CryptoCompare

HARD FORK POLICY 2019

DISCLAIMER

THIS REPORT IS FOR INFORMATIONAL PURPOSES ONLY, YOU SHOULD NOT INTERPRET ANY SUCH INFORMATION AS LEGAL, TAX, INVESTMENT, FINANCIAL, OR OTHER ADVICE.

Summary

Since the creation of Bitcoin, a plethora of additional cryptoassets have emerged in its wake. For some, this involved innovative codebases built from the ground up, inspired in part from the ideas of those that preceded them. However, many significant cryptoassets have since appeared as result of contentious hard forks, the most prominent of which have been Ethereum Classic, Bitcoin Cash, and Bitcoin SV.

In the context of this report, a fork is defined as an event that splits the existing blockchain protocol into two or more versions using a different set of rules and features. Each version shares the same history.

In general, hard forks are an important way for project teams to add new features and bug fixes to a blockchain protocol and in most cases do not pose significant risk. However, when one group of miners in a network disagree over any changes to an existing blockchain proposed by the majority, this can cause what is known as a contentious hard fork, which usually results in two or more permanently diverging chains, each with their own native cryptoasset.

CryptoCompare's Hard Fork Policy report serves as a useful tool for better understanding what hard forks are, why they occur, and what the potential risks are for the investor. In this report we also provide a general outline of how forked coins are claimed, as well as an overview of fork policies, requirements and support among various cryptocurrency wallets and exchanges. This document does not cover airdrops and code only forks (spin-off-coins), where only the code is replicated, but not the blockchain history.

For specific index clients, this report outlines the procedures and policies that CryptoCompare recommends, to ensure that indices exposed to hard forks are dealt with in an appropriate manner.

For questions related to our fork research or any potential requests, feel free to contact our research department at **research@cryptocompare.com**. For enquiries related to data sales or indices, please contact us at **data@cryptocompare.com**.

Contents

Introduction

Since the creation of Bitcoin (BTC) in 2008, a plethora of additional cryptoassets have emerged in its wake. For some, this involved innovative codebases built from the ground up, inspired in part from the ideas of those that preceded them. However, many cryptoassets have since appeared as a result of contentious hard forks, the most prominent of which have been Ethereum Classic, Bitcoin Cash, and Bitcoin SV.

In general, contentious hard forks are phenomena that those within the cryptocurrency industry hope to avoid given the conflict that emerges between key industry developers, mining companies, and high wealth investors. They have led to periods of high price volatility, uncertainty and loss of confidence in the industry. Hard forks can also pose a significant risk to investors who are often incentivised by the prospect of claiming an additional "free" asset, but at a cost that may involve the complete loss of funds. Therefore, it is important for all to build a basic understanding of what exactly a hard fork is, how it can occur, and what precautions to take such that risks are mitigated.

Digital Currencies as a Network of Rules

Digital currencies such as Bitcoin (BTC), Bitcoin Cash (BCH) and Ether (ETH) are governed by a set of rules written into their respective blockchain protocols. These rules must be implemented by all the entities on each network, and serve as a means of evaluating which transactions are valid on each respective blockchain. They also serve as a means of dictating how each blockchain manages scaling and difficulty adjustments, how the supply of a coin is regulated or scheduled, which types of mining rigs are encouraged, or how rewards systems function and so on.
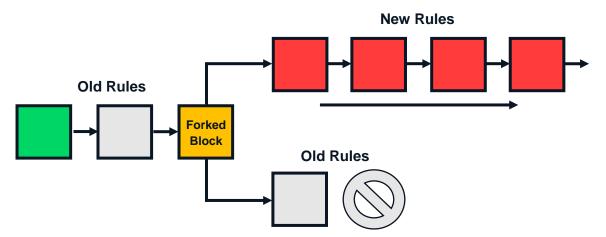
Network Upgrades via Forks

In general terms, a fork is an event that splits the existing blockchain protocol into two or more versions using a different set of rules and features. It is possible that forks can occur by accident when two miners discover a block at the same time which usually corrects itself with no issue; however, we are interested in those that occur intentionally.

When a group of entities on a decentralised blockchain wish to make a change to the governing protocol rules (e.g. to fix bugs, add updates or implement features), any changes must be agreed upon by the participating nodes in the existing network. Assuming consensus is reached, the blockchain can be "upgraded" in two ways: via a soft fork or a hard fork.

A **soft fork** is a change to the blockchain "rules" such that the old blockchain version is still compatible with the new version. I.e. Nodes that continue to operate using the old "rules" or software can still validate transactions on the upgraded blockchain, but may be required to update to the new rules at a later date. Nodes using the new rules will not accept older blocks, therefore encouraging nodes using older software to upgrade to the new versions. This does not result in a chain split (two separate blockchains with incompatible blocks), and goes relatively unnoticed by most investors.
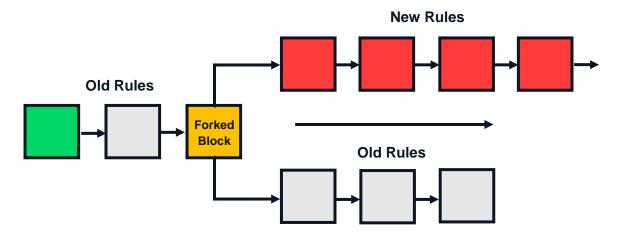
However, there are some changes that would alter the blockchain rules such that the new rules would no longer be compatible with the old rules. This means that any node that hopes to continue to validate transactions on the existing network must upgrade to the newest set of rules in order to do so. This situation typically results in what is known as a **hard fork,** in which two co-existing diverging chains share the same transaction history – one dictated by the old rules, and the other with the new rules.

New Rules

Old Rules

Forked
Block

Old Rules

Hard forks are a common way for developer teams to implement protocol upgrades and features, most of which possess almost unanimous community support where all miners move to the new chain. In this case, the two diverging chains emerge and the chain with the old rules (and hence no mining support) "dies" as miners all agree to upgrade to the new protocol. This can be seen in the diagram above. Protocol upgrades via a hard fork are often a part of a developer team's roadmap and are usually amicable.

Contentious Hard Forks

However, there are cases of fundamental differences in opinion among key developers and miners as to the appropriate roadmap of changes. For instance, a disagreement might arise due to proposed solutions (and protocol changes) to a particular problem (e.g. managing scaling), or perhaps which types of mining rigs are to be enabled or disabled (ASIC vs GPU etc) on the network to prevent the concentration of mining power.

New Rules

Old Rules

Forked
Block

Old Rules

These disagreements have the potential to result in **contentious hard forks**, in which the two permanently diverging chains occur and coexist as a proportion of miners from the original chain (those who disagree with the protocol changes) shift to the new chain. This results in the creation of a new token on the diverging chain, that is non-fungible across the original chain. In other words, the tokens on each diverging chain are unique.

Disagreements over proposed hard fork changes led to infighting between miners and developers of Bitcoin as a result of the Segwit2X proposal in 2017. This was ultimately scrapped because no agreement could be reached. Whether or not a hard fork ultimately occurs, this can still result in conflict.

Frequently, hard forks are never as simple as a disagreement over protocol changes but can be highly political and competitive in nature. This has led to quarrels on Twitter between opposing developer teams and supporters, each side garnering support from high wealth individuals and large mining companies and exchanges. This was seen in the most recent contentious hard fork and "hash war" between Bitcoin Cash (BCH) and Bitcoin Satoshi's Vision (BSV) in November 2018.

"Anonymous" Forks

Following the hard fork that led to the creation of Bitcoin Cash (BCH) in late 2017, a plethora of hard forks followed in its wake. However, the majority of these hard forks were different, in that they didn't necessarily emerge following an extended period of significant disagreement within a large portion of the mining community over proposed changes (contentious hard fork).

Rather, they came into existence relatively under the radar and on short notice[1], from anonymous developers that sometimes implement what is known as a "pre-mine". This allows a fork team to mine a percentage of the total supply of a forked coin before the wider mining community is able to do so. This pre-mined cryptocurrency is generally claimed to be allocated to project development and growth funding. However, many fork teams might be looking to instead profit by getting their forked tokens listed on exchanges so that they could quickly sell off their pre-mine holdings or manipulate fork markets.

