

CRYPTO AND THE FIDUCIARY INVESTOR

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INTRODUCTION

Suppose that an individual serves as trustee of a trust with assets of \$1 million. On November 1, 2021, the trustee invested \$800,000 of the trust assets in a “balanced” fund that is typical for trustees. For the sake of argument, assume that this amount was prudently invested but has neither gained nor lost any value since November 1, 2021.¹ At the same time, the trustee invested the remaining \$200,000 in Bitcoin. From November 1, 2021, to February 1, 2023, the value of Bitcoin had fallen 61%.² So, the \$200,000 placed in Bitcoin had lost \$122,000.

The period from November 1, 2021, to February 1, 2023, illustrates the potential for crypto losses. In later months, Bitcoin prices have rebounded, reaching new highs in March 2024.³ These market gyrations point toward the turbulent nature of crypto markets. Should the trustee be liable for the Bitcoin losses that result from market fluctuations? For purposes of illustration, we will focus on the period from late 2021 to early 2023.

¹ In reality, 2022 was a horrible year for balanced funds as stock market declines and inflation caused losses of almost 20%. See *Fidelity Balanced Fund*, <https://fundresearch.fidelity.com/mutual-funds/performance-and-risk/316345206> [https://perma.cc/5HEG-UPGS] (last visited Feb. 22, 2023).

² See *Bitcoin to USD Chart*, COINMARKETCAP, <https://coinmarketcap.com/currencies/bitcoin/> [https://perma.cc/49LK-JZSQ] (last visited Feb. 1, 2023). On November 1, 2021, the opening price was \$60,963. *Id.* On February 1, 2023, it was \$23,721. *Id.*

³ See Wayne Duggan & Farran Powell, *Bitcoin Price Today: BTC Reaches New All-Time High at \$73.8K*, USA TODAY (Mar. 14, 2024, 8:54 AM), <https://www.usatoday.com/money/blueprint/investing/cryptocurrency/bitcoin-price-today-03-14-2024> [https://perma.cc/T6AU-FNM2].

We can deal with one question fairly easily. Under modern principles of fiduciary investing, no asset is per se off limits to the investing trustee.⁴ Thus, characterizing the Bitcoin as a “speculative” asset does not answer the question.⁵ Similarly, the fact that trust lost value should not be determinative. Under modern principles, courts examine investment decisions at the time they were made (late 2021) rather than when losses are counted (early 2023).

The timing of examination does not, however, tell us whether the Bitcoin investment was prudent. Under governing law—the prudent investor rule—courts must examine challenged investments as part of an overall portfolio. In making these examinations, the prudent investor rule would typically have courts consider expert testimony drawn from financial economics. More specifically, modern portfolio theory (MPT) has a collection of economic tools for creating and evaluating investment portfolios.⁶ Ultimately, the question is whether the overall portfolio is prudent. Thus, the court should examine the Bitcoin investment in conjunction with the balanced fund that, together, constitute the entire trust portfolio.

Here is where cryptocurrencies present unique challenges. The prudent investor rule was finalized in the early 1990s, more than fifteen years before Bitcoin emerged in 2009. The prudent investor rule clearly accepts (and arguably embraces) the teachings of MPT as they existed roughly thirty years ago. MPT was developed primarily for stocks, bonds, and other traditional investment assets. It works well for assets that have expected cash flows that can be discounted to present value.⁷ It also works well for assets that, statistically speaking, have observable expected returns and correlations with the overall market.⁸

Bitcoin and other cryptocurrencies do not lend themselves to ready analysis under these theories. Bitcoin produces no cash flows that can be reduced to present value. Moreover, during its fourteen-

⁴ See RESTATEMENT (THIRD) TRUSTS § 90 (AM. L. INST. 2007).

⁵ Older doctrine would, however, hold trustees liable for investing in “speculative” investments. See *id.* cmt. k.

⁶ See *infra* Part IV (summarizing various tools of modern portfolio theory).

⁷ See *infra* Part IV.B (summarizing discounted cash flow model).

⁸ See *infra* Part IV.C (summarizing capital asset pricing model).

year history, it has had volatile prices. Moreover, the level of volatility is not constant, defying typical assumptions about financial assets. Thus, for the most part, MPT will not provide tools to evaluate Bitcoin and cryptocurrency investments.

At the same time, courts will almost certainly be called upon to analyze the prudence of cryptocurrency investments made by fiduciaries. Cryptocurrency has become increasingly mainstream in recent years, emerging from early shadows cast by scandal and criminality.⁹ Super Bowl LVI (played on February 13, 2022) saw multiple commercials touting separate cryptocurrency businesses.¹⁰ Nothing could be more mainstream. One of those commercials was from the FTX cryptocurrency, which later failed in spectacular and public fashion.¹¹

Without much aid from MPT, how should courts approach claims of imprudent investment in cryptocurrency? Courts might take this lack of aid as itself relevant. If MPT cannot place cryptocurrency in a portfolio, then perhaps fiduciary investors should refrain from doing so. Taking this approach would, however, overextend the prudent investor rule's reliance on MPT. While the creators of the prudent investor rule certainly relied on MPT, the prudent investor rule does expressly adopt it. Moreover, courts should be wary of fixing investment practices in place. It would be ironic if the prudent investor rule, which intended to bring new theories of investing to the law,¹² could be used to calcify investment practices to the mid-1990s.

If MPT does not provide any ready answers, then what governs the investment decision? This Article attempts to sketch the most important issues for fiduciary investors to consider prospectively (and courts to consider retrospectively). First, fiduciaries must

⁹ Cf. John O. McGinnis & Kyle Roche, *Bitcoin: Order Without Law in the Digital Age*, 94 IND. L.J. 1497, 1553 (2019) ("Proponents of bitcoin are relieved to see it has survived hacks, scandals, peer group competition, and a general disapproval by governments.").

¹⁰ See Mallika Mitra, *Why Crypto Ads Won the Super Bowl*, MONEY (Feb. 14, 2022), <https://money.com/super-bowl-crypto-ads-coinbase/> [<https://perma.cc/X2SS-VD7N>].

¹¹ Nitish Pahwa, *If You Bought Crypto Because of Larry David and Matt Damon, I'm Sorry*, SLATE (Feb. 11, 2023, 9:26 AM), <https://slate.com/technology/2023/02/super-bowl-ads-crypto-ftx-larry-david-coinbase-matt-damon.html> [<https://perma.cc/57WV-HW3H>].

¹² See *infra* Part III.A.

diversify their portfolios.¹³ A modest 5% allocation to cryptocurrencies may well be prudent, while a larger 20% allocation may not. Second, and less obviously, fiduciaries must consider the form in which they hold any cryptocurrency allocations.¹⁴ An investor could hold Bitcoin and other cryptocurrencies directly (controlling all of the cryptographic elements of ownership) or indirectly (delegating that control to a third party like an exchange). Both involve risks. Third, fiduciaries must exercise particular care when investing beyond Bitcoin and a handful of other mainstream cryptocurrencies. For example, projects like Terra offered dazzling returns that turned out to be illusory.¹⁵ Rather than receiving high yields, investors in some more innovative projects have suffered near total losses.¹⁶ Perhaps most importantly, fiduciaries must investigate cryptocurrencies more thoroughly than conventional investments and consider how they would be incorporated into the investment portfolio.¹⁷

I. CRYPTO BACKGROUND FOR THE FIDUCIARY INVESTOR

A. Bitcoin

Created in late 2008 and early 2009 by the pseudonymous Satoshi Nakamoto,¹⁸ Bitcoin is the oldest and largest cryptocurrency. In early September 2024, each unit of Bitcoin had a market price of around \$55,000, and all Bitcoin units in circulation had a value of roughly \$1 trillion.¹⁹ Unlike shares in most corporations, units of Bitcoin are not backed by assets, money, or business projects. Bitcoin does not produce dividends, interest, rents, or royalties that we associate with traditional investment

¹³ See *infra* Part V.A.

¹⁴ See *infra* Part V.C.

