.029982
58	0.030508
59	0.050000
60	0.050000

9 Change Log

1. **Version 1.3 on December 13, 2023:** Modify data inputs section to remove usage of Market Selection Framework and replace it with the Trusted Exchange Framework. Modify logic used to generate candidate markets and select constituent markets. The coverage universe is expanded to include the following assets: ace, act, insur, ngc, wild, ctx, cre, clo, unb, meme, like, rfox, roobee, play, nwc, bepro, weth, mcb, mlk, pol, trade, ufo, rfuel, hyve, hydra, okt, hbtc, aqt, bondly, muse, orai, pando, pbr, dsia, kono, psl, xcur, isp, stnd, caps, crts, derc, epik, gmee, orc, png, route, sdao, slim, xava, yld, zcx, blok, eqx, leash, naka, opul, vega, xwg, cere, jet, o3, shill, ads, next, trvl, wsteth, lat, deso, wlkn, bnc, pdt, bbf, cweb, lbl, npt, xpla, arg, mine, fw, swise, dmtr, ageur_eth, nom, waxl, brwl, push, azero, azy, boring, cmp, cwar, dome, ertha, goal, kicks, mcrt, mnw, ngl, nodl, ogv, ole, orb, pokt, pumlx, ranker, skeb, sps, store, vr, well, wwy, xdefi, bdx, fnsa, fuse, izi, karate, myria, suia, tama, toms, vvs, wifi, wmt, lbr, unibot, fdusd, wom_wombatexchange, ordi, moon, bigtime, brick, cyber, lmwr, mbx, ntrn, tia, wsm, zelix, ztx_ztx. The following assets are terminated from the coverage universe: tomo, efi, ddx, cra, onston, sdl, mona, ignis, vtc, rdd, nxt.
2. **Version 1.2 on November 8, 2023:** Removes language around policies and oversight which are contained in the Coin Metrics Prices Policies.
3. **Version 1.1 on August 15, 2023:** The coverage universe is expanded to include the following assets: ali, dep, hotcross, tlos, cfg, lith, sfund, dose, num, sis, jam_geojam, mv, mplx, sidus, acs, blur, arb, snm, fuel, tct, edu, bob, mnt, ron, cos, perl, troy, vidt, wom, brz, fio, mtr, mtrg, solo, spa, xpr, df, burger, nbs, hard, cover, vai, ez, ousd, iag, mngo, wing, aury, gofx, ice, pendle, xrd, id, mbs, umee, tko, uft, radar, mnde, xen, vinu, volt, prmx, myth, bone, brise, gft, gns, prime, rdnt, agix, xeta, igu, kcal, movez, rss3, grail, strm, lai, pepe, aidoge, astra, canto, cetus, cgpt, kas, ladys, mong, squad, sui, tenet, tomi, turbo, turbos, wojak, combo_combo, mav, rlb, tapt, hades, smr, vela, bgb, quick_new, arkm, wld, neon, sei. The following assets are terminated from the coverage universe: nu, usdk, chat, cmt, mof, inx, qlc, renbtc, dta, hkd, cocos, rsv, xhv, nrg, aoa, seele, ohm, tnb, path, ncash, hades.