Traders that held bitcoin in their wallets before the "snapshot" date of a fork would be entitled to some proportion of forked tokens on the diverging chain and are hence incentivised to claim these newly forked "free" tokens for easy money. This comes with obvious risks for the trader, with complete loss of funds not being an unusual occurrence.

There were at least 20+ such forks at the end of 2017 and the beginning of 2018 alone, such as Bitcoin GOD (GOD), BitcoinX (BCX), and Super Bitcoin (SBTC). These types of forks are somewhat easy to spot with clues such as anonymous developers, no publicly available code, a pre-mine and lack of support from top tier exchanges and the mining community. As part of CryptoCompare's regular hard fork procedures for index clients, hard forks, including lesser known forks, are evaluated using a clear set of metrics explained later in the report.

---

[1] Entry barriers for hard forks are extremely low in general. There are services offering a GitHub fork of an original coin, as well as a full design and website, all-inclusive for 0.01 BTC. Fork projects then approach exchanges that are open for listing new coins, regardless of whether the forked coin currently exists or not (futures market).

Cryptoasset Pricing During Hard Forks

Hard forks, now a relatively well-recognised occurrence in the cryptocurrency industry, can be the focus of both financial speculation and worry for many investors. Although there are a few general patterns that might emerge during a hard fork such as a rapid decrease in prices at some point post-fork for the forked token as investors sell off their "free" tokens, pricing is often unpredictable and volatile. It is unclear what exactly the most dominant factor is during hard forks, as prices are usually influenced by wider market events, community sentiment as well as the technicalities, risk factors and incentives surrounding hard forks themselves.

Figure 1 – Prominent Bitcoin Hard Forks of 2017 (Prices in USD)

Figure 1 shows the four most prominent hard forks at the end of 2017 just after the fork date of each fork. These hard forks are accompanied by considerable price swings once forked coins are claimable on an exchange wallet and markets are opened, allowing users to buy/sell and speculate on value of their newly acquired assets. There is usually a period of price rise due to speculation or some form of potential manipulation, accompanied by severe price drops as traders dump their newly claimed coins or speculate.

Network Upgrades

Non-contentious network upgrades that require a hard fork in order to implement do not usually result in an additional asset after the fork. Hence, there is little incentive to trade, other than speculation of value or anticipated risk, that would significantly move the price. Although non-contentious upgrades are usually of little concern compared to contentious hard forks, there is a possibility that planned events can go wrong or be delayed. Therefore, the presence of any fork in general increases uncertainty and hence risk at the time of the fork. For instance, blockchains are at greater risk of 51% attacks during hard forks. As a result, holders may choose to move or sell holdings as a precaution, hence a general decrease in price.

Contentious and Anonymous Hard Forks

However, there are a number of factors that might drive prices when it comes to hard forks that are contentious or anonymous. The most notable of these involves the prospect of "free" tokens, or considerable community conflict that leads to wider industry concern.

Factors that Drive the Prices of Fork-Affected Markets

The Prospect of Free Token Claims	Just prior to the "snapshot" date of the fork, investors that hope to benefit by claiming their "free token" on the diverging chain after the fork will usually buy or hold the original asset in their wallets (assuming it allows a claim to forked assets). This could encourage price movements upwards of the original asset.
	Conversely, once the snapshot has been confirmed, traders can now safely move funds from their "snapshot" addresses as a precaution, or sell their original coins if they believe prices will drop. This may encourage price movements downwards.
	Post-fork, once exchanges list new forked markets, traders might then attempt to sell their newly claimed tokens. A price dip occurs shortly following a fork as a result of this. Thinner markets combined with speculation tends to result in high volatility.
Risk and Uncertainty	The outcome of a fork event is never certain in advance. There are risks that the event runs into problems, is delayed or the network is attacked. Furthermore, it is unclear how most exchanges themselves will treat hard forks, when markets will re-open and how new assets will be named. Consequently, prices may be driven downwards as traders move assets off exchanges or out of wallets due to this increased level of risk and concern.

CryptoCompare

Community Conflict	Hard forks, like that of Bitcoin SV (2018) and Bitcoin Cash (2017) have led to public demonstrations of conflict and aggression on social media platforms between key industry players, mining pools and developers. This is often perpetuated by news and media outlets which sheds a negative light on the cryptocurrency industry as a whole. As above, this can lead to higher risk and loss of trust in the industry. As a result, price moves downwards.
Community Support	As members of the community begin to declare support for or against the fork, this can have significant implications on price. For example, large mining pools that represented a significant proportion of BCH hash power began stating support for BSV. This not only gave legitimacy and value to BSV, but also raised uncertainty over which chain would be dominant post-fork.
Market Manipulation	New markets that list forked tokens often lack liquidity in comparison to the markets of the pre-fork blockchain. As a result, they are exposed to market manipulation. This is most probable in cases where developer teams implement a pre-mine.
Bitcoin Price Movements	Most fork markets will trade initially into Bitcoin. Therefore, they are highly influenced by the bitcoin price. Industry events, whether related to the fork event or not, could shift the bitcoin price. As a result, any fork that trades into bitcoin will also be affected. See Figure 2, as the price of BCH and BSV dropped in tandem with BTC.

Hard Forks and Value Dilution

The price of the original asset as well as the forked asset is often unpredictable in advance of pre-fork tokens or further fork information that emerges extremely close to, or just after the fork event. However, what can be seen for the latest Bitcoin SV fork (using pre-fork token data) in Figure 2 is that the price of the pre-fork cryptoasset (BCH) is more or less equivalent to the price of the post-fork original cryptoasset (BCHABC) plus the price of the forked cryptoasset (BSV):

Pre-Fork Asset Price (BCH) ~ Post-Fork Asset Price (BCH-ABC) + Fork Price (BSV)

As a result, investors or traders that hold these assets have an incentive to also claim the forked asset such that they capture the full value of their holdings. However, this is not always safe or possible, and depends partly on where an investor's original funds are stored.
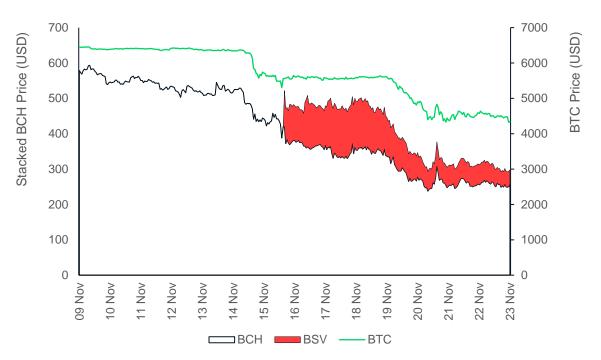
Figure 2 - Value Dilution Throughout the Bitcoin SV Fork (2018)

Conflict and Controversy Throughout the Bitcoin SV Fork

The Bitcoin SV fork event was a prime example of a contentious hard fork shrouded in community conflict and uncertainty. Leading up the fork, key industry players and exchanges began stating their positions.

Months before the fork, nChain, a blockchain start-up associated with Craig S. Wright, announced that it would be forking the BCH chain to create Bitcoin SV. Billionaire Calvin Ayre, the owner of CoinGeek — the largest bitcoin cash mining pool — was BSV's other major backer leading up to the fork. The formally recognised and most dominant Bitcoin Cash version (BCH) is maintained and developed by the Bitcoin ABC group, and had support from prominent individuals such as Jihan Wu (Bitmain) and Roger Ver (Bitcoin.com).

Leading up to the fork event, the Bitcoin Cash price began to fall, as investors presumably began selling and moving BCH funds in expectation. According to CCN[2], there were claims that the BSV team threatened to attack the BCH network in the "hash war" that ensued if nodes would not support BSV. Following Bitmain's support for BCH (operates the largest bitcoin mining pools, AntPool and BTC.com), concern over the shift in mining power from BTC to BCH may have led bitcoin prices to drop sharply just prior to the fork.

During this period, mining power on BCH and BSV became more concentrated, increasing the risk of a 51% attack and significant loss of funds which perpetuated the decrease in prices. There were also estimations that over this period, both sides were mining at a significant loss as they competed for hash power. BSV pools were burning through at least $280,000 per day following the fork, according to an estimate by BitMEX Research[3].