¹⁵ See Arthur E. Wilmarth, Jr., *We Must Protect Investors and Our Banking System from the Crypto Industry*, 101 Wash. U.L. Rev. 235, 259–60 (2023).

¹⁶ See *infra* Part V.D.

¹⁷ See *infra* Part V.E.

¹⁸ See Satoshi Nakamoto, *Bitcoin: A Peer-To-Peer Electronic Cash System* (2008), <https://bitcoin.org/bitcoin.pdf> [<https://perma.cc/4KWZ-T4T9>] (proposing creation of Bitcoin in late 2008); Marcelo M. Prates, *Money in the Twenty-First Century: From Rusty Coins to Digital Currencies*, 15 OHIO ST. BUS. L.J. 164, 210 (2021) (“On Halloween 2008 . . . Satoshi Nakamoto published Bitcoin’s white paper—and changed money forever.”).

¹⁹ See *Bitcoin to USD Chart*, *supra* note 2.

assets. Bitcoin's value comes from markets where participants buy and sell.²⁰

In reality, Bitcoin is simply data stored on computers throughout the world. This data structure is known as the Bitcoin blockchain. Moreover, ownership of Bitcoin is not personal to individuals, corporations, or the other legal actors. Instead, the blockchain determines ownership via an alphanumeric address (similar to a username).²¹ Owners control an address (and any Bitcoin associated with it) via a private key that functions like a password.²²

If Alice owns one unit of Bitcoin, it is because she controls the private key associated with that unit. Control of the private key allows Alice to execute a new Bitcoin transaction. So, she could transfer the one Bitcoin to a third party (e.g., Charlie) by creating a digital signature.²³ A party must create a digital signature to effectuate a transfer, and the only way to create a digital signature is by knowing the private key. Anyone who loses the private key will also lose access to their Bitcoin.

The gut-wrenching story of James Howells illustrates these concepts. He was an early miner of Bitcoin, accumulating about 7,500 units in 2009. The addresses of those 7,500 units are all public on the Bitcoin blockchain. Howells stored the private keys associated with those addresses on a computer hard drive, which he accidentally threw away in 2013. At that time, Howells' hard drive held data worth more than \$1 million.²⁴ Today, the data is worth

²⁰ See Nikolei M. Kaplanov, *Nerdy Money: Bitcoin, the Private Digital Currency, and the Case Against Its Regulation*, 25 LOY. CONSUMER L. REV. 111, 113 (2012) ("Bitcoin has no intrinsic value, and there is no government, company, or independent organization upholding its value or monitoring its use. Instead, bitcoin relies on a peer-to-peer network to gain value through demand and maintains security through the program its users run on their personal machines.") (footnotes omitted).

²¹ See ANDREAS ANTONOPOULOS, *MASTERING BITCOIN* 136 (2d ed. 2017) ("The vast majority of transactions on the bitcoin network spend outputs locked with a Pay-to-Public-Key Hash.... These outputs contain a locking script that locks the output to a public key hash, more commonly known as a bitcoin address.").

²² See *infra* Part IV.B "™"

²³ See *id.*

²⁴ See Vladimir Troitsky, *Unclaimed (Unowned) Digital Assets: Addressing the Legal Implications of Absent or Unknown Ownership*, 16 ELON L. REV. 221, 229 (2024). At the end of 2013, one Bitcoin was worth about \$770. See *Bitcoin to USD Chart*, *supra* note 2.

around \$250 million. Unfortunately, the hard drive is currently inaccessible, somewhere in a Welsh landfill.²⁵ Without the private keys, Howells has no way to create digital signatures. And, without digital signatures, Howells has no way to transfer any of the 8,000 Bitcoin. These 8,000 Bitcoin have no inherent value beyond Howells' ability to transfer them for value. For now, they are simply stuck on the Bitcoin blockchain.

Bitcoin is decentralized, and there is no central administrator who can reverse transactions, reset passwords, and assist owners when they face technical issues. Because of this fact, ownership of Bitcoin is similar to ownership of tangible assets like gold.²⁶ The owner must safeguard the gold to protect it from theft. But, like a pirate who cannot locate his buried treasure, the Bitcoin owner could go too far and make her Bitcoin holdings inaccessible.

B. Forms of Ownership

All illustrated by James Howells' saga, direct ownership of cryptocurrencies presents technical challenges. Suppose a trustee purchases Bitcoin using funds from the trust. The trustee would then control the private key, and the cryptocurrency would become an asset of the trust. The main technical issue would be safeguarding the private key. The private key is, in effect, an extremely valuable password, and the trustee should not store it in a place that could be the target of an easy hack.²⁷ For example, the trustee should not store the private key on a word-processor file. Anyone who gained access to the document would have access to the Bitcoin. With access, the intruder could then execute transactions in which they transfer the trust's Bitcoin to themselves. As noted already, since Bitcoin is decentralized, there would be no way to reverse or undo these transactions, even if they are wrongful.

²⁵ See Isobel Asher Hamilton, *The Quest to Find \$181 Million in Bitcoin Buried in a Dump*, BUSINESS INSIDER (July 24, 2022, 2:17 PM), <https://www.businessinsider.com/james-howells-threw-away-bitcoin-dump-masterplan-get-back-2022-7> [https://perma.cc/4C4Z-K9ZS].

²⁶ See *infra* Part IV.B.

²⁷ See Andrew M. Hinkes, *Throw Away the Key, or the Key Holder? Coercive Contempt for Lost or Forgotten Cryptocurrency Private Keys, or Obstinate Holders*, 16 NW. J. TECH. & INTELL. PROP. 225, 230-32 (2019).

The owner does not, however, manage private keys and the like in raw form. An array of tools, known as “wallets,” exist to help Bitcoin owners store and manage their private keys. A trustee who invests in Bitcoin would be well advised to use such a wallet. For example, the trustee might acquire a piece of hardware resembling a USB drive that can store the private keys. The trustee could then store this “hardware wallet” in a secure place.²⁸

When creating Bitcoin in 2008, Satoshi Nakamoto intended to create a currency that was decentralized and “trustless.”²⁹ Someone who holds Bitcoin via direct ownership does not need to put any trust in a bank or other financial institution; instead, the owner relies on the community of users to facilitate transfers.³⁰ The benefits of direct ownership come at some cost, forcing the owner to navigate the technical challenges by creating a wallet. Moreover, the investors face the risk of loss or theft if they fail to navigate these challenges.

Many investors find it more convenient to bypass these challenges and hold cryptocurrency indirectly. For example, an investor might transfer \$20,000 to an exchange, which then buys 1 BTC for the investor.³¹ After the purchase, the exchange or some other third party may well control the private key on behalf of the investor. If the investor wants to sell the 1 BTC, it would need to

²⁸ See Carol Goforth, *The Lawyer’s Cryptionary: A Resource for Talking to Clients About Crypto-Transactions*, 41 CAMPBELL L. REV. 47, 84, 112-13 (2019) (discussing hardware wallets and wallets).

²⁹ Nakamoto, *supra* note 18, at 1 (“What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party.”); see also Joshua A.T. Fairfield, *BitProperty*, 88 S. CAL. L. REV. 805, 813 (2015) (discussing legal and policy aspects of trustless transfers).

³⁰ See Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 328 (2017) (discussing Bitcoin consensus protocols).

³¹ See Neal B. Christiansen & Julia E. Jarrett, *Forfeiting Cryptocurrency: Decrypting the Challenges of a Modern Asset*, 67 DOJ J. FED. L. & PRAC. 155, 159 (2019) (“Conversely, a ‘hosted’ (or ‘custodial’) wallet is controlled by a third party While hosted wallet users may be able to conduct transactions more easily than unhosted wallet users, they face the risk that the third-party host could lose users’ funds due to theft or human error.”). The SEC complaint against Coinbase describes more mechanics about how an exchange operates. See generally Part II.B, ¶¶ 83 to 86 <https://www.sec.gov/files/litigation/complaints/2023/comp-pr2023-102.pdf> [<https://perma.cc/2CTV-5V9E>] (describing how the Coinbase exchange handles customer funds).

give instructions to the exchange. FinCEN refers to this form of ownership as a “hosted wallet.”³² Coinbase Custody is perhaps the most familiar hosted wallet for U.S. investors, as Coinbase is the largest crypto exchange operating in the U.S.³³

Investors can usually transition between a direct and beneficial ownership fairly easily. So, an investor who holds 1 BTC directly could transfer it to an exchange like Coinbase. After the transfer, the broker would control the private keys on behalf of the investor. Conversely, an investor holding 1 BTC through a broker could typically request that the broker transfer the 1 BTC to an address controlled by the investor.

