Forking Belief in Cryptocurrency: A Tax Non-Realization Event

David G. Chamberlain
California Polytechnic State University

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by

David G. Chamberlain*

ABSTRACT

When the community of believers in a cryptocurrency splits into two, the currency may experience a "hard fork" and split into two independent currencies. Indeed, like fiat currencies, cryptocurrencies only have value if people believe they have value and are willing to use them in transactions. Hard forks do not create new value unless they inspire new belief; otherwise, they merely split the value of the original currency between the two new currencies. The Internal Revenue Service is wrong to conclude in Revenue Ruling 2019–24 that the value of the new currency resulting from a hard fork constitutes gross income in the hands of coin owners. A hard fork is properly understood as a division of each coin of the original currency into two resulting coins and is no more a taxable event than when a property owner subdivides a larger parcel of land into two smaller lots. The appropriate question is not whether there is income, but how the owner's basis in the original property should be split between the two resulting parts. After delving into the nature of hard forks and exploring the governing law, the author suggests an approach for basis allocation.

I. INTRODUCTION

Ever since *The Economist* extolled Bitcoin as "digital gold" in 2013,[1] cryptocurrency has been seen as a strange and mysterious development in both money and technology. Cryptocurrency hard forks, where one currency splits and becomes two, may seem to be the most mysterious phenomenon of all. Certainly, "fiat" currencies like the U.S. dollar and other national currencies are incapable of duplicating such a feat.[2] In light of the extreme novelty, it is not surprising that the treatment of hard forks has generated much confusion and controversy in the tax world. That confusion is quite apparent in Revenue Ruling 2019–24 (Ruling),[3] the latest guidance from the Internal Revenue Service (Service). The facts and analysis in the Ruling show a fundamental misunderstanding of how forks work.[4] This confusion inevitably leads to an incorrect holding that hard forks are realization events that produce gross income subject to the income tax.

1.	*Mining Digital Gold*, ECONOMIST (Apr. 13, 2013), https://www.economist.com/finance-and-economics/2013/04/13/mining-digital-gold. This Article will follow the convention of using the capitalized form (Bitcoin) to refer to the cryptocurrency and the uncapitalized form (bitcoin) to refer to particular coins.

2.	A "fiat" currency is a national currency that is not backed by gold or anything other than the faith and credit of the issuing government.

3.	Rev. Rul. 2019–24, 2019–44 I.R.B. 1004.

4.	Specifically, the Ruling shows confusion between hard forks and airdrops, two very different events. *See* David G. Chamberlain et al., *Disappearing Forks and Magical Airdrops*, 165 TAX NOTES FED. 791 (Nov. 4, 2019). The confusion, and its implications, is discussed further in Part VI below.

However, cryptocurrency in general—and hard forks, in particular—are by no means beyond comprehension by the lay person. Once their true "essence" is understood,[5] the proper treatment of hard forks is not a difficult problem at all. With billions of dollars at stake, this is not an arcane question.[6] Moreover, it is a question well worth studying as it implicates the "realization" doctrine, which lies at the very heart of income tax theory and practice. Solving the problem requires close consideration of the lessons of the key Supreme Court cases *Eisner v. Macomber*[7] and *Glenshaw Glass*.[8]

Like fiat currency, cryptocurrency is only valuable if people *believe* it is valuable and are willing to use it in transactions. For example, if someone is willing to sell me a car worth $32,000 for five bitcoins, that is a clear indication that the currency has value. Indeed, the total "market capitalization" of all cryptocurrency at any point in time is a viable measure of people's aggregate belief in cryptocurrency.[9] Absent a change in people's level of excitement about cryptocurrency, all that a hard fork can do is divide the amount of belief in the original currency between the two currencies resulting from the fork. If news of a particular fork gets people excited about cryptocurrency, the combined value of the coins may increase. On the other hand, if a particular

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5. *See* Eisner v. Macomber, 252 U.S. 189, 215 (1920) (holding that market prices are an "unsafe criterion" for determining whether a stock dividend is "in truth and in essence" a realization event).

6. Take, for example, the August 2017 hard fork that created Bitcoin Cash (BCH), which is the fork most widely discussed by tax practitioners and tax scholars. After the fork, the market capitalization for BCH was about $6.3 billion, according to data compiled by coinmarketcap.com. *Historical Data for Bitcoin Cash*, COINMARKETCAP, https://coinmarketcap.com/currencies /bitcoin-cash/historical-data/ [https://perma.cc/D73P-456B] (last visited June 6, 2021) [hereinafter *Historical Data Bitcoin Cash*] (comparing historical data on July 21, 2017 to August 1, 2017).

7. 252 U.S. at 189.

8. Comm'r v. Glenshaw Glass Co., 348 U.S. 426 (1955).

9. For example, according to coinmarketcap.com, the total market capitalization of all cryptocurrency at the time of writing (June 11, 2021, at 10:50 am PST) is over $1.5 trillion. *Global Charts: Total Market Capitalization*, COINMARKETCAP, https://coinmarketcap.com/charts/ (last visited June 11, 2021).

fork causes people to lose confidence in cryptocurrency, the combined value may decrease.[10]

In all cases, the true essence of the fork is a division of each coin of the original currency into two coins of the resulting currencies, much like a subdivision of real property divides a single parcel into separate lots. While each currency—like each real property lot—has its own characteristics, the division itself is not a realization event and is therefore not taxable. The central premise of the realization principle is that appreciation in the value of an asset is not included in gross income until there is a sale or other disposition of the asset. While it is open to dispute whether the realization requirement is mandated by the Constitution, it is clearly the foundation of the income tax system as designed by Congress.[11] In a hard fork, as in a real property subdivision, the asset owner does not give up anything and does not receive anything from a counterparty. Therefore, there is no sale or disposition that can "unlock" any unrealized gain or loss in the cryptocurrency coins. Gain or loss is not realized—and therefore should not be taxed—until one or both of the resulting coins is sold.

The Service's Ruling fails to recognize that the essential nature of a hard fork is a division of property. Most scholars writing on taxation of hard forks make the same mistake.[12] In fact, they do not analyze hard forks within the framework of property-related events, whether they be dispositions or mere reconfigurations of the property. For example, the Ruling identifies one of the resulting cryptocurrencies as the "new" currency and treats the coin owner's "receipt" of new coins as an "accession to wealth" that is fully taxable. The Ruling does not take into consideration the amount of the original coin's unrealized gain—or indeed whether there is any unrealized gain at all. The Service does not try to characterize the type of income involved, but other scholars use various analogies, including in-kind dividends, found property, and unsolicited samples.[13] All of these approaches miss the

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10.   Part VII of this Article explores this phenomenon in the context of two real-life forks.

11.   *See, e.g.*, I.R.C. § 1001. Exceptions to the realization requirement, such as the mark-to-market rules of § 1256, must be explicit.

12.   The term "scholar" here is used broadly to refer to any author who has written on the topic, including those who might more comfortably be described as "practitioners" (such as lawyers or accountants).

13.   *See infra* notes 104–107 and accompanying text.

mark: neither resulting currency is actually new; no coins are actually "transferred" or "received"; and there is no accession to wealth.[14]

Once it is understood that a hard fork is a division of an original coin into two resulting coins, the only difficult question is how to allocate basis between the two coins. Caselaw provides three unsatisfactory approaches: an allocation based on relative values at the time the original coin was acquired, an assignment of zero basis to one of the two coins, or an "open transaction" approach that assigns basis only when one of the coins is sold.[15] The better approach, drawn by analogy from specific statutory provisions relating to corporate taxation, is to allocate basis in proportion to relative values of the two coins at (or near) the time of the hard fork.[16] Unfortunately, this approach is also problematic due to difficulties of valuation. I propose a method whereby the Service publishes allocation percentages for all forks occurring during the year in a manner similar to the publication of applicable federal rates for interest. This allocation would either function as a safe harbor or, potentially, be made mandatory through a new Treasury regulation.

This Article works its way through the important issues in nine parts. Part II explores the nature of money and how cryptocurrency fits in. Part III is a brief primer explaining key aspects of cryptocurrency algorithms and the forking process. Part IV demonstrates that the realization principle forms the foundation undergirding the U.S. income tax system. Part V analyzes tax authorities proving that hard forks, like other property divisions, are not realization events. Part VI considers where the Service (and others) have gone wrong in their approaches to taxation of hard forks. Part VII uses two real-life hard forks to illustrate the central insights of this Article. Part VIII puts forward my proposal for allocating basis between the cryptocurrency coins resulting from a hard fork. Finally, in a concluding example, Part IX contrasts the Service's method and my proposed method in the context of one of the real-life forks.

II. Money Is a Measure of Belief

Cryptocurrency has many skeptics. While I myself question its sustainability in the long run, there is no doubt in my mind that

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14.   *See infra* notes 40–41 and accompanying text.
15.   *See infra* Part VIII.
16.   *See infra* note 141 and accompanying text.

cryptocurrency is "real" money. Money solves the central problem of barter, known as the "coincidence of wants."[17] That is, in order to undertake commerce in a simple barter system, two parties must each "want" what the other one possesses. The earliest money consisted of an intermediate good that all participants in a market agreed was valuable and would accept as payment for the goods they possess. Gold is the most storied and prominent example of this type of money: I will accept gold from you as payment for my goods because I have the expectation that someone else will accept that gold as payment for goods that I want.

While gold has intrinsic value due largely to its beauty and usefulness as jewelry, it is not necessary for a "token" to have intrinsic value in order to be used as money. Paper currency is an obvious example. For example, a $100 bill is worth much more than the paper it is printed on. Livio Stracca, Head of International Policy Analysis at the European Central Bank, offers an excellent explanation:

> How can something without intrinsic value (with a relative price of zero against any other commodity) arise as a credible means of payment? It can only do as a result of a social convention based on collective imagination. A society can *pretend* that something intrinsically worthless has positive worth if used as an intermediate element in transactions.[18]

In short, cryptocurrency *is* money precisely because enough people—in their collective imagination—*believe* that it is money. It is possible to quantify this belief. A cryptocurrency coin has a value in dollars at the price that it trades. The measure of belief in a particular cryptocurrency is its so-called market capitalization—i.e., the trading price for a coin multiplied by the number of coins outstanding. The combined market capitalization of all cryptocurrencies is a good measure of people's collective belief in cryptocurrency as money.

Cryptocurrency has the three textbook characteristics of money. It is a medium of exchange, a store of value, and a unit of

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17. Livio Stracca, The Economics of Central Banking 3 (2018).
18. *Id*. at 4–5 (emphasis in original).

account.[19] To function as a medium of exchange, a token typically must be portable, durable, divisible, and hard to forge.[20] Cryptocurrency coins can be used and verified by anyone who has a computer with the right software. Furthermore, coins can readily be broken into fractional units.[21] While cryptocurrency's usefulness as a store of value is somewhat diminished by its extreme volatility, many holders invest in Bitcoin precisely for this reason.[22] Another requirement for a token to function as a store of value is scarcity. All cryptocurrencies are designed in one way or another to limit the number of coins that can be minted and circulated at any time.[23]

In the cryptocurrency world, there are believers—and then there are *true* believers whose belief in cryptocurrency verges on the messianic. Well-respected Bitcoin technologist Andreas Antonopoulos is one such true believer.[24] Antonopoulos hails cryptocurrency as a solution to the money needs of the 6.5 billion unbanked people who have been left behind by the global financial elites.[25] He also sees it as a means for people suffering under "repressive and corrupt regimes

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19. *See*, *e.g.*, Boon Seng Tan & Kin Yew Low, *Bitcoin—Its Economics for Financial Reporting*, 27 Austl. Acct. Rev. 220, 221 (2017).

20. *Id*.; *see also* 1 The Internet of Money: A Collection of Talks by Andreas M. Antonopoulos 79 (2016) [hereinafter Antonopoulos 2016].

21. For example, the smallest unit of Bitcoin—known as a "satoshi"—is worth one hundred millionth of a bitcoin. *Glossary: Denomination*, BitcoinDeveloper, https://developer.bitcoin.org/glossary.html [https://perma.cc/4RWP-RPER] (last visited June 6, 2021).

22. *See A Comparative Analysis of Bitcoin Forks*, CoinMetrics (July 29, 2019), https://coinmetrics.io/a-comparative-analysis-of-bitcoin-forks [https://perma.cc/CB7H-EX25] [hereinafter CoinMetrics, *Comparative Analysis*] (describing debate between proponents of Bitcoin who favor its use as a store of value and proponents of Bitcoin Cash who favor its use as a medium of exchange).

23. For example, Bitcoin is designed such that the maximum number of coins that can ever be minted is 21 million. *See* Tan & Low, *supra* note 19, at 222.