---

[2] https://www.ccn.com/bitcoin-cash-where-the-4th-largest-cryptocurrency-stands-the-day-after-the-fork
[3] https://twitter.com/BitMEXResearch/status/1063400765119758336

What do Exchanges do about Forks?

Only a handful of exchanges supported BSV, with the majority either stating no support for BSV, or withholding from stating support until clear outcome of the fork was known. Most exchanges froze deposits, withdrawals and trading of BCH throughout the fork event, only opening markets again once the outcome of the fork was clear and stability and safety was achieved.

They may then choose to list the forked coins, provided that they meet their own criteria which varies considerably by exchange, with many exchanges supporting a strict "no fork" policy. For further information on cryptocurrency exchange policies, please refer to Exchange Fork Policies on page 18.

Implications for Index Clients

Hard forks are a source for concern for any index provider, given the price swings that accompany them. On one hand, a significant fork has the potential to dilute the value of the original asset (BCH) such that, in order to represent the true value of a chain, the forked asset should be included in the index after a fork.

However, as we have seen, a hard fork itself can pose significant risks to investors as a result of the potential for hacks and network attacks, and extreme periods of volatility and uncertainty. Maintaining data integrity at the time of a fork is a challenge, given the diverse treatments of each fork per exchange in terms of support, ticker naming, market opening times and so on.

In addition, there is a risk that adding an illegitimate fork might cause damage to the reputation of an index provider, as it might be viewed as an endorsement. For information on how hard forks affect indices, as well as CryptoCompare's Fork Policy and example procedures, please see Hard Fork Policy for Index Clients on page 21.

Hard Fork Dangers and Risk Mitigation

Costs and Risks

Transaction Fees

In the case of bitcoin, all transactions include a network transaction fee by default. The amount of this fee depends on the size of the transaction in bytes as determined by number of inputs and outputs, not the amount of money being sent. This will vary by wallet and exchange as well as required transaction time. This is a relevant cost because for safety reasons it is often advised to empty the wallet of all the cryptocurrency contained on the original pre-forked blockchain prior to any fork. The process of claiming a hard fork can reveal certain pieces of transactional information and holdings, which can put user funds at risk.

Risks of Hacking and Replay Attacks

One of the major risks associated with claiming a hard-forked coin is that financial privacy can be significantly harmed by this process, given that data of any bitcoin holdings may be revealed to various networks, exchanges, and services you may use in the process. The obvious implications are that one may be exposed to attacks and fraudulent activity. For instance, private keys are used to configure a wallet to claim any new forked coins. There have been cases of fraudulent wallets or websites that accept users' private keys (required to transfer funds), only to steal any cryptocurrency within those accounts.

Furthermore, sending transactions after a forked coin has been claimed also exposes various users to the possibility of replay attacks in cases where an altered blockchain does not have Two-Way Replay Protection in place.

Network Attacks and Instability

During a significant contentious hard fork such as Bitcoin Cash and Bitcoin SV, conflicts within the community may lead to miners shifting mining power from one network to the other. Competition between miners leaves hash rate distribution levels in a state of flux for both networks, which opens either network up to 51% attacks as mining power becomes more concentrated.

Complete Loss of Holdings

Complete or partial loss of holdings is one of the main dangers associated with hard forks. This can occur if either the original or the forked network were attacked by malicious miners. It can also occur if an exchange is hacked, or a user manages the fork process incorrectly by exposing private information to fraudulent wallets or software, or losing private keys.

Pump and Dump/Price Manipulation

For forks that involve a pre-mine, as is often the case, once listed on an exchange, project developers have the power to manipulate markets with pre-mined holdings. As a result, traders are exposed to high volatility, and the potential for prices to be artificially raised such that project teams can then dump their tokens at the peak. The coin price then crashes and any unsuspecting investors quickly lose their original investments. This risk can be mitigated by ensuring that tokens with pre-mines are avoided, fork teams are well evaluated, and high-quality exchanges that are experienced at dealing with forks are used for trading.

Trading on Low Quality Exchanges

Exchanges of low quality, or those that lack the technical expertise to deal with hard forks can seriously put users' funds at risk. Traders that place their trust in centralised exchanges agree that they may act as a custodian for their funds and private keys. The probability of lost funds then increases if the exchange manages this poorly.

A few exchanges offer the trading of fork futures. However, it is possible that forks may never actually occur. For fraudulent exchanges, users may never be able to trade or withdraw fork futures tokens at a later date.

Risk of No Fork Listings on Any Exchange

For users that claim their fork tokens using wallet software or sending a manual transaction, it is possible that these tokens may never be listed on any exchanges. As a result, users are both exposed to the risks of claiming a forked coin and the chance that the forks have no market value or liquidity.

General Risk Mitigation

1 Transfer funds

Before exposing existing private keys to new wallets or exchanges, it is often necessary to empty the associated wallets containing any cryptocurrency holdings before claiming a forked coin. In the case of a security breach, this eliminates any possibility for holdings on the original wallet to be stolen.

2 Trusted Wallets/Exchanges

Only use trusted wallets that support any relevant forked coins when exposing private key information. These trusted wallets often have stricter policies in place that help to mitigate the risks of a breach. Furthermore, be cautious when installing and running certain software if claiming forked coins - a malicious piece of software may use your old private keys to steal any other unclaimed forks.

3 Cooling period

Wait until the new live blockchain is stable and protected for a designated period before claiming any new forked coins. A forked blockchain may not have replay protection in place, which could result in a loss of cryptocurrency due to unintended transactions. In addition, in terms of the time between the announcement of the fork and the activation of the fork, we recommend a time span of at least 3 months - this demonstrates the seriousness and legitimacy of the project, given that the necessary testnet launch, testing period and community building needs to take place.

4 Conduct Hard Fork Research

It is essential to adequately research a hard fork and its team before initiating the process of claiming the asset. Please refer to CryptoCompare's Fork Criteria on page 23 for further information.

Methods for Claiming a Forked Coin

In order to claim a forked coin, one must have had cryptocurrency stored on the original blockchain. Secondly, the currency must be present before a "snapshot" of the specific original cryptocurrency's blockchain is taken at some pre-specified time or "block height". Here, a copy of the exact ledger containing all existing coin transactions and accounts will be recorded and used to designate new forked coins to those who held that specific cryptocurrency originally. There is then a waiting time before the new forked chain goes live, and once this happens any new forked coins can then be claimed in various ways.

1   Supporting Wallet or Exchange

If the fork is supported by a wallet or exchange, one can transfer funds to one of these service providers before the snapshot is being taken. This involves handing over a private key for the service provider, so this is considered as a relatively risky option. However, risks can be mitigated by choosing a high-quality trusted exchange or wallet. In some cases, the forked coins are only available for the user after a long period of time (weeks to months).

2   Running Fork Software

If the source code of the fork blockchain is public, one can download and run the forked software locally and use the provided interface to get hold of the forked coins. This option is also viewed as risky, as the software can contain malware that can steal funds or private information.

3   Send Manual Transaction

The safest but technically most complicated way to obtain a forked coin is to connect to the forked coin's network and send a signed transaction manually. This requires the knowledge of signing a transaction in a format that is compatible with the new network.

Cryptocurrency Wallets

A cryptocurrency wallet is a piece of software of hardware which stores public and private keys to be used to interact with a blockchain to send and receive cryptocurrency. There are many different types of wallets. Different wallets support different cryptocurrencies, support the claiming of different forks, and offer different levels of security. This means there are many factors to consider when choosing a wallet to use, some of which will be explored below, along with some commonly used wallets.

Wallet Types

Desktop wallets are downloaded and installed on a PC or laptop. They are only accessible from the single computer in which they are downloaded. Desktop wallets offer one of the highest levels of security. However, if your computer is hacked or gets a virus there is the possibility that you may lose all your funds.

Common desktop wallets: Atomic, Exodus, Jaxx, Electrum, Armory, Bitcoin Core

Online/web wallets run on the cloud and are accessible from any computing device in any location. While they are more convenient to access, online wallets store your private keys online and are controlled by a third party which makes them more vulnerable to hacking attacks and theft.

Common online/web wallets: GreenAddress, SpectroCoin, Coinbase Wallet, BitGo, xapo

Mobile wallets run on an app on your phone and are useful because they can be used anywhere including retail stores. Mobile wallets are usually much smaller and simpler than desktop wallets because of the limited space available on a mobile.