Rather than dealing with wallet software or hardware, investors simply create an account with a third party. The relationship is similar to the one that investors have with securities brokers.³⁴ Beyond this convenience of ownership, the investor may also want access to cryptocurrency trading. An investor who wants to buy and sell Bitcoin on a daily basis may find it very cumbersome to do so via direct ownership.³⁵ Just finding counterparties to trade could be a challenge. Suppose Alice holds 1 BTC directly and wants to sell it. Even if she finds someone (e.g., Charlie) who wants to buy it for \$20,000, the parties may find the transfer cumbersome. Alice may not want to transfer the 1 BTC to Charlie before he transfers the dollars, and Charlie may have a similar reluctance. Brokers and dealers overcome these problems by acting as counterparties themselves and by coordinating transactions between investors.³⁶

³² See Carol R. Goforth, *Neither a Borrower Nor a Lender Be: Analyzing the SEC’s Reaction to Crypto Lending*, 18 U. MASS. L. REV. 2, 9, 55 n.233 (2022) (referring to Coinbase as “the largest crypto exchange in the U.S.”).

³³ See Ali Dhanani & Wes Edwards, *Cryptocurrency and the Future of Law Firm Payments*, 59 HOUS. LAW. 28, 29 (2021) (“Some examples of reliable hosted wallet services include: Coinbase Custody, Gemini Custody, BitGo, and Bitcoin Suisse Vault, among many others.”) (footnotes omitted); Gary S. Lawson & Joseph Postell, *Against the Chenery II “Doctrine”*, 99 NOTRE DAME L. REV. 47, 94 (referring to Coinbase as “the largest cryptocurrency exchange in the United States.”).

³⁴ See Doris Stacey Gama, *Creating Something Out of Nothing: Taxation of Cryptocurrency Hard Forks*, 31 ALB. L.J. SCI. & TECH. 258, 263 (2021) (“Custodial wallets are run by third-parties such as exchanges and broker services that offer to protect a cryptocurrency holder’s currency within their system.”).

³⁵ See Shaanan Cohny & David A. Hoffman, *Transactional Scripts in Contract Stacks*, 105 MINN. L. REV. 319, 352 (2020) (“Exchanges do generally offer custodial “wallets” that store the keys to a user’s cryptoassets for easy trading.”).

³⁶ See *id.*

Thus, if Alice wanted to trade Bitcoin actively, she would typically hold through a broker or exchange. When she sells, the exchange could convert her 1 BTC into a “stablecoin” that should track the U.S. dollar. The stablecoin is itself a cryptocurrency. Thus, if Alice sells her 1 BTC, the sale could result in her owning not 20,000 US dollars but rather 20,000 [units of stablecoin].³⁷ Alice may not care whether she had \$20,000 in a bank account or 20,000 units of a stablecoin. The exchange, however, may find it more convenient to credit her brokerage account with stablecoins rather than make actual dollar transfers to her bank account. Moreover, the exchange may base its operations outside the U.S., especially when it is looking to avoid U.S. regulation. Such exchanges would usually try to limit their connections to the U.S. by not transacting with U.S. banks.³⁸

In short, beneficial ownership gives cryptocurrency investors the convenience of traditional brokerage services. The downside, however, harkens back to Satoshi Nakamoto’s original purpose in creating Bitcoin. The investor must rely on a third party, like a broker or exchange. Failed exchanges and investor losses play a prominent role in cryptocurrency’s brief history. Mt. Gox was a prominent early Bitcoin exchange that collapsed in 2014,³⁹ and more recently, the FTX exchange collapsed.⁴⁰ Neither exchange was subject to active U.S. regulation, and the collapse of both subjected investors to large losses.

³⁷ See Diana Qiao, *This is Not a Game: Blockchain Regulation and Its Application to Video Games*, 40 N. ILL. U.L. REV. 176, 183 (2020) (“[P]urchasers of stablecoins utilize stablecoins as a quick way to switch from another digital token to stablecoin, and will hold the stablecoins until trading for another digital coin, or convert the stablecoin to fiat currency without delay, and without concern for transaction fees and fluctuation of prices during conversion.”).

³⁸ See Julianna Debler, *Foreign Initial Coin Offering Issuers Beware: The Securities and Exchange Commission Is Watching*, 51 CORNELL INTL. L.J. 245, 267 (2018) (“If the foreign offeror has any indication that it has sold to U.S. persons, including, but not limited to, receiving notice that investors made payments using U.S. bank accounts as in *PlexCorps*, it must take other measures, as necessary, to prevent future sales to U.S. persons.”).

³⁹ See Yilu Zhang, *The Incompatibility of Bitcoin’s “Strong” Decentralization Ideology and Its Growth as A Scalable Currency*, 11 N.Y.U. J.L. & LIBERTY 556, 581-85 (2017) (discussing Mt. Gox and its collapse).

⁴⁰ See Brandon R. Wood, *Pendulum of Deregulation Swings at Consumer Crypto Creditors*, 42 AM. BANKR. INST. J. 16, 16 (2023).

To understand the risks of indirect ownership, recall that the third party assumes the custodial task of holding and managing private keys. Mt. Gox was particularly careless in doing so, allowing thieves to steal private keys and (as a result) the actual Bitcoin.⁴¹ Moreover, the broker should hold enough cryptocurrency to fully secure the claims of its customers. For every customer who owns 1 BTC, the brokerage should actually hold 1 BTC. FTX did not live up to this expectation and could not satisfy the claims of its customers.

C. Cryptocurrency Futures

In a forward contract, a buyer will agree to purchase an asset from a seller.⁴² When entering into the contract, the parties will agree on the price and the time for delivering the asset. Typically, the parties enter into forward contracts using a price that is “fair” to both sides of the deal. For example, suppose that A and B enter into a forward contract under which A buys 1 BTC from B in six months. We will use a rough approximation of financial theory and assume that the current market price (hypothetically \$20,000) is fair to both parties in a forward contract.⁴³

Over time, as the price of Bitcoin fluctuates, the contract will begin to favor one party or the other. For example, suppose that the price rises to \$30,000 over the six-month period. Under the contract with B, A will buy 1 BTC, now worth \$30,000, for only \$20,000. From A’s perspective, the forward contract has provided the same gain that she could have earned had she bought 1 BTC.

Futures contracts are a form of forward contracts with two distinctive features. First, they have standardized terms. Second, the contracts themselves trade as assets on futures exchanges. The two features are related since standardization allows for trading.

⁴¹ See Zhang, *supra* note 40, at 581-85.

⁴² 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, 478-80 (1997) (providing overview of forward contracts).

⁴³ See generally *id.* at 481 (“The forward price is generally determined under a ‘cash and carry’ model. The parties add to the current spot price of the underlying property: (1) the costs that the seller will incur in holding the underlying property until the date of delivery (i.e., insurance, storage, and interest), and (2) any anticipated movement in the spot price of the underlying property.”).