24. For example, Jim Calvin cites Andreas M. Antonopoulos, Mastering Bitcoin: Programming the Open Blockchain (2d ed. 2017), as a recommended text. Jim Calvin, *Adequately Identifying Bitcoin Dispositions for Federal Income Tax Purposes*, 58 Tax Mgmt. Mem. (BNA) 363, at n.3 (Sept. 4, 2017) [hereinafter Calvin, *Identifying Dispositions*].

25. Antonopoulos 2016, *supra* note 20, at 3.

with central banks that impose hyper-inflation at 30 percent a month."[26]
Current financial systems typically rely on trusted intermediaries, such
as banks, to verify identities and guarantee transactions. Nobel Prize-
winning economist Paul Krugman, a supporter of the status quo, sees
trust in those who have built up reputations as a better "technology"
than the algorithms that govern cryptocurrency.[27] But Antonopoulos,
like other true believers, sees the banks as "bad actors" and enthusias-
tically puts his faith in algorithms.[28]

III. Hard Forks Are a Division of Belief

*Note: The Exhibit at the end of this Article illustrates a cryptocurrency
blockchain that experiences a hard fork. It is helpful for understanding
the basic design features applicable to most cryptocurrencies and will
be referenced in the paragraphs below. The illustration, by necessity,
is at a high level of abstraction. Where terminology (and processes)
differ among cryptocurrencies, Bitcoin is used as the example.*

The tax and accounting literature boasts a number of excellent and
accessible explanations of the inner workings of cryptocurrency.[29]

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26. *Id*. at 7.

27. a16z, *A Skeptic's View of Crypto (from the Point of View of
Monetary Economics)*, YouTube (Nov. 2, 2018), https://www.youtube.com
/watch?v=Y_IYGeZLLhI (second video in a three-part debate between Paul
Krugman and Katie Haun, a former federal prosecutor and current partner of
a cryptocurrency venture capital firm); *see also* Paul Krugman, Opinion,
Transaction Costs and Tethers: Why I'm a Crypto Skeptic, N.Y. Times (July 31,
2018), https://www.nytimes.com/2018/07/31/opinion/transaction-costs-and
-tethers-why-im-a-crypto-skeptic.html [https://perma.cc/2CAK-JBTU].

28. *Compare* Antonopoulos 2016, *supra* note 20, at 39–40, *with*
Vincent Ryan, *In Bitcoin We Don't Trust*, CFO (Apr. 24, 2014), https://www
.cfo.com/cash-management/2014/04/corporations-resist-bitcoin-see-lack-of
-regulation-as-a-negative-who-will-regulate/ [https://perma.cc/3H7J-PFGL].

29. *E.g.*, Nicolas Wenker, Note, *Online Currencies, Real World
Chaos: The Struggle to Regulate the Rise of Bitcoin*, 19 Tex. Rev. L. & Pol.
145 (2014) (great starting point with wide-ranging discussion of the origins of
Bitcoin, technical details of cryptocurrency and blockchain, the theory of
money, and the regulatory framework for cryptocurrency); Mary F. Voce &
Pallav Raghuvanshi, *Blockchain and Cryptocurrency: Federal Income Tax
Issues*, 161 Tax Notes 1077, 1078–81 (Nov. 26, 2018) (particularly good and

I will not try to duplicate them. However, a brief introduction is certainly warranted. Without getting bogged down with cryptocurrency's many variations,[30] I will focus especially on what hard forks are—i.e., how they come about—and how they relate to the software protocols underlying all cryptocurrencies. Specifically, I will demonstrate how a hard fork splits each existing coin into two coins that share the same chain of title but are governed by different software protocols. The coins will subsequently trade separately, but their combined value can only increase if investors' belief in the two resulting cryptocurrencies is greater than their belief in the original currency.

A cryptocurrency "coin" is a tradeable digital asset that is created and transferred on a digital ledger known as the blockchain.[31] Each cryptocurrency is governed by a software protocol that specifies all details about the currency's technical design, including details regarding how coins are created and transferred, how transaction entries are made on the blockchain ledger, how new blocks are added to the blockchain, and many more. Each cryptocurrency typically has a team of software developers who are regularly maintaining and upgrading the software protocol.[32]

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accessible discussion of cryptographic features of cryptocurrency (among other technical details)—but beware of initial confusion about distinction between hard and soft forks).

30.   According to the website *Today's Cryptocurrency Prices by Market Cap*, COINMARKETCAP https://coinmarketcap.com/ [https://perma.cc /AE3K-QTEF] (last visited June 11, 2021), there are over 10,400 cryptocurrencies. Accordingly, there are few, if any, statements about cryptocurrency that will be true for every single one. However, the basic principles described here will be applicable to the great majority. Since Bitcoin is the dominant currency, accounting for around 44% of total market capitalization, it makes sense to use Bitcoin as the primary reference for discussion.

31.   For ease of explanation, I will refer to full cryptocurrency "coins." All references in this Article apply to any fractional unit of a coin as well. Note that a cryptocurrency coin is purely notional; it has no physical embodiment.

32.   In the case of Bitcoin, software development is funded by cryptocurrency industry donations. *See* Aaron van Wirdum, *Who Funds Bitcoin Core Development? How the Industry Supports Bitcoin's 'Reference Client,'* BITCOIN MAG. (Apr. 6, 2016), https://bitcoinmagazine.com/articles/who-funds -bitcoin-core-development-how-the-industry-supports-bitcoin-s-reference -client-1459967859 [https://perma.cc/B6KX-ZR59].

The blockchain is simply a ledger of transaction entries. The Exhibit at the end of this Article illustrates a small portion of one such blockchain. New transactions are continuously grouped together and placed in blocks. Each new block is linked to the prior block by a unique "hash code," forming an unbroken chain of blocks. A block's hash code is a fixed-length number created by an algorithm that encodes the contents of the block.[33] The Exhibit illustrates this linking process. Block 5999 at the top of the page contains a set of transaction entries (described below) as well as a hash code ("BBB"). Included in the next block, Block 6000, is a link to the prior hash code ("BBB") as well as its own hash code ("CCC"). Except in the relatively rare event of a fork in the blockchain, only one pair of blocks would be linked by a specific hash code (such as "BBB"). As such, there is only one chain of blocks that comprises the "true" blockchain ledger for a particular cryptocurrency.

There is no central authority in charge of the blockchain ledger. Instead, the entire blockchain is replicated on many different computers owned by anyone who chooses to participate. Without a central authority, there has to be a method to ensure the integrity of the blockchain—that is, to determine which blocks are part of the true blockchain. This method is what is known as the "consensus algorithm." For Bitcoin and many other cryptocurrencies, the two main elements of the consensus algorithm are "proof-of-work" and the "longest-chain rule."

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33.   For example, Bitcoin uses a hash function known as SHA-256, which takes a text message of any length as an input and produces a 256-bit number (i.e., a string of 256 zeros and ones) as an output. In cryptology, for each input string, a viable hash function should produce a hash that is: deterministic (input string always creates same hash); irreversible (infeasible to convert hash back into input string); and collision resistant (unlikely to encounter two input strings that create same hash). Also, a small change in the input string should create a vastly different hash (avalanche effect). Bitcoin hash codes are usually stated as a 64-character long hexadecimal number. For example, the hexadecimal hash for "How are you?" is df287dfc1406ed-2b692e1c2c783bb5cec97eac53151ee1d9810397aa0afa0d89. *See SHA-256 Cryptographic Hash Algorithm*, Movable Type Scripts, https://www.movable-type .co.uk/scripts/sha256.html [https://perma.cc/EH4G-E6TJ] (last visited June 7, 2021).

Proof-of-work is the method used by Bitcoin to determine which blocks are added to the blockchain.[34] Participants known as "miners" compete with each other to solve cryptographic puzzles that give them the right to add the next block.[35] Miners select transaction entries from a pool and compile them in a block. The miners verify that the entries are properly formed (e.g., include valid cryptographic signatures) and that the transferors actually own the bitcoins being transferred (known as the "double spend" problem).[36] The miners then use trial and error to try to find an arbitrary number (a "nonce") that, when added to block, results in the block having a hash code value that is less than a specified target number. The first miner to solve the puzzle is rewarded with newly minted bitcoins. The puzzle is difficult to solve,

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34.   Another common method of confirming what block can be added to the blockchain is known as "proof-of-stake." In a proof-of-stake system, coin owners are selected to be given the right to add a new block to the chain by an algorithm that makes the odds of being selected proportionate to the number of coins the owner agrees to "stake." If the owner tries to add a block that turns out to be invalid, the owner will forfeit the staked coins. If the owner successfully adds a block, the owner will be rewarded with newly minted coins. For a fascinating inquiry into whether proof-of-stake rewards are gross income, see Abraham Sullivan's two-part series in *Tax Notes*. Abraham Sutherland, *Cryptocurrency Economics and the Taxation of Block Rewards*, 165 Tax Notes Fed. 749 (Nov. 4, 2019); Abraham Sutherland, *Cryptocurrency Economics and the Taxation of Block Rewards, Part 2*, 165 Tax Notes Fed. 953 (Nov. 11, 2019).

35.   In proof-of-stake systems, the term "miner" is not used. Various other terms are used for the owners who stake their coins, including "forger" and "baker."

36.   In early attempts to create a virtual currency, the creators struggled with the problem of how participants in a distributed network with no central authority would be able to confirm that any particular coin was not simultaneously being spent in two transactions. Bitcoin's creator, the mysterious Satoshi Nakamoto, is credited with solving this problem through development of the consensus algorithms that determine the "true" ledger. Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, Bitcoin (originally posted Oct. 31, 2008), https://bitcoin.org/bitcoin.pdf [https://perma.cc/5RU4-2P3G]. This problem was known as the Byzantine Generals' problem. For a fascinating discussion of the problem and Nakamoto's solution, see Wenker, *supra* note 29, at 156–57. Wenker's discussion of Satoshi Nakamoto's secret identity is also riveting. *Id*. at 150–51.

but it is easy to verify that the solution is correct. Therefore, other participants will promptly recognize the validity of the block broadcasted by the winning miner and add it to their local copies of the blockchain. The first transaction in any block is the transaction that awards newly created coins to the miner. The Exhibit illustrates this transaction ("Tx 1" in each Block): coin X is created in Block 5999 and awarded to the miner, A.

Besides the creation of coins through a mining transaction, the other type of Bitcoin transaction is the transfer of a bitcoin from one owner to another. The transaction may reflect a sale of the bitcoin, or it may reflect the purchase of a real-world asset in exchange for the bitcoin. In either case, only the transfer of the bitcoin is recorded on the blockchain. The Exhibit contains a highly stylized blockchain entry for such a transaction ("Tx 2" in Block 6000). In this transaction, miner A transfers coin X to the new owner, C. Among other items, the actual entry would also encode A's digital signature.

The longest-chain rule is the method used by Bitcoin to resolve conflicts when different miners solve the cryptographic puzzle at nearly the same time. If this happens, both miners will broadcast their solution to the network. Depending on which broadcast is received first, some participants will add one of the miner's blocks to their copy of the ledger and others will add the other miner's block. There is no way at first to determine which of the two blocks belongs to the "true" blockchain. As always, miners will continue to try to extend the blockchain. However, since there are two competing blockchains, some miners will attempt to add a block that links to one of the competing blocks and other miners will attempt to link to the other one. The first miner to solve the puzzle for either of the competing blocks will broadcast the solution to the network. Relying on the longest-chain rule, all participants will then recognize this branch of the blockchain to be the true one and will discard the other one of the competing blocks. Because there are two competing versions of the blockchain for a brief time, this situation could be considered an accidental fork.

The longest-chain rule is also used to determine whether a software upgrade that the developers roll out is accepted by the network. Since the network is decentralized, it is up to each participant to decide whether to upgrade their software or to continue to run the old software. Depending on how extensive the changes are, blocks created by miners using the upgraded software frequently will not be recognized by participants running the old software. If there are also miners who continue to run the old software, the blockchain will fork.

Generally, after a short period, it will become clear whether more of the network participants support the upgrade or oppose it because one of the forks will grow longer than the other.[37] Generally, the entire community will decide to follow the lead of the majority. If the new software succeeds, the recalcitrant participants will upgrade their software and abandon the old chain. If it fails, the early adopters will revert to the old software and abandon the new chain. In either case, no new cryptocurrency will be created.