Common mobile wallets: BRD, Mycelium, Bitcoin Wallet, AirBitz, Coinomi (and Desktop)

Hardware wallets differ from software wallets in that they store a user's private keys on a hardware device like a USB. Although hardware wallets make transactions online, they are stored offline which delivers increased security. Hardware wallets can be compatible with several web interfaces and can support different currencies; it just depends on which one you decide to use. What's more, making a transaction is easy. Users simply plug in their device to any internet-enabled computer or device, enter a pin, send currency and confirm. Hardware wallets make it possible to easily transact while also keeping your money offline and away from danger.

Common hardware wallets: Ledger Blue, Ledger Nano S, KeepKey, Trezor, OPENDIME

Paper. While the term paper wallet can simply refer to a physical copy or printout of your public and private keys, it can also refer to a piece of software that is used to securely generate a pair of keys which are then printed. Using a paper wallet is relatively straightforward. Transferring bitcoin or any other currency to your paper wallet is accomplished by the transfer of funds from your software wallet to the public address shown on your paper wallet. Alternatively, if you want to withdraw or spend currency, all you need to do is transfer funds from your paper wallet to your software wallet. This process, often referred to as 'sweeping,' can either be done manually by entering your private keys or by scanning the QR code on the paper wallet.

Hot/cold: The difference between cold and hot wallets is that hot wallet is connected to the internet. These are all online and desktop wallets. Cold wallet refers to a wallet without an internet connection, such as hardware device or a paper wallet.

Wallet Summaries and Forked Coin Support

Most wallets do not provide a significant amount of public information on (if any) specific policies that relate to forked coins. However, we have been able to curate a short list of common wallets and which forked coins are supported[4]:

WALLET NAME	TYPE	SUPPORTED FORKED COINS
ATOMIC	DESKTOP	BCH, BSV, BCD
EXODUS	DESKTOP	BCH, BSV, BTG
JAXX	MOBILE/WEB/DESKTOP	BCH
ELECTRUM	DESKTOP	-
ARMORY	DESKTOP	-
BITCOIN CORE	DESKTOP	-
XAPO	WEB	-
SPECTROCOIN	WEB/MOBILE	-
COINBASE WALLET	MOBILE	BCH
BITGO	WEB	BCH, BTG
BLOCKSTREAM GREEN	WEB/MOBILE	-
BRD	MOBILE	BCH
MYCELIUM	MOBILE	-
BITCOIN WALLET	MOBILE	BCH
EDGE	MOBILE	BCH, BSV, BTG
COINOMI	MOBILE/DESKTOP	BCH, BTG, BSV, LCC, BCA…+
LEDGER BLUE	HARDWARE	BCH, BTG
LEDGER NANO S	HARDWARE	BCH, BTG
KEEPKEY	HARDWARE	BCH, BTG
TREZOR	HARDWARE	BCH, BTG
OPENDIME	HARDWARE	-

[4] Some wallets may not support a forked coin, but a user may transfer their funds to an exchange or wallet service (Electron Cash in the case of BSV) that provides a splitting service to claim forked assets.
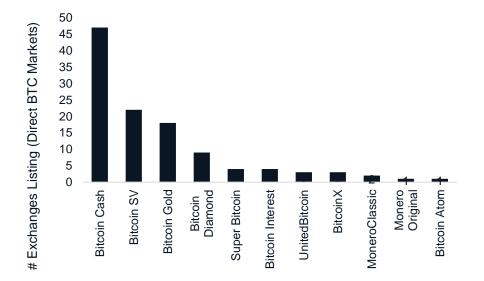
Exchange Fork Policies

Fork Policies Across Top Tier Exchanges

Our research into exchange fork policies involved an analysis of any publicly available fork-related documentation collected from social media pages (Twitter, Reddit), formal policy documents, exchange blogs, announcement pages, and official terms & conditions pages. These sources were summarised and reconciled for each exchange in our analysis, such that a more defined fork policy (if any) could be extracted. Our research shows that policies and procedures related to hard forks are varied, with some exchanges offering explicit and comprehensive hard fork treatments and statements of precaution, and others offering minimal to no fork-related information despite listing fork markets themselves.

Many exchanges tend to list at least one of the following four hard forks: Bitcoin Cash (BCH), Bitcoin SV (BSV), Bitcoin Gold (BTG) or Bitcoin Diamond (BCD). For hard forks that currently trade directly into bitcoin (BTC), 47 exchanges (~30% of total active exchanges on CryptoCompare) list BCH, 22 (14%) list BSV, and 18 (11%) list BTG. A handful of exchanges list BCD (9, or 6% of total), the largest of which includes Binance, OKEX and HitBTC. Very few exchanges currently list more niche hard forks such as Super Bitcoin (SBTC - 4), Bitcoin Interest (BCI - 4) and MoneroClassic (XMC – 2). It is often these anonymous forked coins that pose the most danger to investors and exchanges and hence merit the most caution.

Figure 3 - Number of Exchanges Listing Each Hard Fork (Direct BTC markets)

Listing Stringency

Larger exchanges such as HuobiPro, OKEx and HitBTC are relatively flexible in terms of the hard forks they choose to list (6+ hard forks); this falls in line with their chosen business models which lean towards diversity of tradeable assets. Other exchanges such as Bitfinex, Kraken and Poloniex have a stricter listing record, while Coinbase and Gemini have very strict and comprehensive listing policies, only originally listing BCH after considerable months of review.

Listing of Pre-Fork Tokens (Futures)

Some exchanges offer pre-fork token trading, where traders are able to convert their existing holdings into tokens that represent the original asset and the fork respectively. They are then able to trade throughout fork events with no gaps in trading. Bitfinex, Poloniex and HitBTC offered such tokens during the BSV fork, with accompanying documentation explaining the situation at the time of the fork such that users are informed. However, fork tokens are risky instruments and forks still may never happen. How exchanges choose to settle pre-fork futures tokens can also vary and is unpredictable. Nonetheless, it does allow for effective tracking of market value throughout a hard fork while other markets are closed.

Policies and Defined Requirements

The major concern with regards to any hard fork for exchanges, is security and network stability. Ultimately, exchanges apply policies that guarantee the safety of users' funds in their custody (i.e. to prevent any hackings or other illicit activity). Fork-affected markets are usually frozen just prior to the expected hard fork time; deposits and withdrawals are also disabled. However, exchanges will offer users the option of withdrawing funds from wallets well before the fork in case they wish to do so. Exchanges usually wait until blockchains are stable and secure before re-opening original markets or announcing the listing of any fork markets.

Some exchanges are explicit and strict with regards to fork listing policies, only offering their support and/or listing for a hard fork only after a series of stringent minimum conditions are met over an extended review process. Others are happy to list hard forks the day after stable operation. Unfortunately, for many exchanges, their explicit hard fork treatments are either publicly inaccessible or non-existent.

Nonetheless, many of the key conditions that higher quality exchanges impose for listing/supporting any hard fork, relate to network security. They normally require that hard forks have strong replay protection in place before any consideration. Nonetheless, some exchanges are able to list and safely manage forks without replay protection safely. Other conditions that appear across various exchanges include stable operation across the forked blockchain, functional, and of significant value to their respective clients before being listed. Some highlight the need for the underlying technology behind any forked chain to be integrated, creative and contribute to technological innovation and value. Pre-mining, as mentioned, poses a risk and is taken into account when making listing considerations for any coin. Some exchanges also consider the current market value of a forked coin, as well as the scale of demand for a particular coin from their current users.

Among the top exchanges, the following conditions arise with respect to hard fork policies:

- Default positions are against forked coins unless otherwise decided
- Forked blockchains must be usable, stable and secure
- The underlying technology behind the forked coin must contribute to value
- A fork project must have public developers
- The code must be open source
- There is a testnet available before launch
- A forked coin must have a sizeable community
- The size of the forked coin network must reach critical mass
- Strong two-way replay protection must be in place
- There must be a "clean break", in which the new chain cannot be wiped out by the original chain
- The official client software is launched and announced well before the hard fork is activated, which needs to pass open beta test testing and assessment

For more information on individual exchange policies and listing stringency, please contact our research team at research@cryptocompare.com

Crypto Compare

Hard Fork Policy for Index Clients

The Effects of Hard Forks on Indices

Index Composition

A cryptocurrency index is typically composed of a selection of coins (e.g. BTC, ETH etc), each of which is assigned an index weighting. In the event of a contentious hard fork, the index composition (constituent coins) may need to change in order to better represent the dilution of value that stems from the successful creation of a new asset on a diverging chain. This is particularly important for the forks of very valuable blockchains (BTC, BCH) that may result in a permanent split and a significant decrease in value for the original cryptoasset. When the creation of a new successfully forked asset is not represented in an index containing the original coin, this has obvious negative implications on the value of a given index.