In the prior example, if A and B have a customized forward contract, then C could not readily assume the rights and obligations of one party. With standardization, C could determine the rights and obligations she is assuming.⁴⁴

Almost always, individual parties do not contract with each other directly on a futures exchange. Instead, they contract with a central clearing facility.⁴⁵ So, if A wants to buy an asset and B wants to sell, each of them would enter into a contract with a central clear facility (which we call X). Thus, A and X have a contract, as do B and X. A or B could transfer their rights and obligations to a third party (which we call C) so long as C is authorized to transact on the exchange. All parties must secure their obligations with a “margin,” which is functionally a security deposit.⁴⁶ For example, suppose A has a futures contract to buy an asset with a falling price. A might prefer to breach the contract or transmit her obligations to a third party who would breach. This strategy does not work on a futures exchange, however, because the exchange will require A to maintain a margin account that would cover any losses from A’s breach. Since obligations are fully secured by the margin account, the identity of the parties is not important.⁴⁷

In short, because contractual positions are fully secured and standardized, they can be traded as assets.⁴⁸ Because they are forward contracts, their returns mirror those of the underlying

⁴⁴ See *id.* at 478 n.21 (describing futures contracts).

⁴⁵ See Arthur W.S. Duff & David Zaring, *New Paradigms and Familiar Tools in the New Derivatives Regulation*, 81 GEO. WASH. L. REV. 677, 683 (2013) (“[C]learing requirements ensured both that financial intermediaries stood between futures contract counterparties and that commitments underlying those contracts were well-capitalized.”).

⁴⁶ See Dana Atwood Lukens, *Regulation for the Securities Markets?*, 10 ANN. REV. BANKING L. 379, 413 (1991) (“[F]utures contract margins act as security deposits[.]”).

⁴⁷ See Mark Klock, *Financial Options, Real Options, and Legal Options: Opting to Exploit Ourselves and What We Can Do About It*, 55 ALA. L. REV. 63, 109 n.282 (2003) (“A unique feature of futures contracts is that a party can fulfill their contractual obligation by entering into an offsetting contract with a third party, effectively transferring all obligations under the contract to a complete stranger unknown to the original counterparty. Clearly these arrangements would not be acceptable unless the contracts were designed to be free of the risk of breach.”).

⁴⁸ See *id.*

asset (in our case, Bitcoin and other cryptocurrencies).⁴⁹ Thus, investors can use futures contracts as a way to replicate an investment in Bitcoin or another available cryptocurrency. Returning to an example from above, assume that the fair forward price for Bitcoin delivered in six months is its market price of \$20,000. An investor, A, enters into a futures contract to buy six-month Bitcoin for \$20,000. A should not have to pay a premium to enter into this contract (though she might need to deposit margin with the exchange in order to secure her obligations).⁵⁰ When entering into this contract, A could simultaneously deposit \$20,000 of cash into a bank account or other safe investment; to keep things simple, assume it bears no interest. If Bitcoin goes up to \$30,000 over the six-month period, A will have made \$10,000 on the contract (as she can buy an asset worth \$30,000 for a price of \$20,000). Combined with her \$20,000 in the bank, she will have \$30,000 in total—the same as if she had bought one Bitcoin. In contrast, if Bitcoin falls to \$7,000, she will suffer a \$13,000 loss on the futures contract (being forced to buy an asset worth \$7,000 for a price of \$20,000). Netting the \$13,000 loss against the \$20,000 bank account, A is left with \$7,000—the same as if she had bought one Bitcoin.

D. Crypto Fiascos

Almost since its inception in 2009, Bitcoin and other cryptocurrencies have suffered from periodic fiascos.⁵¹ These fiascos are relevant to the fiduciary investor for two reasons. First, the investor may find itself incurring direct losses. In late 2022, the FTX cryptocurrency exchange failed, imposing losses on customers

⁴⁹ See Levy, *supra* note 43, at 510 (“A long forward contract on the underlying property (i.e., a contract to purchase the underlying property) is the economic equivalent of a direct ownership interest in that property.”).

⁵⁰ See Jerry W. Markham, *Federal Regulation of Margin in the Commodity Futures Industry - History and Theory*, 64 TEMP. L. REV. 59, 63 (1991) (“To secure the obligations of the shorts and longs, margin requirements are imposed.”).

⁵¹ Amy J. Schmitz & Colin Rule, *Online Dispute Resolution for Smart Contracts*, 2019 J. DIS. RES. 103, 125 (2019) (“Just as cryptocurrencies had to endure fiascos like Silk Road, Mt. Gox, and the 2018 ‘coinpocalypse’ on their way to acceptance, smart contracts will raise their own stories of gloom and doom.”) (footnotes omitted).

who had invested via the exchange.⁵² Years before in 2014, the Mt. Gox Bitcoin exchange collapsed, again imposing losses on its investing customers.⁵³ The underlying causes of the two failures were different. At Mt. Gox, the primary problem was poor security and lack of institutional control over customer funds. FTX, in contrast, appears to have been doomed by actual mishandling of customer funds. The CEO appointed to lead FTX after its collapse called it a case of “old fashioned embezzlement.”⁵⁴

As noted already, fiduciary investors can insulate themselves from exchange risk if they hold cryptocurrencies directly rather than indirectly through an exchange. The fiascos have, however, caused losses in crypto prices themselves. Thus, the second reason the fiascos are relevant is that the fiduciary investor might suffer losses because of indirect effects on the price of its investment.

The Terra collapse of May 2022 illustrates this risk.⁵⁵ Strictly speaking, Terra had little, if anything, to do with Bitcoin. The Terra Money Whitepaper (“Terra Whitepaper”)⁵⁶ proposed “a cryptocurrency, Terra, which is both price-stable and growth-driven,” one that would be the “best use case for cryptocurrencies” if it succeeds.⁵⁷ The Terra Whitepaper notes the familiar problem with using Bitcoin and other cryptocurrencies as a medium of exchange. Potential users face substantial volatility between the time they receive payment (e.g., as payment of wages) and the time they convert payment to goods or service. Bitcoin fails even worse as a “unit of account” used to denominate future payments, such as a rent. While a merchant might be willing to tolerate some Bitcoin

⁵² See James English, *Whose Coin Is It Anyway?: FTX, Voyager, and the Challenges of Bankruptcy in a Digital World*, DEL. J. CORP. L. (2023).

⁵³ See Megan McDermott, *The Crypto Quandary: Is Bankruptcy Ready?*, 115 NW. U.L. REV. 24, 44–45 (2020).

⁵⁴ See Jason Karaian & Veronica Majerol, *FTX Used ‘Old-Fashioned Embezzlement,’ New CEO Testifies*, N.Y. TIMES (Dec. 15, 2022), <https://www.nytimes.com/live/2022/12/13/business/sam-bankman-fried-arrest-news> [<https://perma.cc/2CWX-YR7R>].

⁵⁵ Much of the following text about Terra is drawn from an early draft of Eric D. Chason, *Regulating Crypto, On and Off the Chain*, 64 WM. & MARY L. REV. 1011 (2023).

⁵⁶ Evan Kereiakes et al., *Terra Money: Stability and Adoption* (Apr. 2019), https://assets.website-files.com/611153e7af981472d8da199c/618b02d13e938ae1f8ad1e45_Terra_White_paper.pdf [<https://perma.cc/J69F-L8XC>] [hereinafter Terra Whitepaper].

⁵⁷ *Id.* at abstract.

volatility during the hours or days between payment in Bitcoin and conversion to dollars, a long-term lease would expose both parties to enormous volatility if far-distant payments were to be made in Bitcoin.⁵⁸

Terra was certainly not the first cryptocurrency designed to overcome these difficulties. “Stablecoins” are cryptocurrencies pegged to national currencies such as the U.S. dollar.⁵⁹ In January 2025, Tether (USDT) and USD Coin (USDC) were the two largest stablecoins.⁶⁰ They share a similar approach in that units of USDT and USDC are backed by high-quality, dollar-denominated assets.⁶¹ Other stablecoins are backed by more volatile cryptocurrencies. For example, DAI is a stablecoin backed by Ether and other Ethereum-based cryptocurrencies. Unlike the dollar-backed USDT and USDC, units of DAI require significantly higher amounts of collateral relative to the amount of stablecoins issued.⁶² Terra took a different approach. It used “an elastic monetary policy [that] would maintain a stable price” between its stablecoin and the dollar.⁶³ The Terra Protocol actually supported a variety of stablecoins pegged to a variety of fiat currencies. The largest and most important was TerraUSD, which was pegged to the U.S. dollar. From its inception in late 2020 until early May of 2022, TerraUSD successfully maintained this peg⁶⁴ so that 1 TerraUSD would always be worth 1 U.S. dollar (or very close to it).