By contrast, a "hard fork" is a fork that does not abide by the longest-chain rule and therefore results in the survival of two cryptocurrencies.[38] A hard fork occurs when a split develops among the software developers about the future direction of the cryptocurrency. Due to irreconcilable differences, two competing software protocols emerge, each of which is adopted by some of the network participants. One or both of the sides of the fork may involve a software upgrade.[39] As a result of the fork, every coin that exists on the original blockchain ledger will effectively be "duplicated" on both sides of the fork. More accurately, each of the resulting cryptocurrencies will recognize all coins on the original blockchain and will allow owners of those coins to use them as they see fit. That is, each of the resulting currencies will have coins that trace their chain of title back to the same entries on the original blockchain.

Since the software protocols governing both of the cryptocurrencies are constantly in flux, it is largely arbitrary to identify one as the new cryptocurrency and the other as the old one. It is certainly not the case that one currency is a "clone" of the other, as some scholars

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37. More specifically, the length of the chains will indicate which fork the miners have devoted more computing power to extending.

38. The term "hard fork" is a cryptocurrency term that is generally well understood and standardized, but even it is sometimes used in non-standard ways. As most commonly used (and as used in this Article), a hard fork will always result in the existence of two separate cryptocurrencies. However, it is sometimes used to refer to a software protocol upgrade that is adopted by all users of the cryptocurrency—i.e., an upgrade that does not result in the creation of a separate cryptocurrency. *See, e.g.*, Arvind Ravichandran & Maurio A. Fiore, *Cryptocurrency Forks: A Response to the IRS's Recent Guidance*, 166 TAX NOTES FED. 1261, 1270 (Feb. 24, 2020) (using term "chain split" to refer to what this article calls a "hard fork").

39. See Part VII for real-life examples of both circumstances.

have claimed.[40] However, for the sake of discussion, I will refer to one of the resulting currencies as the "new" currency and the other as the "legacy" currency. The new currency will be the one that most scholars identify as the new currency, and the legacy currency will be the one that scholars consider to be a continuation of the original currency.[41]

The Exhibit illustrates many of the features of a hard fork. Block 6000 is the last block mined before the original currency splits into the two resulting currencies. For both currencies, the first block after the fork (Block 6001) links back to Block 6000's hash code ("CCC"). After the fork, the two currencies are wholly independent from each other. Block 6001 is mined by different miners: D mines the legacy currency block, and E mines the new currency block. The coins earned by these miners ($z1$ and $z2$, respectively) exist only on their respective blockchain. However, all of the coins that were created and transferred on the blockchain before the fork continue to exist on both sides of the fork. For example, C continues to own coin X, a coin that traces its history back to the original blockchain, on both sides of the fork. Each of these counterparts can now be traded independently. For example, refer to Block 6001 of each currency. On the legacy side of the fork, C transfers coin X of the legacy currency to F; while on the "new" side of the fork, C transfers coin X of the new currency to G. Coin X of the original currency is effectively split in two. Like any asset that has been divided, the owner is able to sell each piece to a different buyer.

Before moving on, let us return to the question of whether cryptocurrency enthusiasts are justified in putting their faith in the algorithms. Even if we put aside the famous theft of millions of dollars' worth of Ether[42] and the spectacular collapse of the Mt. Gox

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40.   *See, e.g.*, Eric D. Chason, *A Tax on the Clones: The Strange Case of Bitcoin Cash*, 39 Va. Tax Rev. 1 (2019).

41.   Scholars are split on whether the "new" currency is the one that underwent a software protocol change or the one that has a lower market price after the fork, a conundrum that highlights the arbitrariness of the choice. *See, e.g.*, Ravichandran & Fiore, *supra* note 38, at 1270 (noting the conundrum, choosing market price as better criteria, but failing to acknowledge that arbitrariness of choice undermines conceptual basis for taxation). My examples will involve cases where the same currency would be considered to be new under both definitions.

42.   *See* Matthew Leising, *The Ether Thief*, Bloomberg (June 13, 2017), https://www.bloomberg.com/features/2017-the-ether-thief [https://perma.cc/HA3Z-8ZWC].

cryptocurrency exchange,[43] there are reasons not to do so. Although the software protocols underlying cryptocurrencies are nearly always open source, the algorithms are not actually "immutable" since developers are continually upgrading them. Moreover, although miners and coin owners are able to decide for themselves whether any upgrade should be adopted, those owners who object to an upgrade will find their rights and entitlements modified against their will if the majority of the community disagrees. In the event of a fork, only those owners who have equal faith in both of the resulting currencies will find themselves unharmed by the fork. In a major fork, the multimillion-dollar question is whether the collective faith of the entire cryptocurrency community is shaken by the fork and currency values drop, or whether collective faith in cryptocurrency grows and currency values rise.

IV. REALIZATION IS THE FOUNDATION OF THE INCOME TAX

Section 61 of the Code provides that gross income for federal income tax purposes includes "all income from whatever source derived," a formulation that closely tracks the grant of authority to Congress under the Sixteenth Amendment to the Constitution.[44] Section 61 includes a nonexclusive list of specific items of gross income. Closer consideration of the list in section 61 reveals a fundamental dichotomy, two distinct paths leading to income that is potentially subject to tax.[45] One is income that is truly measured on a "gross" basis and is realized without a sale or exchange, such as salary, interest, rents, or royalties. The other is "*gains* derived from *dealings* in property," specified in section 61(a)(3).[46] This singular category of income requires

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43.   *See* Nathaniel Popper, *Mt. Gox Creditors Seek Trillions Where There Are Only Millions*, N.Y. TIMES: DEALBOOK (May 25, 2016), https://www.nytimes.com/2016/05/26/business/dealbook/mt-gox-creditors-seek-trillions-where-there-are-only-millions.html [https://perma.cc/FG7V-PKUH].

44.   U.S. CONST. amend. XVI ("The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration.").

45.   Professor Henry Ordower has also discussed this "dichotomy." Henry Ordower, *Revisiting Realization: Accretion Taxation, the Constitution, Macomber, and Mark to Market*, 13 VA. TAX REV. 1, 82 (1993).

46.   Emphasis added.

both measurement only after recovery of basis *and* a triggering event in the form of a "dealing."

The former requirement, recovery of basis, is almost certainly a constitutional prerequisite for there to be income. This is reflected in *Glenshaw Glass*'s admonition that there should be an "undeniable accession[] to wealth."[47] Clearly, there is no accession to wealth if the proceeds from the sale of property do not exceed the amount the taxpayer initially paid for it. The second requirement, that there be a dealing, reflects the fundamental structure of the federal income tax as a transaction-based system rather than an accretion system. The mere change in the value of an asset—"unrealized appreciation"—does not give rise to gross income unless there is a transaction to unlock it. This is the concept known as realization. Whether realization is a constitutional requirement before a gain can be subject to the income tax is a hotly debated question.[48] It is, however, indisputable that realization is the statutory rule laid out by Congress that applies unless there is an explicit exception. In addition to section 61(a)(3), the rule is effectively codified in section 1001(a), which provides that gain from a "sale or other disposition" of property is computed as the difference between the amount realized in the transaction and the taxpayer's basis in the property.[49] If there is no disposition, there is no income.

The Supreme Court rarely weighs in on the constitutionality of tax provisions. But the granddaddy of such cases, 1920's *Eisner v. Macomber*,[50] famously established realization as a constitutional requirement for income or gain:

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47. Comm'r v. Glenshaw Glass Co., 348 U.S. 426, 431 (1955).

48. *Compare* Charles L.B. Lowndes, *Current Conceptions of Taxable Income,* 25 Ohio St. L.J. 151, 176 (1964) ("it appears that as a constitutional prerequisite realization is no longer required"), *with* Ordower, *supra* note 45, at 16–17 ("[T]he Court . . . has never retreated from its position that realization is a constitutionally-based requirement.").

49. *See* Rodney P. Mock & Jeffrey Tolin, *Realization and Its Evil Twin Deemed Realization*, 31 Va. Tax Rev. 573, 600 (2012) (questioning whether section 1001(a) "sets forth an expressed mandate requiring a realization event" or simply implies it).

50. In *Macomber*, the Court found that a proportional stock dividend was not gross income because it was "no more than a book adjustment" in which the taxpayer's interest in the corporation was divided between old and new shares with no change in underlying property rights. Eisner v. Macomber, 252 U.S. 189, 210 (1920). Similarly, ownership in the new

> Here we have the essential matter: *not* a gain *accruing to* capital, not a *growth* or *increment* of value *in* the investment; but a gain, a profit, something of exchangeable value *proceeding from* the property, *severed from* the capital however invested or employed, and *coming in*, being "*derived*," that is, *received* or *drawn by* the recipient (the taxpayer) for his *separate* use, benefit and disposal;—*that* is income derived from property. Nothing else answers the description.[51]

Thus, according to the Court of 1920, unrealized appreciation—i.e., "a growth or increment of value in the investment"—cannot be subject to the income tax.[52] Much has been made of cases limiting the applicability of *Macomber*'s famous formulation. For example, Professor Surrey described *Macomber* as the "cornerstone of the edifice" the Court intended to build—but never did.[53] However, when revisiting the definition of income in 1955 with *Glenshaw Glass*, the case that the Service and other proponents of taxation of hard forks frequently cite, the Court narrowed the formulation to the context of "distinguishing gain from capital" but did not overrule it.[54] As the issue in *Glenshaw Glass* (taxation of punitive damages) was wholly unrelated to capital assets, the Court was able to break free from *Macomber*'s formulation.

Since cryptocurrency is indisputably "property" for tax purposes,[55] the taxation of hard forks falls squarely into the context of "distinguishing gain from capital." That is, the appropriate framework to apply is that set out in section 61(a)(3): is there a gain from dealing in

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cryptocurrency after a hard fork is strictly proportional to ownership in the original currency before the fork.

51.   *Id.* at 207.

52.   *Id.* (emphasis omitted). Notably, the Constitution *does* give Congress authority to impose a tax on capital, including unrealized appreciation, but only if it is apportioned among the states in proportion to population. U.S. Const. art. I, § 2, cl. 3. The Sixteenth Amendment specifically expanded Congress's taxing power to impose an *income tax* without apportionment. *See* discussion of the taxing power in Lowndes, *supra* note 48, at 172.

53.   Stanley S. Surrey, *The Supreme Court and the Federal Income Tax: Some Implications of the Recent Decisions*, 35 Ill. L. Rev. 779, 781 (1941).

54.   Comm'r v. Glenshaw Glass Co., 348 U.S. 426, 431 (1955).

55.   *See* Notice 2014–21, 2014–16 I.R.B. 938.

property? Or, is the event of the hard fork not a dealing at all but merely a reconfiguration of the "capital"? The Service and others have made the mistake of analyzing hard forks within the framework of other types of income, types which do not require a sale or other dealing to be realized.

These other types of income include types that are wholly unrelated to capital assets, such as the punitive damages in *Glenshaw Glass* or income in the form of unsolicited samples. Considering the close relationship among the original cryptocurrency coin, the legacy coin, and the new coin, none of these types of income could possibly be relevant here. If the true nature of any income from hard forks is to be discerned, it must certainly be gain or other income that is in some way related to these capital assets. But this does not necessarily mean the income (if any) is from a sale or other dealing. The other types of income also include those "proceeding from" capital assets, such as rents and royalties—that is, types of income that are compensation for the use of tangible or intangible assets owned by the taxpayer. However, in a cryptocurrency hard fork, the new coin is not compensation for the use of the original coin. The new coin, like the legacy coin, traces its lineage directly back to the original coin through the chain of title established in the blockchain. After the fork, the original coin ceases to exist as an integral entity; it is replaced by two successor coins, the legacy coin and the new coin, neither of which proceeds from the other.

Having established that the proper question is whether a hard fork is a dealing in property that results in the realization of gain, the relevant framework is established by section 1.1001–1(a) of the Treasury Regulations and *Cottage Savings v. Commissioner*, the Supreme Court case from 1991.[56] Because *Cottage Savings* describes the realization requirement as a matter of "administrative convenience,"[57] some scholars have concluded that the Court no longer considers there to be a constitutional basis for the requirement.[58] Even if this were so, the

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56. Cottage Sav. Ass'n v. Comm'r, 499 U.S. 554 (1991).

57. *Id*. at 559 (quoting Helvering v. Horst, 311 U.S. 112, 116 (1940)).

58. *See* Ordower, *supra* note 45, at 56 ("The decision indicates that the Court might be favorably disposed to upholding the constitutionality of a statute violating that realization condition, but *Cottage Savings* presented no such opportunity."). Mock & Tolin have noted that, even if the realization

opinion makes crystal clear that the Court considers realization to be a *statutory* requirement pursuant to section 1001(a).[59]

In *Cottage Savings*, the taxpayer was a savings and loan association that held many distressed home mortgages. Banking regulations allowed savings and loan associations to exchange mortgage portfolios that had similar types of loans without having to recognize losses for financial statement purposes. After entering into such an exchange, the taxpayer claimed a deduction for multimillion-dollar losses on its federal tax return. On audit, the Service disallowed the losses, arguing that the exchanged mortgage portfolios were economically equivalent to each other and therefore the exchange should be disregarded.