Index Value

The larger the support for a forked chain within the mining community, the higher the chance of a contentious chain being created, and hence the higher the diffusion of value will be for the original cryptoasset. The original asset may experience a decrease in value as significant mining power (mining community support) shifts to the alternative forked chain. It must be clear that a number of factors, many unpredictable, can cause fluctuations in a cryptoasset's value during the duration of a fork. Please see Cryptoasset Pricing During Hard Forks on page 7 for further information.

Fork Coin Requirements

In any case, the priority will be to ensure that the value of an index during a fork is representative of the value distribution that occurs as a result of the mining community's shift from the original blockchain to that of the new chain. This involves adding forked coins of significance to index compositions when possible, provided that two main conditions are met:

1. Sufficient transactional data for the new forked coin is available from at least **three**[5] of our designated benchmark exchanges.

2. The forked coin meets CryptoCompare's basic criteria

If the forked coin does not meet the above conditions, the cryptoasset will be monitored after the fork date and re-evaluated following new information.

---

[5] This is subject to the characteristics of each index. For indices containing fewer than three constituent exchanges for pricing data, only condition 2 is relevant.

Benchmark Exchanges

Our benchmark exchanges have been chosen on the basis of industry reputation, sufficient liquidity, diversity of assets, experience within the industry, and the presence of public fork-related documentation via announcements, formal policies and social media feeds. These exchanges are well-equipped to deal with hard forks, and have proven their ability to consistency deliver high-quality data via an API.

We have taken time to research each exchange thoroughly, compiling a series of metrics that outline the fork policies of each exchange. This includes which major forks are currently listed, how extensively any fork-related information is documented, as well as how stringent each exchange is with respect to hard fork listings.

The more transparent and extensive the fork-documentation is in general, the easier it is to generate an actionable decision as to the treatment of hard forks. Ultimately, the treatment of a hard fork is derived from the listing policies of our benchmark exchanges, the preferences of the client, and CryptoCompare's own internal policies based on research into the publicly available hard fork criteria of over 100 exchanges.

Below is a brief overview of our designated benchmark exchanges, which may be subject to change if market conditions or events warrant such a change:

	June Total Volume (USD)	Coins	Fork Listing Stringency	Forks Listed
Binance	42,130 M	167	Moderate	BCH, BTG, BCD
Bitfinex	11,025 M	113	Moderate	BCH, BSV, BTG
Kraken	7,934 M	26	Moderate	BCH, BSV
itBit	510 M	1	No Forks	-
BitTrex	2,167 M	515	Moderate	BCH, BSV, BTG
Bitstamp	5,604 M	7	Strict	BCH
Coinbase	12,724 M	15	Very Strict	BCH
Poloniex	1,251 M	188	Moderate	BCH, BSV
bitFlyer	2,517 M	3	Strict	BCH
Liquid	1,537 M	91	Strict	BCH, UBTC
OKEx	33,754 M	182	Flexible	BCH, BSV, BTG, BCD, BCX, SBTC, UBTC
HuobiPro	27,594 M	135	Flexible	BCH, BSV, BTG, BCD, BCX, SBTC
Upbit	10,104 M	176	Moderate	BCH, BSV, BTG
Korbit	273 M	18	Moderate	BCH, BSV, BTG
Cexio	200 M	23	Moderate	BCH, BTG
Gemini	1,072 M	4	Very Strict	BCH
Zaif	501 M	56	Strict	BCH
Kucoin	2,177 M	212	Moderate	BCH, BSV, BTG, BCD

CryptoCompare's Hard Fork Criteria

The following fork criteria, both pre-fork, and post-fork have been compiled following research into a combination of exchange fork policies, case studies and known characteristics of forks and fork teams over the last two years. It is impossible to predict exactly how a fork event will unfold leading up to fork date, or if the fork will even occur. There are chances that a fork or upgrade will be cancelled or postponed. In any case, it is necessary to have a criterion with which to judge "potential" forks, as well as forks that have already occurred. For this reason, we have curated both pre- and post- fork criteria that help us to evaluate any significant forks as objectively as possible.

It should be noted that the below criteria are used as a basic template with which to evaluate hard forks. It is up to the discretion of the fork administrative team to evaluate each fork using the metrics that are deemed suitable for the fork in question.

Pre-Fork Criteria

Top Tier Exchange Support: We follow our list of top tier benchmark exchanges as best practices. At minimum, there should be evidence of support for a fork via a public announcement from our benchmark exchanges. Frequently, announcements might not become available until a few days before the fork. In this case, announcements are monitored closer to the fork date.

Community Support: This is measured by the number of Twitter followers on the Twitter account of the fork team. Social media presence is often an important baseline for garnering support for a project. Other relevant considerations are public indications of support from major industry companies, key individuals, exchanges and large mining pools.

Public Project Teams: This indicates that there are people that can be held accountable for any liability. Teams that operate anonymously might suggest a potential for malintent.

Open-Source Code: This makes code auditing and vulnerability checks possible, as well as an overview of the proposed changes available.

Presence of a Pre-mine: Forks that implement a pre-mine are usually at greater risk of pump and dump schemes or other malicious intentions. However, transparency in terms of the total supply of the new coin and the development intentions of the project team can mitigate the expected probability of this risk.

Expected Market Value	This can be most easily gauged by using pricing data from pre-fork trading tokens (or fork futures), if they are offered on our benchmark exchanges. Other estimations of value can come from data related to mining pool support for either chain and the potential hash power they have at their disposal.
Project Roadmap	Some indication of the specific change or solution that differentiates the potential forked chain from the original chain.
Fork Token Supply	It is common for fork teams to designate an arbitrary total supply of a fork coin. For market cap-weighted indices, this can result in substantial weight to the new coin in the portfolio. As a result, we will focus on fork coins that designate a 1:1 ratio of original to forked coins.

Post-Fork Criteria

A Hard Fork has been Confirmed	Multiple diverging blockchains are in coexistence post-fork and share the same transaction history. Each blockchain is actively being mined such that transactions can be processed.
Satisfactory Trading Activity	Assuming the hard fork is listed on at least 3 benchmark exchanges, at least 100 trades must occur per day. Fork volume should represent at least 10% of the combined trading volume of the original token pair and forked coin pair.
Significant Market Value	The new fork token must trade at a price greater than or equal to 10% of the combined price of the original token pair and the forked coin pair.

Hard Fork Procedures

Fork Events Monitoring and Reporting

Hard forks are regularly monitored by the fork committee. Any forks discovered are then evaluated on the basis of CryptoCompare's basic pre-fork criteria. The committee will then decide whether a given fork might be significant enough to be considered for index inclusion.

Following the evaluation, fork events are added to a designated database stating the appropriate index treatment using the best available information, along with relevant dates, details, and descriptions.

Fork treatments are re-evaluated on a weekly basis and updated in the database. For forks that are closely approaching, research into any fork developments is conducted more frequently leading up to the fork date. It is common to see new fork information appear extremely close to the fork date. Due to this, on the days before the fork, research is conducted multiple times a day to ensure that any relevant information is captured that would alter any fork treatments in affected indices.

Governing Committees and Teams

Weekly meetings are conducted between Research and Data Products. Meeting notes are collected, upcoming forks as well as past forks are discussed such that all teams are fully aware of any developments. Any fork implementations are agreed upon and governed by both Data Products and Research.

Potential Implementation Procedures for Hypothetical Scenarios

Given the unpredictable nature of hard forks and limited transactional data throughout certain fork events, implementation procedures are subject to change using the best available information and judgement at the time of the fork. In the interests of providing the most representative market data using the best available information at hand, the priority will be to integrate pricing data with as little delay as possible for any client index, provided that CryptoCompare's fork conditions (see page 21) are met and it is deemed reasonable by the implementation team to do so.