4. **Version 1.0 on March 16, 2023:** Initial publication of Coin Metrics Pricing Methodology. Previous versions of this document were contained in our Market Selection Framework, Hourly Reference Rates Methodology, Real-Time Reference Rates Methodology, and Principal Mark Price Methodology. Those four documents are now consolidated into the Coin Metrics Pricing Methodology. The coverage universe is expanded to include the following assets: bonk, cusd, cra, jewel, apt, asto, aurora, avg, axl, bld, breed, ceur, cpool, ecox, evmos, flx, fly, fort, gf, index, indi, inx, multi, path, rpl, rsv, sd, sdl, tbtc, tribl, gmx, bifi_beef, dpx, boo, beth, magic, juno, port, phb, kishu, lever, flr, hft, porto, polyx, lazio, atm, acm, xcad, ssv, pros, rei, qlc, dego, vite, firo, iq, bar, og, hifi, asr, dyp, time, sylo, polc, bitci, fct2, onston, vsp, afc, bsw, epx, xno, dexe, core, vemp, cult, saitama, ever, babydoge, dc, kar, fsn, hero, oas, hook, cocos. The following assets are terminated from the coverage universe: mft, hpt, hxro, usdn, aion.
5. **Coin Metrics Real-Time Reference Rates Methodology Version 0.15 on February 9, 2023:** Added a 200 milliseconds publication frequency.
6. **Coin Metrics Hourly Reference Rates Methodology Version 2.13 and Coin Metrics Real-Time Reference Rates Methodology Version 0.14 on September 21, 2022:** The coverage universe is expanded to include the following assets: loka, mc, polis, sgb, steth, frax, rai, lUSD, dfi, gbpt, ooki, fis, nest, drep, math, aleph, media, luna2, t, ethw, btcc, vra, swftc, raca, pyr, mbox, sweat, fitfi, qrdo, wemix, zbc, psg, voxel, chess, prq, gari, nym, arv, cudoss, efi, for, juv, cvp, mbl, auto, eden, xcn, kai, velo, akt, berry, klv, kok, senso, floki, sdn, alpine, step, eurt, bfc, toke, shping, oxy, ssx, lit, conv. The publication of reference rates is terminated for the following assets: ramp, grs, ppt, nav, itc, qc, meta, cope, zb. Minor changes to internal audit section.
7. **Coin Metrics Hourly Reference Rates Methodology Version 2.12 and Coin Metrics Real-Time Reference Rates Methodology Version 0.13 on July 1, 2022:** The coverage universe is expanded to include the following assets: fei, op, usdd, xch, gmt, bico, ctk, flm, sfp, starl, glmr, tulip, astro, sfi, gst, mob, bit, vgx, auction, pundix, stg, ata, bel, dar, gal, astr, cqt, cspr, metis, boba, twt, aca, dao, xprt, cube. The publication of reference rates is terminated for the following assets: gxs, dgtx, wluna, dgd, foam, csp, cnn, bft.
8. **Market Selection Framework Version 1.0.2 on February 15, 2022:** The selection algorithm was modified so that any market with volume, measured in U.S. dollars over the past 90 days, of less than 5 percent of the volume of the selected market with the largest volume is excluded.