Relying on Regulation section 1.1001–1(a)'s provision that gain and loss are recognized from the exchange of properties that differ materially "in kind or extent," the *Cottage Savings* Court focused specifically on whether the "legal entitlements" to the properties differed.[60] Even though the portfolios of mortgages involved risks that were so economically similar that banking regulators did not recognize the exchange, the Court had no difficulty concluding that the legal entitlements differed since the loans were made to different obligors and were secured by different homes.

Some have suggested that a hard fork should be analyzed as an exchange of a portion of the original coin for the new coin.[61] The argument is that coin owners' legal entitlements to the legacy cryptocurrency differ materially from those relating to the new cryptocurrency. As far as it goes, this conclusion is clearly correct. After a hard fork, the two cryptocurrencies are governed by different software protocols—indeed, hard forks are the result of a split within the cryptocurrency community as to how best to modify the software protocol. The purpose of the software protocol is to define the legal entitlements that coin owners possess, such as how new coins will be minted and

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requirement is based on administrative convenience, it could nonetheless be a constitutional requirement. Mock & Tolin, *supra* note 49, at 596.

59.   499 U.S. at 559 ("Rather than assessing tax liability on the basis of annual fluctuations in the value of a taxpayer's property, the Internal Revenue Code defers the tax consequences of a gain or loss in property value until the taxpayer 'realizes' the gain or loss.").

60.   *Id.* at 565.

61.   *See* Ravichandran & Fiore, *supra* note 38, at 1275–76.

how coins can be transferred. Furthermore, the legacy coin and the new coin are traded independently after the fork—much like the individual mortgages in *Cottage Savings* were separate and distinct.

Applying *Cottage Savings* to cryptocurrency forks leads to absurd results. If it applies to hard forks, it should also apply to any major upgrade of a cryptocurrency software protocol.[62] Even though no new currency is created, coin owners' rights and entitlements to their coins are different after the upgrade than they were before it. The only difference in the case of most hard forks is that only one of the two resulting currencies experiences a change in its software protocol. Although some scholars have toyed with the possibility that a mere software upgrade would be a realization event,[63] even the Service does not go this far.[64]

In the final analysis, neither Regulation section 1.1001–1(a) nor *Cottage Savings* applies to hard forks. Section 1.1001–1(a) only applies when there is a "conversion of property into cash" or "an exchange of property for other property."[65] A hard fork clearly does not involve a conversion into cash. It does not involve an exchange of property either.[66] The division of an original coin into a legacy coin and a new coin happens automatically as a result of the fork. Each resulting coin

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62. Ravichandran & Fiore distinguish a software upgrade, which they argue is not a realization event, from a hard fork, which they argue is one. *Id.* at 1278. I do not find the distinction they make to be persuasive.

63. *See* Stevie D. Conlon et al., *Taxation of Bitcoin, Its Progeny, and Derivatives: Coin Ex Machina*, 158 Tax Notes 1001, 1017 (Feb. 19, 2018) (arguing that unrealized appreciation in the legacy coin might be recognized in addition to recognizing the value of the new coin as income); Voce & Raghuvanshi, *supra* note 29, at 1091 (arguing that a major modification of a cryptocurrency's software protocol might be treated as an actual exchange of one coin for another); Calvin, *Identifying Dispositions*, *supra* note 24 (arguing that a modification of a software protocol that affects a cryptocurrency's value—for example, an increase in the supply of coins—would be treated as an exchange under Reg. § 1.1001–1 and *Cottage Savings*).

64. Rev. Rul. 2019–24, 2019–44 I.R.B. 1004 (in Situation 1, taxpayer did not receive units of the new cryptocurrency and therefore did not have gross income).

65. Reg. § 1.1001–1(a).

66. *See, e.g.*, Calvin, *Identifying Dispositions*, *supra* note 24, at text accompanying n.27 ("the following can be said [with certainty]: There was no exchange of bitcoin for bitcoin cash").

traces its history back to the same entries on the original blockchain ledger. Nothing is given up and nothing new is received from a counterparty. Indeed, for there to be an exchange, there necessarily must be a counterparty.[67] But there is no counterparty in a hard fork—the blockchain is not a counterparty!

Returning to the question of whether realization is a constitutional requirement, the mark-to-market regime of Code section 1256 casts doubt upon the proposition. Under section 1256, holders of commodity futures contracts must recognize income or loss at the end of each year as though the contracts were sold for fair market value.[68] In *Murphy v. United States*,[69] the Ninth Circuit upheld section 1256 against a challenge that raised the constitutional question. The Ninth Circuit concluded that section 1256 was constitutional because the taxpayer's right under the contracts to withdraw his gains on a daily basis put him in constructive receipt of the income. The court distinguished the "unique accounting method" governing futures contracts and refused to decide "the broader issue of whether Congress *could* tax the gains inherent in capital assets prior to realization or constructive receipt."[70] *Murphy* was not appealed to the Supreme Court and no other case has been decided regarding mark-to-market accounting, so final resolution of the constitutional question remains uncertain.

Although interesting, the constitutional question is ultimately irrelevant. As noted in *Cottage Savings*, Congress has made realization a requirement for the recognition of gains from dealings in property. It would take an explicit statutory exception, such as section 1256's mark-to-market provisions, to override it. The Service does not have the

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67. Even a "deemed" exchange such as the modification of a debt instrument involves two parties—that is, the instrument cannot be modified unless the lender and the borrower both agree to do so. *See* Reg. § 1.1001–3; *see also* James M. Peaslee, *Modifications of Nondebt Financial Instruments as Deemed Exchanges*, 95 Tax Notes 727 (Apr. 29, 2002).

68. I.R.C. § 1256(a)(1).

69. 992 F.2d 929 (9th Cir. 1993). Indeed, the ability to withdraw earnings daily through a margin account is one of the features that distinguishes commodity futures contracts, which are subject to mark-to-market, and commodity forward contracts, which are not. *See* David F. Levy, *Towards Equal Tax Treatment of Economically Equivalent Financial Instruments: Proposals for Taxing Prepaid Forward Contracts, Equity Swaps, and Certain Contingent Debt Instruments*, 3 Fla. Tax Rev. 471, 478 n.21 (1997).

70. *Murphy*, 992 F.2d at 931–32.

power to make such an exception through a revenue ruling. Moreover, while Congress arguably has the power to override the realization requirement in the context of hard forks, it would presumably not have the power to override the recovery-of-basis requirement. Therefore, the amount of income recognized through a hard fork could not be more than the amount of the taxpayer's unrealized appreciation in the cryptocurrency. This stands in stark contrast to the Ruling, under which coin owners would be required to recognize income equal to the value of the new currency without regard to underlying appreciation.

V. Division Is Not Realization

The best analogy for the division of a cryptocurrency coin by virtue of a hard fork is the subdivision of real property into separate parcels. The tax effects of the subdivision of land were discussed by the Supreme Court in *Heiner v. Mellon*.[71] The Court held that the rule established in numerous Board of Tax Appeals cases involving land subdivision was determinative: those cases established the rule that it was necessary to allocate the basis of the larger tract of real property among the parcels resulting from the subdivision and to recognize gain on the sale of each parcel, regardless of how many parcels remain unsold at the end of the year.[72]

Notably absent from the discussion in the numerous cases cited in *Mellon* was consideration of whether the subdivision of the land was itself a taxable event. The fact that the subdivision was a non-realization event was likely too obvious to warrant being mentioned. After all, the

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71.   304 U.S. 271 (1938). Although the Court relied on property subdivision cases in its analysis, the actual issue in *Mellon* was whether the taxpayers should recognize gain on the sale of whiskey during the liquidation of a whiskey business. *Id*. at 274–76 The Court held that gain should be recognized upon the sale of each part of the business, including the inventory of whiskey, rather than deferring the recognition of gain or loss until the entire business was disposed of. *Id*. at 277.

72.   *Id*. at 275 & n.3 (citing Searles Real Est. Tr. v. Comm'r, 25 B.T.A. 1115 (1932); Biscayne Bay Islands Co. v. Comm'r, 23 B.T.A. 731 (1931); Clarke v. Comm'r, 22 B.T.A. 314, 325 (1931); Skinner v. Comm'r, 20 B.T.A. 491 (1930); Cullinan v. Comm'r, 19 B.T.A. 930 (1930); Nalle v. Comm'r, 19 B.T.A. 427 (1930); Avery v. Comm'r, 11 B.T.A. 958 (1928); Hannibal Mo. Land Co. v. Comm'r, 9 B.T.A. 1072 (1928); Roberts v. Comm'r, 7 B.T.A. 1162 (1927); Cullinan v. Comm'r, 5 B.T.A. 996 (1927)).

landowner gave up no preexisting property and received no new property in the process. However, if the subdivision itself *had* been a realization event, then the measure of income on sale of the parcel would have been different: it would be the difference between the sale price and the value of the parcel at the time of the division. No allocation of basis would be necessary because the parcel would take a new, fair market value basis upon recognition of previously unrealized gain at the time of the subdivision. Thus, it is clear that the decisions in the *Mellon* line of cases were predicated on an understanding that the initial subdivision of the land was not a realization event.

A more colorful analogy than real property subdivisions, which has been put forward by some scholars, is that of pregnant livestock.[73] For example, in *Gamble v. Commissioner*, the Tax Court found that the taxpayers must allocate the acquisition price paid for a pregnant racehorse dam between the dam and her foal in order to determine the gain recognized on sale of the foal.[74] This analogy may be too colorful for its own good: *Tax Notes* contributor Lee Sheppard derided the argument on the basis that "Bitcoin is not a pregnant cow."[75] Nonetheless, the implication of *Gamble* is the same as that of *Mellon*: neither the subdivision of a parcel of land, nor the birth of a foal, nor the fork of a cryptocurrency is a realization event.

While the comparison of a hard fork to a subdivision of real property is merely an analogy, the conclusion that a hard fork is *in fact* a division of property is on a very firm foundation. The undivided property is the original coin, which was initially created (and may have been subsequently transferred) on the historic blockchain. The ledger entries on the blockchain are the equivalent of real property deeds filed with the county recorder. The chain of title in the coin may be conclusively tracked through the historic blockchain. The fork is an event that divides the original coin into two coins, the legacy coin and the new coin. It is much like the filing of the subdivision map with the county recorder. In California, for example, not only is the filing of a subdivision map required, but a sale of one of the resulting parcels can be

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73. *See, e.g.*, Nelson C. Yates II, *Stock or Livestock? Hard Fork Basis Allocation*, 162 Tax Notes 61, 67–69 (Jan. 7, 2019).

74. Gamble v. Comm'r, 68 T.C. 800, 820–21 (1977).

75. Lee A. Sheppard, *Cryptocurrency Customer Compliance*, 165 Tax Notes Fed. 709, 715 (Nov. 4, 2019).

voided if no map was filed.[76] That is to say, like a hard fork, a subdivision of property is an event of legal note and significance, even though it is not a taxable event.

There are numerous similarities between subdivisions of real property and cryptocurrency hard forks. As in the case of any of the separate parcels and the larger property, the chain of title to the original coin is unbroken by the fork: that is, exactly the same chain of title applies to both the legacy coin and the new coin. The legacy coin and the new coin have different characteristics because the software protocol controlling one or both currencies has been modified. But this fact does not distinguish hard forks from subdivisions of land insofar as the resulting parcels have different characteristics: for example, one of the subdivided parcels may be bordered by a river while another may be landlocked. Whether the combined value of the legacy and new coins after the fork is greater than the value of the original coin before the fork is no more relevant to the question of whether a realization event has occurred than whether a large tract of real property becomes more valuable after it is divided into marketable parcels. As the Court put it in *Macomber*, market prices are "an unsafe criterion" in determining the "essence" of property that has been divided.[77]

As shown above, the conclusion that taxpayers do not realize income when their property is divided into two or more pieces must largely be inferred from authorities addressing how subsequent dispositions of those pieces are taxed. That is, authorities are scarce for cases where a single taxpayer's property is divided. When it comes to the question of how to treat the division of property among two or more owners, there is more direct guidance. This guidance strongly supports the view that property divisions are non-realization events.

One of the earliest cases is the 1935 Board of Tax Appeals case *Walz v. Commissioner*.[78] This case involved the partition of community property between a husband and wife at the time of their divorce. The issue was whether Mr. Walz could deduct a loss of $10,231 on the partition of 400 shares of stock in Radio Corporation of America out of community property to his wife's sole ownership. The court held that

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76.   *See* Cal. Gov't Code § 66426 (necessity to file tentative and final maps for property subdivision); Cal. Gov't Code § 66499.32 (voidability of deeds or contracts if subdivision maps are not filed).