Below are a set of pre-fork initial procedures that must be carried out in order to correctly map fork pairs to an exchange, and to ensure the availability of trading data that represents the correct cryptoasset. Next, a series of potential scenarios are laid for significant forks that are likely to meet CryptoCompare's basic fork criteria.

Basic Initial Procedures

Assuming information is available from our benchmark exchanges:

1. Check for pre-fork trading tokens
2. Correctly map tickers and pairs to the assets they represent
3. Confirm which exchanges will enable trading throughout the fork
4. Sanity check pricing for each exchange market against the majority

Hypothetical Scenarios

SCENARIO 1: There are **pre-fork tokens** trading on **at least 3 benchmark exchanges**

Pre-Fork

Step 1   Transactional data is collected from exchanges that offer pre-fork trading tokens; tokens are mapped to the correct assets. The main purpose of this is to ensure we obtain a representative pricing feed for the forked coin, as exchanges without pre-fork tokens do not usually list new assets at the time of the fork due to the risks involved.

Pre-fork tokens (futures) are unique, in that they are tokens (possibly created on Ethereum) that trade on the perceived value of the fork and original coin. There is therefore minimal risk of loss due to hacking as a result of fork chain instability during and after the fork. After the fork date, once the forked blockchain is deemed stable and usable, the appropriate assets are then deposited into the traders' wallets, and withdrawals are eventually enabled[6].

Step 2   Before the fork, data collection continues for original cryptocurrency pairs[7] on all existing exchanges up to 30 minutes before the fork (this might change depending on announcements) from benchmark exchanges. From this point, certain benchmark exchanges will close markets, and will disable all deposits and withdrawals as a matter of policy and as a safety precaution.

Step 3   From 30 minutes before the fork to the expected time of the fork, benchmark exchanges that enable trading throughout the fork, AND have been explicit as to what exactly their ticker represents[8], will be placed on a list of potential constituent exchanges for a switch at the time of the fork. If there is any uncertainty over which tickers represent which asset, we revert to a potential scenario 3 below if there are fewer than 3 benchmark exchanges that are correctly mapped with certainty for each asset.

---

[6] Assuming the exchange involved has stated its intention to do so
[7] Bitcoin Cash (BCH) for instance at the time of the Bitcoin SV (BSV) fork.
[8] At the time of the Bitcoin SV fork (~15th November), exchanges used a variety of ticker names ranging from BCH to BCHABC and BAB to represent Bitcoin Cash. However, there was a good chance that Bitcoin SV would come out as the dominant fork, and therefore it was unclear whether BCH would then represent the original Bitcoin Cash, or the fork Bitcoin SV. Therefore, it was important to use only explicit public declarations from exchanges and best judgement to determine what each asset represents to avoid mapping errors.

Fork Time

At the time of the fork, the pricing feed for the affected assets is switched such that we use our benchmark exchanges that have confirmed trading during the fork and have clear ticker associations. This may be accomplished using a combination of pre-fork and original token pairs. This should result in a smooth pricing stream with minimal lag for both the original and forked asset.

Depending on the preferences and characteristics of affected client indices, index compositions will be updated to include live pricing data for the additional forked asset. Our recommendation is to implement a minimum 1-day index suspension period during which to assess the pricing feeds of pre-fork token markets.

Post-Fork

It is important to first confirm whether a successful fork has occurred following our basic post-fork criteria. Once this is confirmed, other benchmark exchanges will wait until they deem the forked and original blockchain to be secure and stable. Following this, exchanges then begin to list new forked tokens and to open original asset markets.

As exchanges open both existing and new markets, they may choose to rename tickers. Here it is important to ensure that all tickers are mapped correctly following a public announcement from the exchange. Once this is accomplished, a pricing sanity check is conducted and transaction streams are integrated.

SCENARIO 2: **No pre-fork trading** on any benchmark exchanges, some **original asset markets remain open** throughout the fork event.

Pre-Fork

In this case, there is no way to track an expected fork price prior to or during the fork event using benchmark exchanges. However, it is possible to maintain live pricing feeds for original asset markets from benchmark exchange markets that remain open. This procedure continues from Step 2 of Scenario 1.

Fork-Time

Provided that ticker associations are confirmed, pricing data continues to feed in from benchmark exchanges that have confirmed uninterrupted trading throughout the fork. At the fork time, assuming a fork is significant and meets CryptoCompare's pre-fork criteria, it will be added to an index with a price of 0 until pricing data becomes available.

Post-Fork

Similar to the Post-Fork procedure of Scenario 1. Pricing streams for the new forked coin will be added to the index provided that appropriate data becomes available, pair mappings can be confirmed, and conditions are safe to do so.

SCENARIO 3: **No pre-fork tokens** AND **all fork-affected markets closed** on constituent benchmark exchanges

Pre-Fork

Similar to Scenario 2, there is no way to track an expected fork price throughout the fork event. As a result, index dissemination would continue up to the point in which markets are closed by our group of benchmark exchanges. After this, the price of any fork-related markets will represent the last available price before market closures.

Fork Time

No pricing streams will be disseminated to fork-affected indices.

Post-Fork

Similar to the previous procedures, it is important to first confirm whether a successful fork has occurred following our basic post-fork criteria. Once at least 3 of our benchmark exchanges have opened original fork-affected markets, we will begin the dissemination of data at a specified time following a period of monitoring.

Subsequent procedures are similar to that of the previous scenarios as exchanges begin to list forked coins, and open existing markets.

Implementation Options

Contingent upon data being available and accurate, we are able to provide index clients with bespoke hard fork implementation solutions depending on their preferences. However, we recommend a conservative approach with a minimum pricing suspension period such that investors are insulated from any unpredictable factors or serious market swings following the fork event.

Common Data Difficulties During Hard Forks

1. **Ticker Identification:** Fork ticker allocation across exchanges is often inconsistent. Certain exchanges maintain the same ticker name for the original asset while others decide to create two new tickers to differentiate the original and the forked asset. Without explicit announcement from exchanges, it is difficult to confirm what exactly each ticker represents following a hard fork.

2. **Exchange Announcements:** Some exchanges are very explicit as to how they will proceed throughout a hard fork, in terms of market closures, ticker allocation etc. Others provide little to no indication.

3. **Opening/Closure of Fork-Affected Markets:** After a hard fork, exchanges tend to re-open fork-affected markets at varying times. This is also the case for when new listings for fork markets will take place.

4. **Exchange Treatments:** Exchanges manage the risk of hard forks differently, from complete closure of all fork-affected markets, to the early provision of pre-fork trading tokens. It is important to maintain the most recent information such that the best implementation strategy can be put in place using our pool of benchmark exchanges.

5. **Market Prices:** Assuming ticker associations are made explicit, there may still be variations in market pricing for the original asset. Market prices might represent the sum of both the original forked asset, or one single asset. This makes it important to maintain a selection of potential exchange markets such that the most representative price can be chosen for pricing feed purposes.

6. **Data Availability:** In many cases, it is unclear when exactly transactional data will be available from each exchange API, or if the forked asset will even trade sufficiently to be considered significant.

7. **Volatility:** At the time of any fork, markets often experience high volatility and rapid price swings. As only a few exchanges maintain open markets during a fork, the resulting lower liquidity increases the risk of market manipulation on those markets.

8. **Fork Result:** Finally, it is difficult to predict with full certainty if a fork will occur. They do run into problems and delays. Furthermore, assuming a fork occurs, there may be some ambiguity as to which chain is dominant just after the fork event and as a result, how exchange will treat each chain.

CryptoCompare's Hard Fork Recommendation Summary

Given the considerations discussed in the above sections, we have curated a hard fork recommendation that addresses the need to capture representative pricing data with minimal gaps in data provision, while also maintaining a strict criterion that helps to manage the risks associated with hard forks.