9. **Coin Metrics Hourly Reference Rates Methodology Version 2.11 and Coin Metrics Real-Time Reference Rates Methodology Version 0.12 on February 15, 2022:** The coverage universe is expanded to include the following assets: xec, kda, mina, xdc, elon, flux, movr, ceek, win_wink, dvi, dusk, asd, gala, spell, ens, tru, alcx, clv, imx, agld, jasmy, farm, alice, chr, dydx, tlm, mdt, gtc, sun, c98, people, lina, rndr, ach, super, mask, quick, arpa, qi, idex, rad, bond, mir, joe, gods, front, pla, orn, ramp, rgt, fida, forth, tribe, wluna, coval, rbn, lcx, asm, ddx, suku, krl, rari, mco2, gyen, btrst, api3, rly, wcfg, musd, ilv, atlas, usdp, joe, ldo, cvx, fxs, kp3r, alpaca, bnx, boson, dora, ghst, nft, ohm, om, pond, rare, revv, stpt, torn, tvk, wncg, xym, ygg. The publication of reference rates is terminated for the following assets: hedg, eurs, bzx, poa, wpr, dmg, cdt, phx, appc, btt, idrt, rdn, via, evx. The section “Data Inputs”, subsections “Other Cryptocurrencies Excluding Stablecoins” and “Stablecoins”, was modified to consider markets quoted in USD Coin or Tether to serve as constituent markets. The constituent markets for all assets in the coverage universe are updated. The constituent markets for all assets in the coverage universe are updated.
10. **Coin Metrics Hourly Reference Rates Methodology Version 2.10 and Coin Metrics Real-Time Reference Rates Methodology Version 0.11 on September 28, 2021:** The coverage universe is expanded to include the following assets: amp, axs, shib, audio, bake, med, dag, slp, xdb. The publication of reference rates is terminated for the following assets: agi, btmx, dgx, ethos, mco, sngls, cpay, eng, lun, pnt. The constituent markets for all assets in the coverage universe are updated.
11. **Coin Metrics Hourly Reference Rates Methodology Version 2.9 and Coin Metrics Real-Time Reference Rates Methodology Version 0.10 on May 27, 2021:** The coverage universe is expanded to include the following assets: icp, cope, maps, btcst, ctsi, erg, woo, prom, strax, usdn, cfx, mdx, nkn, sand, fx, pha. The publication of reference rates is terminated for the following assets: tnt, npxs, zar. The constituent markets for all assets in the coverage universe are updated.
12. **Coin Metrics Hourly Reference Rates Methodology Version 2.8 and Coin Metrics Real-Time Reference Rates Methodology Version 0.9 on April 25, 2021:** The methodology was modified to add fiat currencies to the coverage universe. The coverage universe is expanded to include the following assets: eur, krw, gbp, jpy, aud, try, brl, rub, sgd, bidr, ngn, cad, chf, zar, idrt, hkd, uah, qc, klay, cake, btmx, flow, zks, stmx, skl, reef, dodo, coti, bora, cream, ray, tryb, rook. The publication of reference rates is terminated for the following assets: zxc, bcpt, yamv2, xns, tmtg, kp3r.
13. **Coin Metrics Hourly Reference Rates Methodology Version 2.7**

and Coin Metrics Real-Time Reference Rates Methodology Version 0.8 on February 23, 2021: The coverage universe is expanded to include the following assets: `linch`, `alpha`, `octo`, `perp`, `scrt`, `grt`, `keep`, `xvs`, `nu`, `tel`, `badger`.

14. **Coin Metrics Hourly Reference Rates Methodology Version 2.6 and Coin Metrics Real-Time Reference Rates Methodology Version 0.7 on January 26, 2021:** The coverage universe is expanded to include the following assets: `susd`, `pol`, `ust`, `lto`, `swap`, `nim`, `lbc`, `mta`, `kp3r`, `glm`, `near`, `noia`, `rose`, `inj`. The publication of reference rates is terminated for the following assets: `gnt`, `fxc`, `bht`, `cmct`, `strat`, `loki`. The constituent markets for all assets in the coverage universe are updated.
15. **Coin Metrics Hourly Reference Rates Methodology Version 2.5 and Coin Metrics Real-Time Reference Rates Methodology Version 0.6 on November 5, 2020:** The coverage universe is expanded to include the following assets: `akro`, `ampl`, `ar`, `bal`, `bzrx`, `celo`, `comp`, `crv`, `csp`, `dmg`, `dot`, `foam`, `kin`, `oxt`, `rune`, `sol`, `srn`, `vtho`, `wbtc`, `wmxm`, `xhv`, `xyo`, `yamv2`, `yfi`, `yfii`, `uma`, `ewt`, `rev`, `rsr`, `avax`, `tmtg`, `jst`, `hnt`, `trac`, `vlx`, `mx`, `fet`, `aoa`, `iris`, `pnk`, `mln`, `shr`, `uqc`, `one_harmony`, `trb`, `ogn`, `ava`, `loki`, `hxro`, `wxt`, `cpay`, `fil`, `uni`, `swrv`, `sushi`, `aave`, `egld`, `hns`, `dia`, `boa`, `uos`, `ctc`, `renbtc`. The publication of reference rates is terminated for the following assets: `arn`, `pma`, `erd`, `man`, `iq`, `lend`. The Market Selection Framework was amended such that extremely low volume markets are less likely to be selected as a constituent market if higher volume markets of similar quality are available. The constituent markets for all assets in the coverage universe are updated.
16. **Market Selection Framework Version 1.0.1 on November 5, 2020:** The selection algorithm was modified so that any market with volume, measured in U.S. dollars over the past 90 days, of less than 1 percent of the volume of the selected market with the largest volume is excluded.
17. **Coin Metrics Hourly Reference Rates Methodology Version 2.4 on July 29, 2020 and Coin Metrics Real-Time Reference Rates Methodology Version 0.5 on July 29, 2020:** The coverage universe is expanded to include the following assets: `wrx`, `band`, `ksm`, `usdk`, `snx`, `stx`, `fxc`, `kcs`, `hive`, `nrg`, `cel`, `ubt`, `chsb`, `crpt`, `bht`, `cvt`, `data`, `eurs`, `xns`, `gt`, `dgtx`, `kava`, `tt`, `sxp`, `mx`, `ocean`, `erd`, `lpt`. The publication of reference rates is terminated for the following assets: `storm`, `gto`. A revision policy was amended. The constituent markets for all assets in the coverage universe are updated.
18. **Coin Metrics Hourly Reference Rates Methodology Version 2.3 on February 27, 2020 and Coin Metrics Real-Time Reference Rates Methodology Version 0.4 on February 27, 2020:** The coverage universe is expanded to include the following assets: `xaut`, `paxg`,