77.   Eisner v. Macomber, 252 U.S. 189, 215 (1920).

78.   32 B.T.A. 718 (1935).

no gain or loss results when "owners in common of a mixed aggregate of assets purchased for profit . . . decide to partition it."[79] Subsequent cases and rulings confirmed that no gain or loss would result on an approximately equal division of community property upon divorce.[80] The Service also extended this holding to the division of jointly held property in non-community property states.[81] Although these cases and rulings all relate to partitions of property incident to divorce, a subject area that is now governed by the more permissive provisions of Code section 1041,[82] it is noteworthy that the *Walz* court stated the rule as being applicable to any form of common ownership.

Outside of the divorce context, the Service has issued a number of rulings that address whether the partition of jointly owned property results in realized gain or loss. Revenue Ruling 56–437 holds that the partition of corporate stock held in joint tenancy into two separate stock certificates held by each former tenant is a nontaxable division.[83] Lest it be assumed that the rule only applies to fungible property like corporate stock, other rulings extend it to partitions of real property. In a set of private letter rulings,[84] the Service held that the partition of a single contiguous tract of real estate that was held by several family members as tenants in common into separate parcels owned by each family member was also a nontaxable division. The rulings found that the partition was not an exchange for purposes of Code section 1001 because "the parties do not acquire a new or additional interest."[85]

In Revenue Ruling 79–44,[86] the Service refused to further extend the non-realization holding to the situation where ownership of

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79.   *Id*. at 719.

80.   Carrieres v. Comm'r, 64 T.C. 959 (1975), *acq. in result*, 1976–2 C.B. 1, *aff'd per curiam*, 552 F.2d 1350 (9th Cir. 1977); Rev. Rul. 76–83, 1976–1 C.B. 213.

81.   Rev. Rul. 81–292, 1981–2 C.B. 158.

82.   For example, Code section 1041 now extends non-recognition treatment to all property settlements pursuant to divorce even if they are unequal or involve transfers of separate property.

83.   Rev. Rul. 56–437, 1956–2 C.B. 507.

84.   P.L.R. 2003-28-035 (Jul. 11, 2003); P.L.R. 2003-28-034 (Jul. 11, 2003); P.L.R. 2003-03-023 (Jan. 17, 2003).

85.   The quoted language is repeated in each of the private letter rulings cited *supra* note 84, with each also citing the California property law case Noble v. Beach, 130 P.2d 426, 430 (Cal. 1942).

86.   Rev. Rul. 79–44, 1979–1 C.B. 265.

two separate parcels of land that were jointly owned were divided such that each taxpayer took ownership of one of the two parcels. However, although the facts are more complicated, this revenue ruling is fully consistent with the private letter rulings discussed above.[87] Two unrelated farmers, *A* and *B*, each owned an undivided one-half interest in two separate parcels of farmland as tenants in common. Both parcels were worth 2,000*x* dollars, but only one had a 1,000*x* dollar mortgage for which both *A* and *B* were personally liable. *A* and *B* "rearranged their interests" so that each wholly owned one of the parcels. Since *A* took the property subject to the mortgage, *B* executed a promissory note to *A* in the amount of 500*x* dollars. The ruling concluded that the exchange was a realization event for both parties but that it qualified for non-recognition treatment as a like-kind exchange under Code section 1031 except to the extent of boot received by *A* (i.e., the 500*x* promissory note). This result follows only if the transaction is analyzed as, first, a partition of each parcel into two halves, which is a non-realization event, followed by an exchange of half-parcels, which is a realization event. If the partition of the property in the first step had been a realization event, then the ruling would have had to analyze that step separately.

　　In summary, all of the precedents clearly lead to the conclusion that a division of a unitary piece of property is a non-realization event. This is true even if there are two or more owners of the property prior to the partition. No other conclusion can reasonably be reached in the case where a single taxpayer owned the property prior to the division as is the case in a hard fork where the owner of the original coin retains ownership of both of the resulting coins.

VI. THE SERVICE TAKES THE WRONG FORK

Because *Glenshaw Glass* is the principal authority relied upon by the Service and most scholars who conclude that a hard fork is a taxable event, a closer look at the case is warranted. The Glenshaw Glass Company received punitive damages from a machinery manufacturer in settlement of claims of fraud and violation of antitrust laws.[88] Relying

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　　87.　Unlike private letter rulings, revenue rulings are binding on the Service and substantial authority for taxpayers. Of course, taxpayers remain free to take positions contrary to revenue rulings.

　　88.　Comm'r v. Glenshaw Glass Co., 348 U.S. 426, 427–28 (1955).

on the Court's statement in *Macomber* that income may be "derived from capital, from labor, or from both combined,"[89] Glenshaw argued that the punitive damages were not taxable as income because they were not derived from either capital or labor.[90] In response, the Court held that the *Macomber* formulation "was not meant to provide a touch-stone to all future gross income questions,"[91] and substituted a formulation that *has* in practice served as something of a touchstone: "Here we have instances of undeniable accessions to wealth, clearly realized, and over which the taxpayers have complete dominion."[92] The Ruling cites *Glenshaw Glass* for this very proposition.[93] Most scholarly commentaries on taxation of hard forks do the same.

Applying the *Glenshaw Glass* formulation, three requirements must be met for there to be income or gain within the reach of the federal income tax: (1) an accession to wealth, (2) clear realization, and (3) dominion and control. This Article makes clear that neither of the first two requirements are met in the case of a hard fork. As Part II argues, any accession to wealth that a coin owner may enjoy is the result of an increase in people's collective belief in cryptocurrency; a hard fork in and of itself only results in a *division* of belief within the cryptocurrency community, not an *increase*.[94] Parts IV and V have discussed the realization requirement, which remains as relevant as ever after *Glenshaw Glass*, and have shown that a hard fork is merely a division of property and therefore *not* a realization event. A few scholars have also entertained division-of-property approaches.[95] As for dominion and

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89.   Eisner v. Macomber, 252 U.S. 189, 207 (1920) (quoting Doyle v. Mitchell Bros., 247 U.S. 179, 185 (1918)).

90.   *Glenshaw Glass*, 348 U.S. at 431.

91.   *Id.*

92.   *Id.* at 431.

93.   Rev. Rul. 2019–24, 2019–44 I.R.B. 1004 (citing *Glenshaw Glass* in "Law and Analysis" section).

94.   Part VII will demonstrate these principles in the context of two real-life forks. Moreover, it will show that one of the forks took place in the context of a loss of wealth, rather than an accession thereto.

95.   One scholar firmly supports the division of property analysis. Benjamin M. Willis, *You Weigh In: Can Cryptocurrency Forks Be Tax Free?*, 166 TAX NOTES FED. 1469 (Mar. 2, 2020). Two other scholars seriously entertain the notion that a hard fork is a division of property. Ted R. Stotzer, *Virtual Currencies—Gaps, Questions, and Pitfalls*, 161 TAX NOTES 1463 (Dec. 17, 2018) (suggesting forks may either be treated like stock splits (a

control, while the Ruling and various scholars have raised interesting timing questions, the requirement is ultimately of no relevance since the first two requirements are not met.

Making a partial attempt to apply the *Glenshaw Glass* test, the Ruling reaches the conclusion that coin owners do indeed realize income in a hard fork. Specifically, the Ruling holds that a coin owner recognizes ordinary income equal to the full value of the "new" coin created in the hard fork when the owner is able to exercise dominion over the coin.[96] As for the requirement that there be an accession to wealth, the Ruling summarily concludes that there *is* an accession to wealth because the coin owner "receive[s] a new asset."[97] This conclusion ignores the fact that the coin owner receives nothing new as a result of the fork: the legacy coin and the new coin each trace their existence back to the same original coin. As for *Glenshaw Glass*'s requirement that income be "clearly realized," the Ruling contains no discussion at all. There is no indication that the drafters of the Ruling even considered the division-of-property cases. On the dominion-and-control requirement, the Ruling concedes that dominion may not occur at the instant of the fork and that recognition of the income may, in some cases, be deferred until a later time.[98] Several scholars have posited that taxpayers do not have income until they sell, exchange, or otherwise dispose of the new coin because it is only then that they

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division of property) or taxable stock dividends); Yates, *supra* note 73, at 68–69 (discussing how basis allocation could be made if hard forks were treated like pregnant cows giving birth to calves). A final scholar considered the division-of-property approach in one article but rejected it in a later article. *Compare* Calvin, *Identifying Dispositions*, *supra* note 24 (discussing divisions of trusts and other divisions as possible analogies), *with* Jim Calvin, *When (and If) Income Is Realized from Bitcoin Chain-Splits*, 58 Tax Mgmt. Mem. (BNA) 479 (Nov. 27, 2017) [hereinafter Calvin, *Chain-Splits*] (implicitly rejecting division analysis by definitively adopting unsolicited sample analogy).

96. Rev. Rul. 2019–24, 2019–44 I.R.B. 1004 (Situation 2).

97. *Id.*

98. The Ruling uses as an example the situation where the taxpayer holds the original coin through a cryptocurrency exchange and the exchange does not immediately support the new coin. *Id.* The Ruling would require the taxpayer to recognize income as soon as the exchange decides to support the coin since the taxpayer would then have the ability to sell the coin.

"unambiguously assert" dominion over it.[99] Interesting though this issue is, I do not further discuss it here.

All indications are that the Service intended the Ruling to apply to taxpayers coming to own coins of the new cryptocurrency as a direct result of the fork.[100] The discussion above assumes that it does. However, by its literal terms, the Ruling does not actually apply to these coins. It is apparent that the drafters of the Ruling did not have a clear understanding of how hard forks work. The drafters apparently understood that a hard fork creates a new currency but mistakenly assumed that owners of the original currency only come into possession of the new currency if coins are "airdropped" to the owner's "ledger address" by some external agent.[101] In actuality, as explained in Part III, every owner of a coin of the original currency automatically comes to own one coin of the legacy currency and one coin of the new currency as a direct result of the hard fork. An airdrop is a very different event. In an airdrop, promoters of an unrelated cryptocurrency offer free coins to owners of a pre-existing currency, typically as a marketing strategy to attract attention to a forthcoming initial coin

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99. Chason, *supra* note 40, at 4; *see also* Calvin, *Chain-Splits*, *supra* note 95. These scholars consider the new coin to be akin to a free sample or other unsolicited property and rely on cases and rulings in that domain, such as Haverly v. United States, 513 F.2d 224 (7th Cir. 1975) (holding that the professor had income when he asserted dominion over complimentary textbooks by donating them). Although the timing of income realization under this approach is the same as under my division-of-property analysis, the character of the income differs (ordinary rather than capital gain) as does the ability to offset the income by a portion of the original coin's basis. The approach suffers from the same analytic defects as the Ruling's approach.

100. In a discussion with the drafters of the Ruling, the author (and his prior coauthor) confirmed that the Service's position is that a hard fork results in income to taxpayers who come to own coins of the new cryptocurrency no matter how that ownership comes about. *Accord* David J. Shakow, *Taxing Bitcoin and Blockchains: What the IRS Told Us (and Didn't)*, 166 Tax Notes Fed. 241, 249 n.45 (Jan. 13, 2020). Moreover, a recent advice memorandum from the Service's Chief Counsel office to Branch 4 correctly describes the mechanics of a hard fork and concludes that the result is the same. *See* Kristen A. Parillo, *IRS Clarifies Treatment of Crypto Hard Fork*, 171 Tax Notes Fed. 466 (Apr. 19, 2021).

101. Rev. Rul. 2019–24, 2019–44 I.R.B. 1004 (compare Situation 1 where there is no airdrop with Situation 2 where there is one).

offering. In the case of an actual airdrop, the Ruling's analysis would be sound: airdropped coins rarely have significant value but should properly be characterized as unsolicited "free" samples. In contrast to a hard fork, there is a counterparty in an airdrop. There remains some possibility that the Service will come around to adopting the division-of-property analysis once they fully understand how hard forks work. In the meantime, we will have to assume the Ruling applies to hard forks.