General Fork Criteria

1. Fork markets listed and supported by at least 3 benchmark exchanges
2. Sizeable community support, judged by Twitter followers, exchange support and significant mining pool support.
3. Public project teams and open-source code
4. Sufficient reason for pre-mine if applicable
5. The forked chain is announced well in advance of its activation date
6. Significant market value judged by market cap and/or price
7. A successful, stable and secure hard fork has been confirmed
8. Fork transactional data is available via exchange APIs
9. Fork markets offer sufficient liquidity compared to original markets

Implementation

Use of Pre-Fork Tokens – Exchanges often take time to list new forked markets following a fork event. As a result, pricing data just immediately after a fork event is limited. In the interest of providing the most representative and accurate estimation of price with minimal pricing suspension, pre-fork tokens can be used in the absence of any other superior data. Once benchmark exchanges begin to list fork markets, and markets can be mapped with certainty, pricing streams for both the original and any new forked markets can then be added to provide the best price estimations.

One Day Minimum Suspension – We recommend that pricing streams are suspended for a period of at least a day after a fork date to ensure that the fork criteria remain fulfilled, data streams can be maintained, and the correct ticker mappings can be confirmed. Hard forks result in thinner markets, and this, combined with the potential for market manipulation, incomplete information, and risk of hacking of to the network, can lead to wild speculation and volatility in prices. This period is important such that any index is insulated from these potentially erratic and unpredictable price swings immediately following a fork.

Basic Procedure – At the time of the fork, pricing feeds to affected indices will be suspended for a minimum period of 1 day. In the meantime, pre-fork trading data will be monitored and maintained such that the fork criteria are met. Once this period has passed, and providing data is available, a pricing feed for both original and forked markets will be disseminated to any affected indices using pre-fork token data if no superior data sources are available.

We recommend a strict policy contingent upon all conditions being met, and a further testing period put in place if required. Please note that these recommendations are only guidelines and each forked coin should be considered on an individual basis.

CryptoCompare's Pair Mapping and Ticker Allocation for Forks

Ticker Names across Exchanges

Hard forks, once listed on exchanges are often represented by varied tickers and coin names. There are many cases where fork developer teams designate a ticker name for their fork token that isn't necessarily equivalent to that listed on exchanges[9]. It is therefore essential that appropriate ticker names are designated to forks such that the correct assets are mapped across all exchanges.

The Dominant Chain Maintains the Original Ticker Name

By default, after a contentious hard-fork, the dominant chain will normally maintain the original coin and ticker name.

Asset Names do not Change after a Non-Contentious Fork

Note that ticker and coin names do not usually change following a non-contentious network upgrade.

Effort will be made to Assign a Representative Ticker and Coin Name

After a hard fork, effort will be made to allocate ticker names that best meet the requirements of the developers in charge of the forked project, as well as the choices of the most prominent benchmark exchanges. However, this depends on technical resources and whether a ticker name is already taken by an existing token of significant value on CryptoCompare.

---

[9] For example, Bitcoin SV is listed as BSV and BCHSV depending on the exchange. Similarly, Bitcoin Cash is listed as BCH, BCC, BCHABC etc.

Data Provision for API Users During Hard Forks

Limited Fork Transactional Data via Dashboards and APIs

As a security precaution, exchanges often close any fork-affected markets just prior to a contentious fork event. As a result, minimal transactional data will be processed via APIs and there is a chance that prices will reflect the last available prices for the duration of the fork event. Once markets have re-opened and live data is available, transactional data will then be processed for exchanges that have resumed trading for original as well as fork markets, and will be subsequently available via the API.

For non-contentious forks, there are usually no temporary gaps in transactional data availability as exchanges tend to keep markets open throughout these events. Therefore, users will still be able to access live data for the fork-affected asset via the API and market dashboards.

Ticker Name Changes

Following any fork market listing on exchanges following a fork event, we list coins and ticker names using the best available information at the time. However, there may be cases where it is more representative to use an alternative coin and ticker name further down the line. In this case, ticker names may be modified. This may lead to fork data being unavailable temporarily as tickers are renamed and mapped in our internal systems.

Pre-Fork Futures Data

Provided that transactional data is available on exchange APIs, we do our best to list pre-fork futures tokens from prominent exchanges on CryptoCompare prior to any fork. Where no other data is available, this provides a good way of tracking fork prices and community support throughout the entirety of a fork event. Please note that we do not advise the trading of pre-fork tokens throughout any fork event.

Announcements

API users will be promptly and regularly updated of any hard fork events or necessary internal technical changes that could affect data feeds for fork and fork-affected markets.

Conclusion

Hard forks, predominantly those with anonymous developer teams, came to mainstream prominence in late 2017 following the Bitcoin Cash fork in August 2017. At the time, markets were bullish and for those that entered the cryptocurrency industry early, returns would have been significant. With retail investors looking to speculate, hard forks would have appeared a great target as they guaranteed traders "free" tokens on the diverging chain, that they could then sell on a very active market at high prices. This was a very profitable time for fork teams, who took advantage of market hype and unsuspecting retail investors by quickly selling off pre-mined tokens on any exchanges that would list them. This was achievable given the limited knowledge about the risks of claiming and trading hard forks at the time.

The hype around hard forks has since passed, with only a few new forks of any significance occurring towards the end of 2018. Network upgrades via hard forks are common and usually harmless, but some caution must be taken nonetheless as they may run into issues. It is contentious and anonymous forks that traders should be well aware of. Large contentious forks such as that of Bitcoin SV have led to widespread community conflict, uncertainty, higher risks of network attacks, and volatile prices. Anonymous coins have similar dangers but are much easier to avoid, and have a far less impact on the industry as a whole. The simplest and most effective risk mitigation is to move funds out of insecure wallets or exchanges.

Exchanges manage hard forks in various ways, some with stricter listing policies than others. There is variation as to when exchanges list new forked coins, and how tickers are named once a fork has occurred. This has obvious implications on data validation, ticker mapping and data collection throughout fork events. Many reputable exchanges close all fork-affected markets during a contentious hard fork event, as well as disable withdrawals and deposits of the affected asset.

There are however some exchanges that offer pre-fork trading tokens which are effectively fork futures, that allow traders to continuously track the expected price of original and forked assets without any gap in trading. When possible, pre-fork pricing data can be used to calculate the most representative value of a forked token when no other data is available.

Index clients that wish to incorporate forked assets into constituent index components, should only consider those that are significant in market value and listed by our benchmark exchanges, provided that they meet certain strict criteria. We recommend a conservative fork policy implementation with a suspension of at least one day such that potential risks to data integrity and investor funds can be mitigated.

*For API users interested in the fork data available from exchanges before, during and after forks, please use the API. For those interested in accessing CryptoCompare's data for their own purposes, whether it be cryptocurrency trade data, order book data, blockchain data, social data or historical data across thousands of cryptocurrencies and 200+ exchanges, please take a look at CryptoCompare's API here: **https://min-api.cryptocompare.com***

DISCLAIMER

THIS REPORT IS FOR INFORMATIONAL PURPOSES ONLY, YOU SHOULD NOT INTERPRET ANY SUCH INFORMATION AS LEGAL, TAX, INVESTMENT, FINANCIAL, OR OTHER ADVICE.

Terminology

Fork

A fork is an event that splits the existing blockchain protocol into two or more versions using a different set of rules and features. The additional versions all share the same history.

Soft Fork

A soft fork occurs when the underlying protocol of a blockchain is changed, such that it continues to be backwards compatible with older versions. This means that participants that still operate on the older blockchain protocol will still be able to validate and verify transactions on the upgraded version.

However, functionality for those that have yet to upgrade to the new protocol may be affected; for instance, non-upgraded miners looking to mine new blocks on the upgraded protocol may have their efforts rejected on the new network. Hence, a soft fork encourages the remaining minority of older participants to gradually upgrade to the new software.

Hard Fork

A hard fork occurs when a blockchain protocol is changed, such that it becomes incompatible with older versions. In effect, participants taking part in transactions on the old blockchain must upgrade to the new one in order to continue validating transactions. However, participants that do not upgrade may continue to support and validate transactions on the older blockchain protocol separately.

The result of this is that a blockchain splits into two - hence the name "hard fork". If there are nodes permanently supporting the new chain, then the two chains will co-exist.

Users that once held cryptocurrency on an older blockchain before the protocol change at a pre-specified blockchain length will now also hold an amount of new cryptocurrency on the altered blockchain. This new cryptocurrency has essentially been derived from an older cryptocurrency as well as its associated blockchain's transaction history and is known as a "forked coin".

Chain Split/Coin Split

Split of a blockchain after a hard fork, that results in the creation of a new coin that shares the history of the old coin.