The Terra Protocol used a system of smart contracts in its attempt to maintain parity between TerraUSD and the dollar. If the price deviated from its peg, the Terra Protocol would need to take corrective action to ensure that one TerraUSD is worth one dollar. If TerraUSD’s price exceeds one dollar, the correction would be almost trivial. The Terra Protocol simply needs to create new

⁵⁸ *Id.* at 1.

⁵⁹ See CAMPBELL R. HARVEY ET AL., *DEFI & THE FUTURE OF FINANCE* 24-25 (2021).

⁶⁰ See *Top Stablecoin Tokens by Market Capitalization*, COINMARKETCAP, <https://coinmarketcap.com/view/stablecoin/> [<https://perma.cc/N7V6-CGRB>] (last visited Jan. 30, 2025).

⁶¹ See HARVEY ET AL., *supra* note 60, at 25.

⁶² See *id.* at 26 (“To mint more of the stablecoin, a user must necessarily back the issuance by an overcollateralized debt position.”).

⁶³ Terra Whitepaper, *supra* note 57, at 1.

⁶⁴ See *TerraClassicUSD to USD Chart*, COINMARKETCAP, <https://coinmarketcap.com/currencies/terrausd/> [<https://perma.cc/734S-695U>] (last visited Aug. 1, 2022).

units of TerraUSD and introduce them into the market. Unlike Tether and DAI, TerraUSD does not require backing by other assets. In a sense, TerraUSD could “print” new money as if it were a government unbound by a gold standard or the like.

The true challenge for TerraUSD came when its price fell below one dollar. In concept, the correction is similar to when the price is too high. The Terra Protocol needs to shrink the supply of outstanding TerraUSD in order to bring its price up to one dollar. For reasons beyond the scope of this Article, the Terra Protocol could not adequately support the price of TerraUSD when it fell below the \$1 peg. Since TerraUSD was a stablecoin, its entire reason for being was to be worth \$1. After TerraUSD failed in this goal in May 2022, the entire Terra structure collapsed.

TerraUSD was not a mainstream cryptocurrency like Bitcoin.⁶⁵ One might conclude, therefore, that the Terra collapse had no effect on a fiduciary investor with an allocation to Bitcoin. Terra’s collapse, however, rippled throughout cryptocurrency markets. On May 1, 2022, Bitcoin traded at about \$40,000. By July 1, 2022, it had fallen by roughly 50%. For the rest of 2022, its price never truly recovered, tending to fluctuate between \$20,000 and \$25,000 through.⁶⁶ Observers have referred to this period as a “crypto winter,”⁶⁷ calling Terra a “Lehman Brothers moment” for cryptocurrency as a whole.⁶⁸ Over 2023 and 2024, Bitcoin prices reversed these losses and achieved new highs.⁶⁹

⁶⁵ See *id.* (at its May 6, 2022 peak, the market capitalization of TerraUSD was \$18.77 billion); see *Bitcoin to USD Chart*, *supra* note 2 (at the same time, the market capitalization of Bitcoin was \$686.02 billion).

⁶⁶ See *Bitcoin to USD Chart*, *supra* note 2.

⁶⁷ Gary B. Gorton & Jeffery Y. Zhang, *Bank Runs During Crypto Winter*, 14 HARV. BUS. L. REV. 297, 298 (2024) (“From November 2021 to June 2022, the aggregate market value of cryptocurrencies fell from \$2.9 trillion to \$1 trillion. This led to a cascade of events in the cryptocurrency ecosystem called ‘Crypto Winter.’”)

⁶⁸ See Alex Hern, *Could Terra Fall Prove to Be Lehman Brothers Moment for Cryptocurrencies?*, THE GUARDIAN (May 11, 2022, 11:35 AM), <https://www.theguardian.com/technology/2022/may/11/terra-price-cryptocurrency-stablecoin> [https://perma.cc/8URQ-NQED].

⁶⁹ See Duggan & Powell, *supra* note 3 and accompanying text.

II. THE PRUDENT INVESTOR RULE

A. *Uniform Prudent Investor Act*

Approved in 1994, the Uniform Prudent Investor Act (“UPIA”) updated fiduciary investment standards as applied to trusts. The UPIA attempted to align these standards with evolving trust practices and, more importantly, a body of financial economics known as “modern portfolio theory.”⁷⁰ The American Law Institute approved similar standards in Restatement (Third) of Trusts: Prudent Investor Rule (1992).⁷¹ Because of its widespread statutory adoption,⁷² the UPIA will be the primary focus of this Section.

At its core, the UPIA requires trustees to “invest and manage trust assets as a prudent investor would” and to “exercise reasonable care, skill, and caution.”⁷³ This duty of prudence is an objective one, similar to the “reasonable person” standard of tort law.⁷⁴ This prudent investor rule, however, is best interpreted in light of investing standards that preceded it. UPIA set out to make “five fundamental alterations” in how courts should evaluate the investment decisions of trustees.⁷⁵

First, legal evaluations should be of an entire portfolio rather than individual assets. Under UPIA § 2(b), “A trustee’s investment and management decisions respecting individual assets must be evaluated not in isolation but in the context of the trust portfolio as a whole.”⁷⁶ The application to cryptocurrencies is fairly obvious. A trustee who invests all trust assets in cryptocurrency should be evaluated differently from one who invests a small percentage.

⁷⁰ UNIF. PRUDENT INV. ACT prefatory note (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994).

⁷¹ RESTATEMENT (THIRD) OF TRUSTS § 90 (AM. L. INST. 2007) (“The trustee has a duty to the beneficiaries to invest and manage the funds of the trust as a prudent investor would[.]”).

⁷² George L. Blum, Annotation, *Uniform Prudent Investor Act*, 61 A.L.R.7th Art. 1 (2021) (“By 2007, virtually every state and the District of Columbia had adopted the UPIA with varying degrees of modification.”).

⁷³ UNIF. PRUDENT INV. ACT § 2(a) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994).

⁷⁴ *Id.* § 1 cmt.

⁷⁵ *Id.* prefatory note.

⁷⁶ *Id.* § 2(b).

Second, trustees must pursue “an overall investment strategy having risk and return objectives reasonably suited to the trust.”⁷⁷ The UPIA charges trustees with evaluating several factors when establishing these objectives, such as the economic position of the beneficiaries.⁷⁸ The key determination will be the risk tolerances and preferences of the beneficiaries. A central tenet of modern portfolio theory is that investments have tradeoffs between risk and return.⁷⁹ Some would even claim that the *only* way to obtain higher returns is to take on more risk.⁸⁰ At first glance, this principle seems to apply neatly as well. Since its inception, Bitcoin appears to be a risky asset with a high rate of return.⁸¹ Viewed in isolation, Bitcoin may appear to be a risky asset, but it might not contribute to the overall risk of a portfolio. Furthermore, Bitcoin’s days of offering extraordinary returns could be in the past. For now, we should note that the risk/return tradeoff is central to the fiduciary investing and will require special care in the case of Bitcoin and cryptocurrencies.

Third, the UPIA eliminated all categoric restrictions on investment assets; “[a] trustee may invest in any kind of property or type of investment consistent with the standards of” the UPIA.⁸² This simple statement has profound implications for legal proceedings challenging investments in cryptocurrencies. Plaintiffs cannot simply claim that cryptocurrencies are an asset class forbidden to trustees. Indeed, the UPIA comments expressly state that the UPIA “impliedly disavows the emphasis in older law on avoiding ‘speculative’ or ‘risky’ investments.”⁸³ In a similar fashion, the Third Restatement notes that, under prior law, “broad categories of investments and techniques often came to be classified

⁷⁷ *Id.*

⁷⁸ *See id.* §§ 2(c)(6)-(7).

⁷⁹ *See* Ian Ayres & Edward Fox, *Alpha Duties: The Search for Excess Returns and Appropriate Fiduciary Duties*, 97 TEX. L. REV. 445, 456 (2019).