The Ruling engages in what might be called an "unembellished" *Glenshaw Glass* analysis. It concludes that the income resulting from the hard fork is income "from whatever source derived" but does not try to further characterize it. The majority of scholars take the same approach.[102] It is clear that neither the Service nor the scholars consider the income to be gain from dealing in property under section 61(a)(3).[103] However, some scholars have embellished the *Glenshaw Glass* analysis by positing various other analogies,[104] including dividends of property,[105]

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102.   Notably, none of the scholars that agree with the Ruling's analysis make the same mistake as to how owners of the original currency come to own coins of the new currency. *E.g.*, Conlon et al., *supra* note 63, at 1016–18; Rachana Khandelwal, Note, *Taxation of Cryptocurrency Hard Forks*, 8 Contemp. Tax. J., no. 1, Winter 2019, at 25; Shakow, *supra* note 100, at 249–50; Sheppard, *supra* note 75, at 715–17; Nick Webb, Note, *A Fork in the Blockchain: Income Tax and the Bitcoin/Bitcoin Cash Hard Fork*, 19 N.C. J.L. & Tech. 283 (2018); Voce & Raghuvanshi, *supra* note 29, at 1090–92; *see also* Danhui Xu, Note, *Free Money, but Not Tax-Free: A Proposal for the Tax Treatment of Cryptocurrency Hard Forks*, 87 Fordham L. Rev. 2693, 2699–701 (2019) (relying on a *Glenshaw Glass* analysis to require immediate taxation of the new coin but proposing to allow a basis offset).

103.   Among scholars, only Ravichandran & Fiore, *supra* note 38, have adopted the view that the income is described in Code section 61(a)(3) ("[g]ains derived from dealings in property") under a *Cottage Savings* analysis. *See supra* notes 61–66 and accompanying text. Although the Ruling cites section 61(a)(3), it is clear that the analysis is not based on it since the Ruling concludes that income from the fork is ordinary in character.

104.   *See, e.g.*, Comments on the Tax Treatment of Hard Forks from ABA Section of Tax'n to Acting IRS Comm'r David Kautter, at 8 n.17 (Mar. 19, 2018), https://www.americanbar.org/content/dam/aba/administrative /taxation/policy/031918comments2.pdf [https://perma.cc/5625-LH43] [hereinafter ABA Tax'n Comments] (positing various analogies with very little analysis).

105.   *See, e.g.*, Stotzer, *supra* note 95, at 1467.

found property (treasure trove),[106] and unsolicited property (free samples).[107]

In Part IV, I have argued that section 61(a)(3) *is* the proper framework for analyzing hard forks and that no gross income results from a hard fork because there is neither a "gain" nor a "dealing." Nonetheless, a few words are warranted about each of these other analogies to dispel the notion that any other framework of analysis could be fruitful. Dividends are a poor analogy since they are an artifact of the special treatment of corporate earnings, which are first taxed at the corporate level when earned and then again at the shareholder level when distributed. In a cryptocurrency fork, there is no corporation and there are certainly no corporate earnings; all of the gain (if there is any) remains unrealized. Found property is also a poor analogy. Found property represents a true windfall—an undeniable accession to wealth. In a hard fork, the "new" coin is no more a windfall than the legacy coin: both are successors to the original coin. Finally, unlike an airdropped coin, the new coin is not a free sample. The promotor of an initial coin offering provides the airdropped coin as a free sample, but there is no promotor transferring coins in a hard fork. The developers of the new cryptocurrency protocol do not own any coins that they transfer to the original coin owners; the owners already have all rights necessary to claim the new coins.

VII. REAL-LIFE FORKS ARE NOT ACCESSIONS TO WEALTH

Two real-life hard forks help illustrate the principles discussed in this Article. Taken together, they demonstrate clearly that hard forks are properly characterized as a division of an original coin into two coins through a partition of the blockchain, a non-realization event. Neither

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106.   *See*, *e.g.*, Webb, *supra* note 102, at 298 ("Bitcoin Cash might best be characterized as treasure trove"); *see also* Chason, *supra* note 40, at 37 (characterizing Bitcoin Cash as "a windfall for Bitcoin owners") & at 24 ("doctrinal definition [of treasure trove] and the [treasure trove] regulation both support the taxation of treasure trove *and other windfalls*" (emphasis added)).

107.   *See*, *e.g.*, Calvin, *Chain-Splits*, *supra* note 95, at text following n.11 ("[c]hain-split coins are unsolicited property that may be claimed by taxpayers if they have sufficient credentials"); Chason, *supra* note 40, at 35–36 ("best doctrinal analogy for crypto clones is free samples of merchandise").

resulting coin is a rent thrown off by the other. As we will see, even identifying which coin is the new coin and which is the legacy coin is not always clear.

This story begins with the most famous fork, the split of the original Bitcoin blockchain into the legacy currency—still called Bitcoin—and the new currency, which took the name Bitcoin Cash (BCH). If this August 2017 fork were considered in isolation, the approach taken by the Service and most scholars appears plausible. Most of the original coins held by Bitcoin owners had substantially appreciated since the date of purchase. The BCH coins immediately started trading at a price that was substantial but was perhaps a tenth of the price at which legacy bitcoins were trading. Finally, legacy bitcoins continued to trade at similar prices as the original bitcoins before the fork. In short, the BCH coins appeared to be "free money" that unlocked unrealized appreciation in the original coins, arguably a clearly realized accession to wealth.

A later fork cast serious doubt on these premises. More than a year after the Bitcoin-BCH fork, Bitcoin Cash experienced a hard fork of its own. In this case, there were two development groups who released competing upgrades of the software protocol. One group called its currency Bitcoin Cash ABC (ABC) and the other called its currency Bitcoin Cash Satoshi Vision (BSV). Although ABC eventually "won" the battle and came to be traded under the Bitcoin Cash name and ticker symbol, this result was far from guaranteed in the days following the fork. ABC also traded at a higher value than BSV, but the difference in value was not so significant as to give the impression that BSV was "free money." Perhaps most importantly, the fork occurred in 2018 after the "great crypto crash" of January 2018.[108] As a result, many of the original BCH coins were trading at a lower price at the time of the fork than their original purchase price. For such coins, it is not possible to argue that unrealized appreciation was unlocked by the ABC-BSV fork.

First, let's take a closer look at the famous Bitcoin-BCH fork. The fork was the result of irreconcilable differences of opinion within the Bitcoin community. To set the scene, Bitcoin was facing a

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108.   *See*, *e.g.*, Michael Patterson, *The Great Crypto Crash of 2018: Cryptocurrency's 80% Plunge Is Now Worse than the Dot-com Crash*, Fin. Post (Sept. 12, 2018), https://business.financialpost.com/technology/block chain/cryptos-80-plunge-is-now-worse-than-the-dot-com-crash [https://perma .cc/SU4T-7E37].

"scalability" issue. As originally designed, the average time for the creation of a Bitcoin block was ten minutes and the maximum size of a block was one megabyte. As a result, the maximum number of transactions that could be handled by the Bitcoin network was severely limited, with estimates ranging from three to fifteen transactions per second.[109] Controversy raged in the Bitcoin community for quite some time. Defenders of the status quo wanted to keep the number of transactions low so that Bitcoin would chiefly be an investment or a "store of value" like gold.[110] Some proponents of change argued that Bitcoin should become a "medium of exchange" and a ready alternative to cash.[111] This goal was highlighted by proponents' choice of the name Bitcoin Cash for the currency to be governed by the new protocol.[112]

Because the Bitcoin protocol is open source, BCH developers were able to make modifications to it to implement the new protocol. The principal change was to increase the maximum block size from one megabyte to eight megabytes.[113] BCH developers announced in advance that the fork would occur at block number 478,558 of the Bitcoin blockchain. The first BCH block (i.e., at block height 478,559) was mined nearly six hours after that final block on the shared historic blockchain.[114] While this lengthy delay called into question whether the fork was going to be successful, Bitcoin Cash ultimately did succeed and is currently a popular cryptocurrency by market capitalization.[115]

Recall that *Glenshaw Glass* requires both realization and accession to wealth. The main thesis of this Article is that hard forks

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109. *E.g.*, Webb, *supra* note 102, at 291 (three transactions per second); Xu, *supra* note 102, at 2695 (fifteen transactions per second).

110. *See* CoinMetrics, *Comparative Analysis*, *supra* note 22.

111. *Id*.

112. *See* Chason, *supra* note 40, at 18.

113. Luke Graham, *A New Digital Currency Is About to be Created as the Bitcoin Blockchain Is Forced to Split in Two*, CNBC (Jul. 31, 2017; updated Aug. 1, 2017), https://www.cnbc.com/2017/07/31/blockchain-fork -will-create-new-digital-crypto-currency-bitcoin-cash.html [https://perma.cc /5MJX-HUNR].

114. Stan Higgins, *Bitcoin Cash Just Mined Its First Block, Making Blockchain Split Official*, CᴏɪɴDᴇsᴋ (Aug. 1, 2017; updated Aug. 2, 2017), https://www.coindesk.com/bitcoin-cash-just-mined-first-block-making -blockchain-split-official [https://perma.cc/8KNB-4PU9].

115. *Historical Data Bitcoin Cash*, *supra* note 6 (ranked 11 on June 8, 2021).

are not realization events. They are never, in and of themselves, an accession to wealth either. As we will see, the ABC-BSV fork demonstrates that there may actually be a loss of wealth in connection with the fork. The effect of the Bitcoin-BCH fork on the combined value of the legacy and new coins is also far from clear. Bitcoin, like other cryptocurrencies, is so volatile that it is difficult to ascribe any cause for fluctuations or to predict what the price trajectory might be if an event (like the fork) did not occur. Consider the following particularly volatile dates around the time of the fork:[116]

Table 1

	Bitcoin	**BCH**	**Combined**	**Increase**
July 19, 2017	$2,273		$2,273	
July 20, 2017	$2,818		$2,818	$544
July 31, 2017	$2,875		$2,875	
August 1, 2017	$2,718	$380	$3,098	$223
August 4, 2017	$2,896	$233	$3,129	
August 5, 2017	$3,253	$213	$3,466	$337

Comparing Bitcoin's closing price on the day before the fork (July 31, 2017) with the combined closing prices for Bitcoin and BCH on the day of the fork, there is an apparent increase of $223. However, this is a smaller increase than either the increase in Bitcoin's value a little over a week before the fork ($544 between July 19 and July 20) or the increase in the combined value of the two coins a few days after the fork ($337 between August 4 and August 5). The assumption that the fork itself created any new value appears to be unwarranted.

The second fork to be discussed is considerably less well known but makes the most dramatic case of all against claims that hard forks are accessions to wealth. On November 15, 2018, Bitcoin Cash experienced a hard fork that brought with it both drama and controversy.[117] Two development groups each released competing

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116.   *Id.* (closing prices for each date).

117.   *See* Aaron van Wirdum, *When the Fork Forks: What You Need to Know as Bitcoin Cash Goes to War*, Bitcoin Mag. (Nov. 14, 2018), https://bitcoinmagazine.com/articles/when-fork-forks-what-you-need-know

upgrades of the software protocol and vied for the "soul" of the entire Bitcoin enterprise. The developers behind ABC introduced a "canonical" ordering of transactions—in contrast to Bitcoin's initial design that allowed miners to choose which transactions to include in their blocks.[118] They also extended some of the currency's features, including support for a class of smart contracts. The developers behind BSV rejected all of the changes introduced in the ABC protocol, increased the block size limit to 128 megabytes, and promised to make future changes to bring the protocol closer to the original Bitcoin protocol.[119]

Prior to the fork, both coins were vigorously trading in futures markets, and it was unclear which one would achieve dominance. ABC eventually came out on top with roughly a three-to-one price advantage. According to one contemporaneous source, ABC was trading at $289 per coin and BSV at $97 per coin soon after the fork.[120] However, at one point in time, the difference in trading prices was much smaller: ABC futures were trading at around $260 per coin while BSV futures were close behind trading at around $220.[121]

The ABC-BSV fork differed from the prior Bitcoin-BCH fork in many significant ways. One difference is that there were modifications to the software protocols on both sides of the fork. As a result, software modification could not be a meaningful criterion to determine which of the coins is the "new" coin. Another important difference is that, according to the contemporaneous source, the combined value of the two coins after the fork was less than the value of Bitcoin Cash before the fork.[122] This did not look like a case of "free money" at all. A final difference is that the fork occurred after the massive loss of value across the cryptocurrency ecosphere in the great crypto crash of January 2018. As a result, many owners of Bitcoin Cash coins had large

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-bitcoin-cash-goes-war [https://perma.cc/C5CV-ZG48]. Most of the information in this section is based on van Wirdum's article.

118.   *Id.*

119*.   Id.*

120.   Olga Kharif, *Bitcoin Cash Fork Hits Investors' Pocketbooks as Two Coins Slip*, BLOOMBERG (Nov. 15, 2018), https://www.bloomberg.com /news/articles/2018-11-15/bitcoin-cash-fork-hits-investors-pocketbooks-as -two-coins-slip [https://perma.cc/4YSL-4PP9].

121.   van Wirdum, *supra* note 117.