Planned Hard Fork

A planned hard fork is a type of hard fork that occurs as a result of a scheduled blockchain protocol upgrade based on a project's pre-stated development plan. In this case, the older protocol will cease to be supported if all goes to plan and the fork will not involve the creation of a permanent separate chain.

Contentious Hard Fork

This type of hard fork occurs after a longer period of debate, discussion and disagreement within the cryptocurrency community on whether to formally implement a hard fork and the associated protocol changes. Despite the disagreement, some within the community decide to implement a hard fork anyway, leading to what can be defined as a "contentious hard fork". Examples of contentious hard forks are Ethereum Classic, Bitcoin Cash and Bitcoin SV.

Anonymous Fork

These hard forks, unlike contentious forks or planned forks, come into existence relatively under the radar and on short notice, from anonymous developers that sometimes implement what is known as a "pre-mine". This allows a fork team to mine a percentage of the total supply of a forked coin before the wider mining community is able to do so. This pre-mined cryptocurrency is generally claimed to be allocated to project development and growth funding, however many fork teams might be looking to instead profit by getting their forked tokens listed on exchanges so that they could quickly sell off their pre-mine holdings or manipulate fork markets. These forks aim to re-use the brand of well-established coins to gain publicity, and hence listings on exchanges. Examples of these anonymous forks include Bitcoin GOD, MoneroV and Super Bitcoin.

Pre-mine

Before releasing a blockchain to the public, developers decide to start running nodes to 'pre-mine' coins up to a percentage of the total supply. This is often justified by most project teams, with a plan to cover future development and operational costs.

Spin-Off Coin

A spin-off coin is derived from a specific blockchain's original protocol. However, only the blockchain's code is copied and altered rather than its chain history, so it is not technically classified as a forked coin in our context. Using an altered blockchain code with unique characteristics, a brand new blockchain is created and begins with no prior transaction history.

Crypto Compare

Replay Attack

When a hard fork occurs, the original blockchain protocol as well as its transaction history is duplicated. As a result, a user will possess both a quantity of the original blockchain's coins as well as a quantity of the new blockchain's coins. However, in the absence of "replay protection", transactions involving the transfer of the original blockchain's coins are valid on both chains. That is, if one user intends to transfer one original coin to another user, this transaction is also valid on the new coin's blockchain. This transaction is now public, which exposes a security vulnerability in which an attacker may fraudulently or maliciously "replay" this same transaction on the new forked blockchain or vice versa.

Two-way Replay Protection

In order to protect against replay attacks, the blockchain protocol is able to implement 2-way replay protection that eliminates the possibility of any duplicate transactions arising on both blockchains. This means that transactions from the original chain are never valid on the new altered chain after the hard fork occurs and vice-versa.

Airdrop

An "airdrop" occurs when a blockchain project distributes free tokens or coins to the cryptocurrency community. In order to obtain these, often the only requirement is for someone to already own coins from the relevant blockchain (such as Bitcoin or Ethereum) stored on their wallet. Airdrops may require social media posts in favour of the project in question, or directly contacting a member of the relevant project team on a designated forum to claim any free coins.

Hash Power

Hash power is the measuring unit that measures how much power a cryptocurrency network is consuming to be continuously functional, that is, how much hash power is consumed to generate blocks at some specific rate.

Mining Pool

A mining pool is a joint group of cryptocurrency miners who combine their computational resources over a network to mine cryptocurrency, and share the reward between themselves, usually in a way that represents their respective contributions to the mining activity.

Miner

A miner is an individual who mines a cryptocurrency, which involves validating blocks of transactions. The miner receives some amount of the cryptocurrency as a reward for this, which is the mechanism used to increase the total supply of the cryptocurrency.

Node

A node is an entity on a blockchain network, that is in essence the foundation of the technology, allowing it to function and survive. It can be any active electronic device as long as it is connected to the internet. The role of the node is to support the network by maintaining a copy of a blockchain and, in some cases, to process transactions.

Testnet

A global testing environment in which developers test decentralized projects. Testnet coins are separate and distinct from actual coins, and are never meant to have any value. This allows application developers to experiment without having to use real cryptocurrencies. This is an important part of a cryptoasset's development as it allows developers to discover any bugs and vulnerabilities in the network code and to ensure that the final network would in fact maintain stability and functionality.

Smart Contracts

Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into code. The code and the agreements exist across a distributed, decentralised blockchain network. Smart contracts permit trusted anonymous parties to transact without the need for a central authority, legal system, or external enforcement mechanism. They render transactions traceable, transparent, and irreversible.

51% Attack

A 51% attack, or double-spend attack, occurs when a miner or group of miners attempt to spend cryptocurrencies on a blockchain twice, by exploiting control over the majority of the hash power.

Chain Split/Pre-Fork Tokens

Chain split or "pre-fork" tokens are assets created by exchanges in expectation of a fork such that traders can speculate on the value of the original asset as well as its expected fork, prior, during and after the fork date. Traders are usually able to convert the original asset into equivalent amounts of these chain-split tokens before the fork if they wish to trade. Following the fork, assets are distributed into users' accounts depending on the outcome of the fork. This technique allows an exchange to offer live trading of forked assets throughout a fork event, when most exchanges would typically close their markets as a security measure. Exchanges that have offered this model include Bitfinex, Poloniex and HitBTC.

Clean break

A clean break occurs after a hard fork, when the new chain cannot be wiped out by the original chain. Essentially, a successful and permanent hard fork has occurred.

Scaling

Scaling refers to a series of additional blockchain measures or features implemented by developers such that a given blockchain, growing in usage, can effectively handle the increased network load of transactions in the future. A blockchain that becomes sluggish or inefficient due to a load it cannot handle is a situation known as "blockchain bloat". Depending on the blockchain, there are several scaling solutions that have been proposed, ranging from increasing the block size, or implementing the Lightning Network in the case of Bitcoin, or "sharding" and the Raiden Network in the case of Ethereum.

Selected References

Please note that detailed fork policy summaries are available on request, and were derived from a combination of social media resources, announcement pages, formal policy documents, terms & conditions pages etc. Given the extent of these resources, we have omitted them from the resource list below. Please contact research@cryptocompare.com for more information.

Josiah Wilmoth. 2018. Bitcoin Cash: Where the 4th-Largest Cryptocurrency Stands the Day after the Fork. https://www.ccn.com/bitcoin-cash-where-the-4th-largest-cryptocurrency stands-the-day-after-the-fork

BitMEX Research, 2018. Url: https://twitter.com/BitMEXResearch/status/1063400765119758336

Aziz. 2017. Guide to Forks: Everything You Need to Know About Forks, Hard Fork and Soft Fork. Url: https://masterthecrypto.com/guide-to-forks-hard-fork-soft-fork/

Cryptocurrency Facts. 2017. How to Get "Forked Coins" From Bitcoin Forks. Url: https://cryptocurrencyfacts.com/how-to-get-forked-coins-from-bitcoin-forks/.

Jimmy Song. 2017. How Segwit2x Replay Protection Works. Url: https://bitcointechtalk.com/how-segwit2x-replay-protection-works-1a5e41767103.

Steven Hay. 2018. How to Profit and Claim Bitcoin Forks in 2018 – The Ultimate Guide. Url: https://99bitcoins.com/how-to-claim-bitcoin-forks-guide/. Accessed 43154]

Sudhir Khatwani. 2018. Explaining Hash Rate or Hash Power in Cryptocurrencies. Url: https://coinsutra.com/hash-rate-or-hash-power/

Jake Frankenfield. 2018. Mining Pool. Url: https://www.investopedia.com/terms/m/mining-pool.asp

Lisk. Accessed 2019. Nodes. Url: https://lisk.io/academy/blockchain-basics/how-does blockchain-work/nodes

Bitcoin.org. Consensus Rules, Validation Rules. Url: https://bitcoin.org/en/glossary/consensus-rules

TokenMarket. Testnet. Url: https://tokenmarket.net/what-is/testnet/

Jimi S. 2018. Blockchain: how a 51% attack works (double spend attack). Url: https://medium.com/coinmonks/what-is-a-51-attack-or-double-spend-attack-aa108db63474

Mohit Mamoria. 2017. Lightning Network, Explained. Url: https://cointelegraph.com/explained/lightning-network-explained