⁸⁰ *See* RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. g (AM. L. INST. 2007).

⁸¹ *See infra* Part V.B.

⁸² UNIF. PRUDENT INV. ACT § 2(e) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994). *See also id.* at 3 “All categoric restrictions on types of investments have been abrogated; the trustee can invest in anything that plays an appropriate role in achieving the risk/return objectives of the trust and that meets the other requirements of prudent investing.”

⁸³ *Id.* § 2 cmt.

as ‘speculative’ and thus as imprudent *per se*.⁸⁴ Litigants who challenge cryptocurrency investments could not prevail merely by categorizing the investments as speculative. The Third Restatement notes that the prudent investor rule was intended to allow “expert trustees to pursue challenging, rewarding, nontraditional strategies when appropriate to the particular trust[.]”⁸⁵ Thus, plaintiffs could not prevail simply by noting the novelty or risk of cryptocurrency investments. Instead, plaintiffs must go through an analysis of why cryptocurrencies are inappropriate. We have already seen that the risk/return tradeoff has a special place in the analysis.⁸⁶ A successful plaintiff should be required to show that Bitcoin contributes to investment risk without offering offsetting returns.

Fourth, the UPIA requires that fiduciaries diversify their investment portfolios.⁸⁷ Diversification enhances the risk/return tradeoff mentioned above; it reduces risk without necessarily reducing expected returns.⁸⁸ Absent a waiver of the duty to diversify, a trustee could not prudently invest all trust assets in cryptocurrencies. Despite this seemingly clear directive, complicated issues could arise when the duty of diversification is waived. For example, a trust instrument might relieve a trustee of the duty of diversification. In such a situation, the trustee may still be operating under an overall duty of prudence but could have large concentrations in particular assets. Given the lack of categorical restrictions in the UPIA, the trustee might be permitted to invest a large portion of trust assets (perhaps even all) in cryptocurrency if the trust instrument waives diversification.⁸⁹

Fifth, the UPIA expressly permits trustees to delegate investment decisions.⁹⁰ The UPIA does scrutinize the delegation itself for prudence, focusing on the process by which the trustee

⁸⁴ RESTATEMENT (THIRD) OF TRUSTS ch. 17, intro. note (AM. L. INST. 2007).

⁸⁵ *Id.*

⁸⁶ *See* UNIF. PRUDENT INV. ACT § 2(b) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994).

⁸⁷ *See id.* § 3.

⁸⁸ *See id.* § 3 cmt.

⁸⁹ *See id.* § 1(b) (“The prudent investor rule, a default rule, may be expanded, restricted, eliminated, or otherwise altered by the provisions of a trust.”).

⁹⁰ *See id.* § 9(a).

selected the investment professional.⁹¹ If the delegation process is found to be prudent, then the trustee is not liable for any imprudent decisions that the investment professional makes.⁹² Thus, a trustee should not be liable for crypto investments that an investment professional makes so long as the trustee prudently retains the professional. While an important part of the UPIA structure, this fifth principle does not present any special issues for cryptocurrencies. It does, however, provide a way of analyzing trustees who choose to hold cryptocurrency indirectly via an exchange. Such trustees would need to act prudently when selecting an exchange to handle private keys.

We can synthesize these principles in the following manner. Trustees are not categorically barred from investing in cryptocurrencies, but they are not categorically permitted to do so either. Because trustees must diversify their portfolios, they may not have overly large concentrations in cryptocurrencies. Trustees who make unconcentrated investments in cryptocurrencies can still face scrutiny under the UPIA based on the overall duty of prudence. The question will be how the investment contributes to the overall risk/return profile of the trust.

B. Justifying Investment Decisions

Thus, trustees can defend crypto investments in two different ways. The more obvious path would be to assert that cryptocurrencies offer high expected returns that justify the risks that they took.⁹³ A court scrutinizing the investment decision should not examine the actual returns on cryptocurrencies between the date of investment decision and the date of litigation. Instead, it should look at the reasonable expectations an investor would have formed when the trustee made the investment decision.

For example, suppose a trustee invested in Bitcoin at its peak price of almost \$65,000 in November 2021. That investment would suffer from poor performance through February 2023, when Bitcoin traded at about \$23,000.⁹⁴ The poor performance, however, should

⁹¹ *See id.*

⁹² *See* UNIF. PRUDENT INV. ACT § 9(c) (NAT'L CONF. OF COMM'RS ON UNIF. STATE L. 1994).

⁹³ *See infra* notes 243-244 and accompanying text.

⁹⁴ *See Bitcoin to USD Chart, supra* note 2.

not be relevant to the prudence analysis. Reasonable expectations about Bitcoin in November 2021 should be the primary focus.

The less obvious path would be to defend the decision based on risk reduction. At first blush, this path does not appear productive for a trustee who is defending investment decisions. Bitcoin, like other cryptocurrencies, has a history of wild swings in prices. Recall, however, that the relevant question is how the investment contributes to the overall risk of the portfolio. On its own, Bitcoin appears to be quite risky. As part of a diversified portfolio, however, it may not be. This Article will examine the portfolio risk of Bitcoin more carefully below.⁹⁵

C. ERISA

The discussion above focuses on the UPIA, the Third Restatement, and private gratuitous trusts. Such trusts are the common vehicle for structuring wealth transfers within a family. In most states, similar rules will apply to charitable trusts as well.⁹⁶ While this Article does not attempt to canvas all regimes for fiduciary investing, the duties imposed by the Employee Retirement Income Security Act of 1974 (“ERISA”) deserve some attention. ERISA regulates retirement plans sponsored by most private-sector employers in the United States.⁹⁷ Historically, defined-benefit pension plans were the most important form of retirement plan. Since the enactment of ERISA, however, 401(k) plans have become the dominant form of retirement plan in the United States.⁹⁸

⁹⁵ See discussion *infra* Part V.B.

⁹⁶ See RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. c (AM. L. INST. 2007); RESTATEMENT (SECOND) OF TRUSTS § 379 (1959).

⁹⁷ See 29 U.S.C. § 1003(a). ERISA’s coverage does not extend to retirement plans sponsored by governmental employers and churches. See 29 U.S.C. § 1003(b)(1)-(2). Moreover, it does not apply to a limited class of executive compensation known as excess benefit plans. See 29 U.S.C. § 1003(b)(5).

⁹⁸ See Edward A. Zelinsky, *The Defined Contribution Paradigm*, 114 YALE L.J. 451, 453 (2004) (“Pension cognoscenti have frequently remarked on the stagnation of defined benefit pensions and the concomitant rise of defined contribution plans.”).

The investing standards for defined-benefit plans function much like they do for private gratuitous trusts.⁹⁹ A fiduciary will hold and invest a pool of assets on behalf of participants in the plan.¹⁰⁰ As under the UPIA, the fiduciary has a duty of prudence and a duty of diversification. If a fiduciary breaches this duty, participants generally have standing to sue.¹⁰¹ Unlike the private trust, however, the defined-benefit plan is essentially a way to secure fixed claims of the participants. Most beneficiaries of private trusts possess claims that relate to the level of trust assets (*e.g.*, the right to all income of a trust). They are clearly harmed by investment losses. In contrast, participants in defined benefit plans are not always harmed by investment losses. For example, a participant might be entitled to a pension equal to 1% of her final salary times her years of service. This claim does not depend on the level of plan assets. If the plan is adequate, the participant's benefits may not be threatened by the loss, in which case participants do not have the standing to sue.¹⁰² Even if the plan is underfunded, a federal insurer (the Pension Benefit Guaranty Corporation) will ensure that the participant is paid most or all of her benefits.

401(k) plans offer participants individual accounts rather than fixed benefits secured by a pool of assets. As a result, participants directly benefit and suffer from investment performance. As a default rule, the investing standards for 401(k) plans are the same

⁹⁹ See 29 U.S.C. § 404(a)(1)(B); 29 U.S.C. § 1104(a)(1)(B) (imposing duty of prudence on ERISA fiduciary investors); *see also* *Firestone Tire & Rubber Co. v. Bruch*, 489 U.S. 101, 110-11 (1989) (noting the relationship between fiduciary investing standards in trust law and ERISA).