122.   Kharif, *supra* note 120.

unrealized *losses* at the time of the ABC-BSV fork. Taken together, there is no possible factual predicate to any claim that the fork involved a mass accession to wealth.[123]

VIII. DIVISION OF BASIS IS THE HARD PART

Once it is established that hard forks are divisions of property, it is necessary to consider how the coin owner's basis in the original coin should be allocated between the legacy coin and the new coin. Under the approach taken by the Ruling and most scholars, no allocation of basis is necessary because the new coin takes a basis equal to the amount of income that is recognized as a result of the fork, which is the coin's fair market value at that time.[124] However, since the division of property is a nonrecognition event, this rule is not applicable. A simple approach would be to assign a zero basis to the new coin, thereby treating the legacy coin as the successor to the original coin and having it retain the original coin's basis.[125] However, as discussed below, such a rule would lead to inappropriate results and arbitrage opportunities. Regulations and caselaw both make clear that an attempt must be made to allocate basis when a larger property is divided into parts. Having

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123. Part IX below provides a numeric illustration of this point.

124. This is the general rule that applies in cases where the receipt of property is taxable, such as prizes and found property. As it is not possible to take a "cost" basis, the property takes a basis equal to the amount of income recognized for tax purposes. This prevents double taxation when the property is later sold.

125. This approach has been referred to as "calving" because it is analogous to the rule that applies when a cow that became pregnant after being acquired gives birth to a calf: that is, the cow retains its original basis, and the calf takes a zero basis. *See* Mattia Landoni & Gina C. Pieters, *Taxing Blockchain Forks* (SMU Cox Sch. of Bus. Resarch Paper No. 19-18, 2019), https://ssrn.com/abstract=3475598 [https://perma.cc/CS9V-PNUT]. In application, it is also the effect of the approach proposed by the ABA and the AICPA. The ABA/AICPA approach treats a hard fork as a recognition event but assigns a zero value to the new coin. *See* ABA Tax'n Comments, *supra* note 104, at 9; Updated Recommendations on Notice 2014-21, Virtual Currency Guidance, from AICPA to IRS, at 6–7 (May 30, 2018), https://www.aicpa.org/content/dam/aicpa/advocacy/tax/downloadabledocuments/20180530-aicpa-comment-letter-on-notice-2014-21-virtual-currency.pdf [https://perma.cc/A95M-BA34] [hereinafter AICPA Comments].

said this, the guidance on *how* the basis is to be allocated is not always clear and is sometimes conflicting.

The operative rule is found in Treasury regulation section 1.61–6(a):

> When a part of a larger property is sold, the cost or other basis of the entire property shall be equitably apportioned among the several parts, and the gain realized or loss sustained on the part of the entire property sold is the difference between the selling price and the cost or other basis allocated to such part. The sale of each part is treated as a separate transaction and gain or loss shall be computed separately on each part. Thus, gain or loss shall be determined at the time of sale of each part and not deferred until the entire property has been disposed of.[126]

Accordingly, the rule is that the basis of the larger property (i.e., the original coin) must be "equitably apportioned" among the parts (i.e., the legacy coin and the new coin). The difficult question is what method of apportionment is "equitable."

Example 2 from section 1.61–6(a) illustrates a case where the equitable allocation is made based on relative values "at the time of purchase" of the original property. Specifically, it involves a case where a used car lot and an adjoining filling station are acquired at a time when the car lot was worth $10,000 and the filling station was worth $15,000. Given such clear facts, it is not surprising that the $25,000 purchase price is allocated accordingly and gain on the sale of the filling station is calculated on the basis of the $15,000 cost allocated to it. This "rule" that the allocation should be made on the basis of the relative values of the parts of the whole property contemporaneous with the date of the original purchase became firmly established, at least in the case of real property divisions.[127]

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126. Reg. § 1.61–6(a).

127. *See, e.g.,* Fisher v. United States, 82 Fed. Cl. 780, 784 n.7 (2008) (citing Beaver Dam Coal Co. v. United States, 370 F.2d 414, 416–17 (6th Cir.1966); Byram v. Comm'r, T.C. Memo. 1975-135, 34 T.C.M. (CCH) 626; Am. Smelting & Refin. Co. v. United States, 191 Ct. Cl. 307 (1970); Fairfield Plaza, Inc. v. Comm'r, 39 T.C. 706, 712, (1963), *acq.*, 1963–2 C.B. 3;

The case of *Gladden v. Commissioner* delves into the question of how basis can be apportioned when the value of a component of the larger property is uncertain or difficult to determine at the time of the original purchase.[128] The case involved the determination of gain when the taxpayers sold water rights appurtenant to their Arizonan land to the government. The Ninth Circuit drew a sharp distinction between cases where the water rights were fully vested at the time when the taxpayer bought the land and those where water rights were wholly unexpected at the time of the purchase.[129] In the first case, the court assumed that it would be easy to determine the relative values of the land and the water rights at the time of purchase. In the latter case, the court concluded that the water rights should be assigned no value at the time the land was purchased and allocated a zero basis. As the case before the court involved neither of these two extremes—that is, at the time the land was purchased, the water rights were *likely* to be granted but had not yet vested—the court remanded the case to the Tax Court for a determination as to whether they could be valued.

If the rule of *Gladden* were applied to cryptocurrency forks, the results might differ significantly depending on when the taxpayer purchased the original coin. If the coin were purchased after the fork was announced, the basis presumably should be allocated. For example, prior to the Bitcoin-Bitcoin Cash fork, BCH coins were already trading on a futures market. As the futures price fluctuated, so too would taxpayers' basis allocations. If the coin were purchased at a time when the fork was being discussed, but was not assured to happen, the basis allocation would be much more uncertain. In fact, the open transaction doctrine, discussed below, might apply. Finally, if the coin were purchased long before the fork was even considered, a zero basis should be assigned.

A zero-basis rule would lead to inappropriate results in many cases. For example, consider the case where the taxpayer's basis in the

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Ayling v. Comm'r, 32 T.C. 704, 711 (1959), *acq.*, 1959–2 C.B. 3; Cleveland-Sandusky Brewing Corp. v. Comm'r, 30 T.C. 539, 545 (1958), *acq.*, 1958–2 C.B. 3), *aff'd per curiam*, 333 Fed. Appx. 572 (Fed. Cir. 2009). Also see the Board of Tax Appeals cases cited *supra* in note 72.

128.   262 F.3d 851, 853–54 (9th Cir. 2001).

129.   The comparison was made between "Greenacre," which was "almost certain to receive . . . federally subsidized water rights," and "Brownacre," which "will almost certainly remain parched." *Id*. at 854.

original coin is similar to the combined value of the legacy coin and the new coin. In addition, assume that the new coin has substantial value. The result of allocating all of the basis to the legacy coin and none to the new coin would be to create a large built-in loss in the legacy coin. The taxpayer could then sell the legacy coin and recognize a large capital loss that is wholly artificial. This result does not reflect the true economics of the situation, which is that the taxpayer held the original coin with neither unrealized gain nor unrealized loss. The taxpayer could use this artificially generated loss to offset other capital gains. An equally inappropriate result would obtain if the taxpayer were to sell the new coin. In this case, the taxpayer would have to report an artificial gain. In any event, the *Gladden* zero-basis rule is only dicta—and therefore not binding even in the Ninth Circuit—since the Gladdens purchased the land when it was likely that water rights would be granted.

Another approach that is supported by caselaw is based on the "open transaction" doctrine. The seminal case on open transactions is *Burnet v. Logan*,[130] dating back to 1931, where the Supreme Court decided that Mrs. Logan did not recognize income from her sale of corporate stock in exchange for a sum of cash and a stream of annual payments based on the amount of iron ore extracted from a mine until her entire basis in the stock was recovered. The Court refused to use "mere estimates, assumptions, and speculations" to determine the amount realized on the sale, allowing Mrs. Logan to defer income recognition until it was known for certain that the amount realized would exceed the amount she originally invested.[131] This is called the "open transaction" doctrine because taxation of the transaction is left open until a later date when it is known whether or not profit will be realized.[132] Professor Jeffrey Kwall, who has extensively studied the open transaction doctrine, persuasively argues that Congress has never given its seal of approval to the open transaction doctrine.[133]

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130.   283 U.S. 404 (1931).

131.   *Id*. at 412.

132.   *See id*. at 413 ("The transaction was not a closed one. Respondent might never recoup her capital investment from payments only conditionally promised.").

133.   Jeffrey L. Kwall, *Out with the Open-Transaction Doctrine: A New Theory for Taxing Contingent Payment Sales*, 81 N.C. L. Rev. 977, 994–96 (2003).

Most open transaction cases, like *Logan*, involve the determination of the amount realized when property with an uncertain value is received in a transaction. In *Fisher v. United States*,[134] the Court of Claims extended the doctrine to the allocation of basis when the value of a component of a larger asset at the time of the larger asset's acquisition is uncertain. *Fisher* involved the demutualization of several insurance companies—i.e., the conversion of the mutual insurance companies into public companies. Prior to demutualization, policyholders had certain "ownership rights" in addition to their interest in the life insurance policies themselves. Ownership rights, which included the right to vote and the right to distributions of surplus profits, could not be sold separately from the underlying insurance policy and automatically terminated when the policy did. In *Fisher*, when the insurance companies demutualized, the taxpayer received public company shares in exchange for giving up ownership rights. The issue in the case was the amount of income the taxpayer must recognize when the shares were later sold, which depended of course on the taxpayer's basis in the shares. All parties agreed that the taxpayer's basis in the shares was equal to the taxpayer's basis in the ownership rights. The Service argued that the taxpayer had a zero basis in the ownership rights, alternatively arguing that the rights had no value at the time the premiums were paid or that the ownership rights were so intertwined with the other rights under the insurance policies that they were "not susceptible to valuation."[135] Ironically, the Court of Claims accepted the latter argument but reasoned that, if the ownership rights could not be separately valued, it was impossible to make any allocation of the taxpayer's basis in the policy between the ownership rights and the underlying policy. The court then applied a variation of the open transaction doctrine, holding that the taxpayer did not realize any income because the proceeds of the stock sale did not exceed the taxpayer's basis in the insurance policy as a whole. It should be noted that *Fisher* was not the last word on the subject in the context of insurance company demutualizations: The Ninth Circuit upheld the Service's zero-basis argument in *Dorrance v. United States*.[136]

While I do not believe that it is appropriate to apply the open transaction method to cryptocurrency hard forks, it is nonetheless a

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134.   82 Fed. Cl. 780 (2008).

135.   *Id*. at 796.

136.   809 F.3d 479 (9th Cir. 2015).

position that some cryptocurrency owners may choose to take, relying on the *Fisher* case—at least outside of the Ninth Circuit, where *Dorrance* is the relevant precedent. The *Fisher* court's reasoning that the ownership rights were intrinsically related to the insurance policy's other rights would arguably be applicable in the cryptocurrency context. After all, the only thing that differentiates the legacy currency from the new currency is the difference in the software protocols that govern them. The software protocol governing the original currency always had the possibility to evolve into these two new protocols—as well as many other possible protocols. It would be impossible to separate out each possible protocol and place a value on it at the time the original coin is purchased.

In the case where the coins have increased in value, open transaction treatment is the most favorable of all treatments because it defers basis recovery as long as possible. Consider the following scenario. A taxpayer bought an original coin for $100. The coin subsequently underwent a hard fork after which the legacy coin was worth $150 and the new coin was worth $50. If the taxpayer immediately sold the new coin, no gain would be realized because the amount realized ($50) is less than the taxpayer's unitary basis in both coins ($100). This is true even though the combined value of the legacy and new coins is twice that of the original coin. In this scenario, taxation would be deferred until the taxpayer sells the legacy coin. For example, if the legacy coin's value remains $150 and the taxpayer sells the coin sometime later, gain of $100 would be realized because that is the difference between the amount realized ($150) and the remainder of the unitary basis ($50).

In summary, regulations and caselaw identify three potential methods of allocating the original coin's basis between the legacy coin and the new coin after a hard fork: the open transaction method, the zero-basis method, and acquisition-date allocation. None of these methods are satisfactory. The open transaction method is too good to be true in cases where the coin has appreciated in value, potentially deferring taxation to a time well after the taxpayer has begun to cash out. The zero-basis method results in inappropriate results whenever the new currency has significant value: it either provides the taxpayer with an opportunity to generate artificial losses by selling the legacy currency or requires the taxpayer to recognize artificial gains when selling the new currency. Finally, although the caselaw strongly favors allocating basis in proportion to the values of the parts of the larger property on the date of acquisition, valuation of the legacy coin and the

new coin is clearly impossible on the date the original coin is acquired if the fork was not yet contemplated at that time.