husd, dgx, busd, ftt, hedg, okb, zb, hbar, ckb, mof, vsys, cennz, luna, chz, seele, dx, matic, abbc, rif, tomo, hpt, and ant.

19. **Coin Metrics Hourly Reference Rates Methodology Version 2.2 on February 6, 2020 and Coin Metrics Real-Time Reference Rates Methodology Version 0.3 on February 6, 2020:** The constituent markets for all assets in the coverage universe are updated. The coverage universe is adjusted to remove the following assets: `box`, `cosm`, `fsn`, `medx`, `pst`, and `ttc_protocol`. The coverage universe was expanded to include Dai and the previous asset with this name was renamed to Sai to appropriately reflect MakerDAO's transition from Single-Collateral Dai (Sai) to Multi-Collateral Dai (Dai).
20. **Coin Metrics Hourly Reference Rates Methodology Version 2.1 on December 9, 2019 and Coin Metrics Real-Time Reference Rates Methodology Version 0.2 on December 9, 2019:** The coverage universe is expanded to include the following assets: `algo` and `beam`. Updated calculation methodology to include price inverse variance weighting to reduce the impact of outliers.
21. **Coin Metrics Real-Time Reference Rates Methodology Version 0.1 on August 30, 2019:** Initial publication of Real-Time Reference Rates Methodology.
22. **Coin Metrics Hourly Reference Rates Methodology Version 2.0 on July 8, 2019:** Increased publication times from once daily at midnight UTC to once hourly. Changed human oversight from once daily at midnight UTC to once daily at 16:00 New York time.
23. **Coin Metrics Hourly Reference Rates Methodology Version 1.2 on June 13, 2019:** The coverage universe is expanded to include the following assets: `gno`, `hot_holo`, `maid`, `nuls`, `qkc`, `rdd`, `rvn`, `zen`, and `mona`.
24. **Coin Metrics Hourly Reference Rates Methodology Version 1.1 on May 30, 2019:** Updated data contingency rules. If no observable transactions from constituent markets occur during a one-minute time interval, the next one-minute time interval's volume-weighted median price is used instead of the previous. This contingency rule is applied recursively.
25. **Coin Metrics Hourly Reference Rates Methodology Version 1.0 on May 13, 2019:** Initial publication of Reference Rates Methodology.
26. **Market Selection Framework Version 1.0.0 on May 13, 2019:** Initial publication of Market Selection Framework.