¹⁰⁰ In ERISA nomenclature, "participants" are the employees who participate in the plan by reason of their employment status. 29 U.S.C. § 1002(7). "Beneficiaries" are the spouses and other non-employees who enjoy benefits under the plan. U.S.C. § 1002(8). For the sake of simplicity, this Article refers only to participants, but beneficiaries enjoy similar status and standing.

¹⁰¹ ERISA authorizes actions "by a participant, beneficiary, or fiduciary (A) to enjoin any act or practice which violates any provision of [ERISA] or the terms of the plan, or (B) to obtain other appropriate equitable relief (i) to redress such violations or (ii) to enforce any provisions of [ERISA] or the terms of the plan[.]" 29 U.S.C. § 1132(a)(3).

¹⁰² See *Thole v. U.S. Bank N.A.*, 590 U.S. 538, 547 (2020) ("[Plaintiffs] have received all of their vested pension benefits so far, and they are legally entitled to receive the same monthly payments for the rest of their lives. Winning or losing this suit would not change the plaintiffs' monthly pension benefits. The plaintiffs have no concrete stake in this dispute and therefore lack Article III standing.").

as for defined-benefit plans. A fiduciary holds the assets on behalf of participants and is subject to duties of prudence and diversification. In practice, however, the vast majority of 401(k) allow participants to direct their own investments. Plan fiduciaries will identify a set of investment options that their participants may choose from. Very few plans offer cryptocurrency as an official option. Some plans, however, allow participants to invest in a very wide range of assets offered by brokers. In such plans, the investment options will depend on the products offered by the broker, who may have cryptocurrencies and related assets.¹⁰³ Determining the precise nature of fiduciary investment duties can be difficult in 401(k) plans because of the common element of participant control. This Article will not take up these specialized issues, focusing instead on the overall fiduciary prudence of cryptocurrency investments.

In March 2022, the Department of Labor warned ERISA fiduciaries against offering cryptocurrency as an investment option in retirement plans. According to DOL's release, ERISA fiduciaries should "exercise extreme care before they consider adding a cryptocurrency option to a 401(k) plan's investment menu for plan participants."¹⁰⁴ The DOL characterized cryptocurrency as a "speculative and volatile investment," arguably invoking older norms of fiduciary investing that were supposedly abrogated by ERISA and UPIA.¹⁰⁵ The DOL expressed other concerns, such as the inability of most participants to make informed investing decisions about cryptocurrencies. Though the release did not address diversification expressly, it must have been a concern of the DOL. A 401(k) plan that allows participants to allocate 5% of their account balance in cryptocurrency presents a different risk than a plan that allows a 100% allocation.

The DOL's warning targeted 401(k) plans that offer cryptocurrency options to participants. It did not, however, address defined benefit plans that invest a portion of their plan assets in

¹⁰³ See generally Anne Tucker, *Retirement Revolution: Unmitigated Risks in the Defined Contribution Society*, 51 HOUS. L. REV. 153 (2013) (overviewing self-directed retirement plans).

¹⁰⁴ Dep't of Lab., Compliance Assistance Release No. 2022-01" 401(k) Plan Investments in "Cryptocurrencies" (Mar. 10, 2022).

¹⁰⁵ See *supra* notes 84-86 and accompanying text.

cryptocurrency. A lurking diversification issue, however, may explain the DOL's focus. Defined benefit plans must diversify their holdings. They cannot concentrate assets in a single stock, and concentrating their holdings in cryptocurrency would be a blatant violation of the duty to diversify. Defined benefit plans should, though, be allowed to invest a small portion of assets in cryptocurrency. Competent fiduciaries should understand these points. 401(k) plan participants, however, will often lack this understanding. Offering them the option to invest in cryptocurrencies may result in many of them investing all of their retirement savings in cryptocurrencies. Indeed, when the DOL issued its release, the price of Bitcoin was around \$42,000.¹⁰⁶ In early February 2022, it was \$23,000, a decline of about 45%.

D. Distinguishing Diversification from Prudence

In *Fifth Third Bancorp v. Dudenhoeffer*,¹⁰⁷ the United States Supreme Court seemed to separate the duties of prudence and diversification. *Dudenhoeffer* dealt with an employee stock ownership plan (or ESOP). ESOPs invest in stock issued by corporate employers and, because of this focus, are excused from the diversification requirements of ERISA. Before the decision, many lower courts had found that employer-stock investments were presumptively prudent, placing special burdens on plaintiffs seeking to challenge them.¹⁰⁸ In *Dudenhoeffer*, the Court unanimously rejected such presumptions. "ESOP fiduciaries . . . are not liable for losses that result from a failure to diversify. But aside from that distinction, because ESOP fiduciaries are ERISA fiduciaries and because [ERISA's] duty of prudence applies to all ERISA fiduciaries, ESOP fiduciaries are subject to the duty of prudence just as other ERISA fiduciaries are."¹⁰⁹

¹⁰⁶ See *Bitcoin to USD Chart*, *supra* note 2.

¹⁰⁷ *Fifth Third Bancorp v. Dudenhoeffer*, 573 U.S. 409, 421-22 (2014). See 29 U.S.C. § 1104(a)(2).

¹⁰⁸ *Bancorp*, 573 U.S. at 417 ("Several Courts of Appeals have gone beyond ERISA's express provision that ESOP fiduciaries need not diversify by giving ESOP fiduciaries a 'presumption of prudence' when their decisions to hold or buy employer stock are challenged as imprudent.").

¹⁰⁹ *Id.* at 419.

As noted before, this Article will not consider the legal and policy issues surrounding ERISA in detail. Nevertheless, ERISA does parallel the UPIA¹¹⁰ and highlights some interesting issues that apply to all fiduciary investors. Plan fiduciaries should seek to formulate a prudent strategy that balances the risk and return on plan assets as a whole. Could cryptocurrency be part of the strategy? Some plans, like some trusts, may be excused from the duty of diversification. In *Dudenhoeffer*, the plan was excused from diversification requirements because it was an ESOP.¹¹¹ This category would not apply to plans that offer investments in cryptocurrencies like Bitcoin or Ether since they are not employer securities.

III. MODERN PORTFOLIO THEORY

A. Introduction

The prudent investor rule would not prohibit investments in cryptocurrencies even if they were considered “speculative.”¹¹² The appropriateness of the investment, instead, turns on whether it contributes positively to the risk/return profile of the entire portfolio.¹¹³ Whether this is the case should be a matter of financial economics rather than pure legal analysis. Moreover, the prudent investor rule reflects and incorporates modern portfolio theory. Nevertheless, courts (not economists) will be the ones that judge fiduciary investing.

Portfolio investing requires a tradeoff between risk and return.¹¹⁴ Standard financial theory states that investors earn higher returns by taking on higher risks. Thus, investors must balance their desire for more returns and less risk when

¹¹⁰ See UNIF. PRUDENT INV. ACT prefatory note (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994) (Implications for charitable and pension trusts).

¹¹¹ See *Bancorp*, 573 U.S. at 417.

¹¹² See *supra* notes 83-86 and accompanying text.

¹¹³ UNIF. PRUDENT INV. ACT § 2(b) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994) (“A trustee’s investment and management decisions respecting individual assets must be evaluated not in isolation but in the context of the trust portfolio as a whole and as a part of an overall investment strategy having risk and return objectives reasonably suited to the trust.”).

¹¹⁴ *Id.* prefatory note (objectives of the Act) (“The tradeoff in all investing between risk and return is identified as the fiduciary’s central consideration.”).

formulating their optimal portfolio. While all investors are assumed to prefer higher returns and lower risks, the optimal portfolio will vary from investor to investor based on their individual risk tolerance. Investors with high tolerance will pursue greater returns while taking on more risk. The prudent investor rule charges fiduciaries with identifying the appropriate portfolio based on the risk tolerance of beneficiaries.