The obvious solution to the valuation conundrum is to allocate basis in proportion to the relative values of the legacy coin and the new coin on (or near) the date of the fork. This is the solution that other scholars have advanced.[137] Consider again our simple example: an original coin was purchased for $100; the coin subsequently underwent a hard fork after which the legacy coin was worth $150 and the new coin was worth $50. Since the legacy coin's value is three-fourths of the combined value of the legacy and new coins at the time of the fork, three-fourths of the original coin's basis ($75) would be allocated to the legacy coin, and one-fourth ($25) would be allocated to the new coin.

Despite the intuitive appeal of allocating basis based on fork-date values, the question remains whether there is adequate authority for such an approach. The regulations require that the allocation be "equitable" but do not specify what approaches meet this standard.[138] As discussed above, the vast weight of the caselaw suggests that allocation should be based on acquisition-date values. However, there *are* cases where sales-date values were used. Where the taxpayer failed to enter testimony regarding acquisition-date values in a case involving the sale of subdivided real estate, the Service's use of sales-date assessed values was upheld.[139] Similarly, when the court was unpersuaded by the taxpayer's self-serving testimony and concluded that "it does not appear that anything occurred between the time of purchase and the time of sale which would materially alter the relative values," the court upheld the Service's allocation based on sales prices.[140] While these cases use sales-date values, they continue to hold up allocations based on acquisition-date values as the ideal.

More helpfully, there are a few situations involving distributions of corporate stock where, pursuant to an explicit delegation in the Code, Treasury regulations provide for allocation of basis in proportion

137.   *E.g.*, Xu, *supra* note 102, at 2717; Yates, *supra* note 73, at 66.

138.   Reg. § 1.61–6(a).

139.   Cullinan v. Comm'r, 5 B.T.A. 996, 1001 (1927) (some lots purchased in 1916 and some in 1919; sales of lots in 1919 at issue).

140.   Clayton v. Comm'r, T.C. Memo. 1956-21, 15 T.C.M. (CCH) 105, *aff'd*, 245 F.2d 238 (6th Cir. 1957).

to distribution-date values. One of them is under Code section 307, which governs the allocation of basis between original stock held by a shareholder and stock received in a non-taxable stock dividend.[141] Consider an example similar to the cryptocurrency fork example above: a shareholder, who owns one share of common stock with a basis of $100, receives a share of preferred stock as a non-taxable dividend. Assume that, immediately after the dividend, the share of common stock is worth $150 and the share of preferred stock is worth $50. Under the regulations, since the value of the preferred share after the distribution equals one-fourth of the combined value and the common share and the preferred share, the preferred share would be allocated one-fourth of the common share's original basis ($25) and the common share's basis would be reduced to three-fourths of its original basis ($75).

The tax-free stock dividend in this example has similarities to a cryptocurrency hard fork. Assume the shareholder is a minority shareholder who purchased his common share many years before the dividend and that the preferred share was part of a new class of shares created in connection with the dividend. At the time of purchasing the original common share, the shareholder knew that it was possible the corporation would create a new class of preferred shares and issue them as a dividend, but the shareholder had no way of knowing the particular characteristics of the class of preferred stock that was eventually issued. Due to the unknown and unknowable nature of the future division of ownership rights at the time the original share was acquired, the regulations do not try to place a hypothetical value on the two classes of stock on that date. The regulations choose to value the shares on the date of the distribution instead. The same rationale would apply in the context of a cryptocurrency hard fork.

Even though there is no clear statutory, regulatory, or caselaw support for allocating coin basis in proportion to fork-date values, I

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141.   Reg. § 1.307–1(a) (promulgated under the explicit grant of authority by I.R.C. § 307(a)). This section applies where there is a distribution of stock that is tax-free under Code section 305. This is the section that codifies the holding of *Macomber*. A similar rule applies in the case of a "spin-off" of the stock in a controlled corporation to the shareholders of the controlling corporation that is tax-free under Code section 355. *See* Reg. § 1.358–2(a)(2)(i) (promulgated under the explicit grant of authority in I.R.C. § 358(b)).

believe that it is the most appropriate method and can be adopted by taxpayers. This is because all of the alternatives, as discussed above, have unsatisfactory results. Having said this, there are a number of obstacles to valuing cryptocurrency at the time of the fork—particularly, for the new coin. Professor Chason correctly identifies many of the obstacles, including difficulty of determining the actual "moment of birth" of the new currency, thin and volatile markets, lack of support by cryptocurrency exchanges, and lack of notice to owners of the original currency.[142] Of course, these difficulties are all obstacles to applying the majority approach reflected in the Service's Ruling. In fact, the difficulties have a far greater impact under the majority approach because the value of the new coin is the measure of income that is immediately recognized rather than just a factor in the allocation of basis, which is relevant only when either of the coins is sold.

Perhaps, the "real" values of the legacy and new coins are best understood to be the average values over some period, such as the entire month after the fork. However, if no standards are set on how such values would be determined, leaving taxpayers to their own devices, the results might be vastly different for different taxpayers. As the American Institute of Certified Public Accountants (AICPA) notes, the lack of a standard approach also places an "undue burden" on taxpayers struggling to comply with their tax obligations.[143] Deferring valuation until the time when taxpayers have dominion and control over the new currency would lead to even greater variation between taxpayers.

In light of these valuation difficulties, I offer a recommendation for handling the basis allocation problem. The Service should calculate and publish allocation ratios within a few months of each new fork, similar to the approach for "applicable federal rates." If the Service does not address a particular fork, it can safely be assumed that the fork is so obscure and insignificant that the proper valuation of the new coin would round to zero. Presumably, the Service's guidance would only function as a safe harbor absent explicit authorization by Congress or Treasury.

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142. Chason, *supra* note 40, at 19, 30.

143. *See* AICPA Comments, *supra* note 125, at 7.

IX. Closing Example and Conclusion

To understand the stakes involved in taxation of hard forks, it is instructive to take a closer look at the ABC-BSV fork, which was discussed in Part VII. Suppose a taxpayer purchased one Bitcoin Cash coin for $2,433 on January 1, 2018.[144] At the close of the day before the ABC-BSV fork (November 14, 2018), that Bitcoin Cash coin was worth $425,[145] reflecting an unrealized loss of $2,008. For the sake of illustration, assume the prices of ABC coins and BSV coins reported by a contemporaneous source on November 15 are the best measure of their values: the value of the ABC coin was $289 (75% of combined value) and the value of the BSV coin was $97 (25% of combined value).[146] Note that the combined value of the two coins ($386) was $39 *less* than the closing value of the Bitcoin Cash coin on the previous day ($425). Under the Service's Ruling, assuming BSV was identified as the new coin, the taxpayer would immediately recognize $97 of ordinary income. The taxpayer's basis in the ABC coin would be the same as the original Bitcoin Cash coin ($2,433) while the BSV coin would take a basis equal to the $97 of income recognized. In short, the Ruling would force the taxpayer to recognize $97 of income even though the combined value of the coins decreased, and the taxpayer held the original coin with a substantial unrealized loss.

My approach is far more reasonable. The taxpayer's basis in the original Bitcoin Cash coin would be equitably allocated: the legacy ABC coin would be allocated 75% of the original $2,433 basis, which is $1,825; the new BSV coin would be allocated 25% of the original $2,433 basis, which is $608. Both coins would have built-in losses ($1,536 for the ABC coin and $511 for the BSV coin), which is the appropriate result since the taxpayer held the original coin with an unrealized loss. Like the original coin, both coins would be capital assets; they would also have the same holding period as the original coin.

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144.   Closing price for Bitcoin Cash (BCH) on January 1, 2018. *Historical Data Bitcoin Cash*, *supra* note 6.

145.   Closing price for Bitcoin Cash (BCH) on November 14, 2018, according to Kharif, *supra* note 120.

146.   Prices for ABC and BSV at 1:49 PM PST on November 15, 2018, according to Kharif, *supra* note 120.

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In addition to producing the most reasonable result, treating a hard fork as the division of the original coin into the legacy coin and the new coin is the correct approach as a matter both of fact and of law. Factually, as explained in Part III, the legacy coin and the new coin both trace their "chain of title" back to the same original coin,[147] much as two lots of real estate would trace their title back to the same larger parcel after the larger parcel is subdivided.[148] The only thing that differentiates the legacy cryptocurrency from the new currency is the software protocol that governs each one's technical architecture, including rules for the creation and transfer of coins.[149] In fact, since a fork may be caused by a change in the software protocol governing either or both of the resulting coins, it is largely arbitrary identifying one currency as the new currency and the other as the legacy currency.[150] Doing so is no more meaningful than it would be in differentiating one lot of real estate from another after subdivision of a larger parcel. Accordingly, a system of taxation—like the one in the Service's Ruling—that measures gross income by the value of one of the resulting currencies is unreasonable and unwarranted.[151]

The realization principle is the foundation of the federal income tax. Arguably, the principle has a constitutional basis that was established by the Supreme Court in *Macomber* and reaffirmed by the Court in *Glenshaw Glass*.[152] However, even if the principle has no constitutional basis, it is firmly established in the structure of the Code.[153] Any deviation from the principle would have to be explicitly authorized by the Code.[154] The Service cannot override the principle through a mere revenue ruling. Under the realization principle, there can be no gross income as a result of the increase in value of an asset unless there is a sale, disposition, or other realization event relating to the asset. The

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147. *See supra* notes 38–41 and accompanying text.

148. *See supra* notes 76–77 and accompanying text.

149. *See supra* text accompanying notes 31–32 (nature of software protocols) and text accompanying notes 38–39 (hard fork resulting from divergence of software protocols).

150. *See supra* text accompanying notes 117–123 for discussion of the modifications of both protocols in the ABC-BSV fork.

151. *See supra* text accompanying notes 96–98 for description of the Ruling.

152. *See supra* notes 50–54 and accompanying text.

153. *See supra* note 49 and accompanying text.

154. *See supra* notes 68–70 and accompanying text.

mere division of an asset—such as a real property subdivision or a cryptocurrency hard fork—is not a realization event.[155]

Returning to the facts, consider the example at the outset of this Part. In this example, the value of the original coin had declined between the time the coin was bought and when the currency experienced the hard fork. Therefore, there was no unrealized appreciation that could have been unlocked by the fork even if the fork were a realization event. But what if the fork should not be analyzed in the context of a property disposition but rather as a type of income that is properly measured on a gross basis?[156] No valid alternative theory along these lines can be constructed. For example, the new cryptocurrency coin is not rent for use of the original coin,[157] nor is it found property,[158] nor is it an unsolicited sample.[159] Even if it is argued that the income from a hard fork is a new kind of income that has never been seen before, the argument fails because a hard fork does not represent an "accession to wealth" as required under *Glenshaw Glass*.[160] In the example at the outset of this section, this fact is crystal clear: the combined value of the legacy coin and the new coin after the fork was lower than the value of the original coin before the fork. Even in cases where the combined value of the coins *does* increase after the fork, the increase is the result of increased enthusiasm among cryptocurrency investors rather than the result of the hard fork itself.

Once it is established that a hard fork results in the division of cryptocurrency coins into two resulting coins, it is necessary to determine the basis of each coin. Although the law is not entirely clear, the best solution is to split the basis of the original coin between the two coins in proportion to their values at (or near) the time of the fork.[161] In recognition of the substantial valuation issues and the advisability of having a certain and consistent solution for all taxpayers, I propose that the Service should publish allocation percentages by the end of each year for all forks that occurred during the year.

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155.   *See supra* Part V.
156.   *See supra* notes 45–46 and accompanying text.
157.   *See supra* notes 55–56 and accompanying text.
158.   *See supra* note 106 and subsequent text.
159.   *See supra* note 107 and subsequent text.
160.   *See supra* notes 88–93 and accompanying text.
161.   *See supra* Part VIII.

X. Exhibit

Block 5999

> *Original currency*
>
> Prior hash: AAA
> Tx 1: *A* earns coin *x* for mining block
> Tx 2 ... Tx 99
> Hash: BBB

Block 6000

> *Original currency*
>
> Prior hash: BBB
> Tx 1: *B* earns coin *y* for mining block
> Tx 2: *A* transfers coin *x* to *C*
> Tx 3 ... Tx 99
> Hash: CCC

Block 6001

> *Legacy currency*
>
> Prior hash: CCC
> Tx 1: *D* earns coin *z1* for mining block
> Tx 2: *C* transfers coin *x* to *F*
> Tx 3 ... Tx 99
> Hash: DDD

> *"New" currency*
>
> Prior hash: CCC
> Tx 1: *E* earns coin *z2* for mining block
> Tx 2: *C* transfers coin *x* to *G*
> Tx 3 ... Tx 99
> Hash: EEEE