Financial theory has developed tools to assist investors in evaluating how individual assets fit within their optimal portfolios. Later, this Article will consider these tools and how they might apply to cryptocurrencies like Bitcoin. As we will see, these tools have an uneven effect on cryptocurrency investments. Some, like the benefits of diversification, have straightforward application. Others, however, depend on statistical measures that may not prove meaningful.

B. Diversification

To understand diversification, we briefly unpack a couple of terms: risk and risk aversion. In financial terms, risk refers to the variance of possible returns.¹¹⁵ For example, assume that you are interested in investing in a start-up that provides bar-prep lessons.¹¹⁶ In recent years, however, the number of freshly graduated JDs has fluctuated. You expect that the start-up will provide a 30% return on investment in those years that see higher-than-average numbers of new JDs. In other the years, the start-up will provide a 0% return. So, you expect a 15% return (assuming that the two types of years are distributed equally). Another start-up opportunity, however, provides library services to law schools in the United States. You expect that the number of law schools will be stable (despite fluctuations in enrollment). Every year, you expect the library services company to provide a return of 15%.

Which opportunity is better? Risk-averse investors would seem to prefer the certainty of the library-services company. While

¹¹⁵ See Robert J. Rhee, *A Price Theory of Legal Bargaining: An Inquiry into the Selection of Settlement and Litigation Under Uncertainty*, 56 EMORY L.J. 619, 679 (2006) (“Variance, a measure of risk, is a proxy for the confidence in one’s assessment of probability[.]”).

¹¹⁶ Start-ups are a classic “high-risk, high-return” investment. See Joseph Bankman, *The Structure of Silicon Valley Start-Ups*, 41 UCLA L. REV. 1737, 1765 (1994).

the behavioral underpinnings of risk aversion are beyond the scope of this Article, it is typically assumed that investors are predominantly risk averse.¹¹⁷ This assumption derives from principles of financial economics and is so strong that it has become embedded in legal standards like the prudent investor rule.

While the bar-prep startup looks risky in isolation, it may not be all that risky as part of a larger investment portfolio. Suppose that you can invest not only in the bar-prep course company but also in several other companies that provide test-prep services (CPA, SAT, etc.). Just to provide a working example, suppose that there are nine other companies. Like the bar-prep company, each of the other nine companies offers equal chances of 30% and 0% returns. Most importantly, assume that there is no correlation between the returns from the individual companies. So, for example, there is no relationship between the returns from CPA prep and bar prep.

Our portfolio of 10 companies looks much less risky now. As before, we expect an average return of 15%. Only an incredible stroke of misfortune would lead to a return of 0% on the portfolio. All ten companies would have to have bad years, and the likelihood of that happening is about 0.1%.¹¹⁸ By combining several investments, we have created a relatively low-risk portfolio even though each component is itself risky.

The most important lesson of diversification is that spreading a portfolio across *unrelated* assets will reduce risk. We assume that risk reduction is a goal of most investors, not because of inherent logic but because of assumptions about economic behavior. Indeed, risk reduction does not always lead to better ultimate results.¹¹⁹ Returning to our example, investors who put all of their money in

¹¹⁷ See Edward J. McCaffery, *Why People Play Lotteries and Why It Matters*, 1994 WIS. L. REV. 71, 75–76 (1994) (“[Financial theory] typically presumes that agents are rational and risk averse. This is axiomatically equivalent to asserting that agents have a diminishing marginal utility of wealth.”) (footnotes omitted); Lawrence Blume & Daniel L. Rubinfeld, *Compensation for Takings: An Economic Analysis*, 72 CAL. L. REV. 569, 602 (1984) (describing “diminishing marginal utility that is the source of risk aversion”).

¹¹⁸ The likelihood of one bad year at one investment is 50% or 1/2. For 10 unrelated investments, it is $(1/2)^{10}$, or 1/1024, roughly 1/1000 or 0.1%.

¹¹⁹ Financial theory holds the people should not play lotteries. See McCaffery, *supra* note 119, at 75–79. Nevertheless, lottery winners are indisputably better off for having played.

one company have a 50% chance of earning a return of 30%. If they spread their money across 10 unrelated companies, however, they have only a 0.1% of earning such a large return. Some investors might conceivably want an opportunity for large returns.¹²⁰

Moreover, we should question an important premise of the example. Most investments are not uncorrelated. We might wonder, for example, whether bar prep and CPA prep services are both related to the same underlying economic forces. Dealing with differences in risk preference and correlated investments is the project of the capital asset pricing model (CAPM), discussed the next Section.

Before turning to CAPM, however, we should consider how diversification applies to investments in cryptocurrencies. Bitcoin, the largest cryptocurrency in terms of market capitalization, is a volatile (and hence, risky) asset.¹²¹ It is difficult to place a precise number on its volatility, which itself fluctuates over time. Rather than delving into a precise measurement of Bitcoin volatility, we can note that it is more volatile than the overall U.S. stock market (measured by returns on the S&P 500).¹²² As a result, a fiduciary investor would almost certainly need to diversify any holdings of Bitcoin (unless that duty is waived). Moreover, the fiduciary investor should not rely on other cryptocurrencies because they are typically correlated with the returns on Bitcoin.¹²³ Thus, diversification would need to come from other assets (e.g., a traditional portfolio of stocks and bonds).

This much should be fairly obvious. Trustees face near certain litigation if they hold concentrated positions in Bitcoin during a down market. They cannot insulate themselves by holding other cryptocurrencies. So, at most, they should hold a portion of their

¹²⁰ People are risk seeking if “they will prefer a gamble to the certain option when both have the same expected value.” Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1051, 1105 (2000).

¹²¹ See Matthew D. Rayburn, *Bitcoin When the Bank Breaks: Uncertainty in the Treatment of Bitcoin & Other Cryptocurrencies in the Face of Bankruptcy*, 16 N.Y.U. J.L. & BUS. 257, 271 (2019).

¹²² See *id.*

¹²³ See Payal Shah, Trading the Ether/Bitcoin Correlation, <https://www.cmegroup.com/articles/2023/trading-the-ether-bitcoin-correlation.html> [<https://perma.cc/8ABC-ETBG>] (“Historically, bitcoin and ether have been highly correlated.”).

portfolios in cryptocurrency. The question, then, is how much? Ten percent? Zero percent? Determining the optimal level of investment turns difficult. As we will see, Bitcoin and other cryptocurrencies do not neatly fit into the usual financial models that could answer such questions.

C. Capital Asset Pricing Model

The capital asset pricing model (CAPM) is a traditional tool for predicting the expected return of an investment asset in a portfolio.¹²⁴ CAPM is part of “modern portfolio theory,” which the drafters of the prudent investor rule relied upon. In its pure form, CAPM envisions the existence of a “market portfolio” that includes all risky assets,¹²⁵ though an index of publicly traded stock, like the S&P 500, works well enough for our purposes.¹²⁶

Individual assets are then evaluated according to their relationship to this market portfolio. Under CAPM, the important measure is “beta,” which measures the degree of relationship to the market portfolio.¹²⁷ Recall our hypothetical start-up company that provides bar prep services. We imagine that it was completely independent of other test prep services. Let us take our assumption a step further and say that the returns from the bar-prep business are unrelated to the returns on the S&P 500.¹²⁸

For purposes of CAPM, investment in the bar-prep business is risk free. Viewed in isolation, the investment seems risky (even chance of 0% or 30% returns). However, if the investor added it to the market portfolio, the risk would start to disappear. Both the

¹²⁴ RESTATEMENT (THIRD) OF TRUSTS: INTRODUCTION TO PORTFOLIO THEORY AND OTHER INVESTMENT CONCEPTS § 90 gen. note on cmts. e-h (AM. L. INST. 2007) (“[A] basic theory of capital markets and investing . . . calls for investors to hold a ‘market’ portfolio. The theory is based on the so-called standard capital-asset pricing model, or CAPM. Purists assert that the market portfolio should contain all ‘risky assets’[.]”)

¹²⁵ *See id.*

¹²⁶ *See* Ronald J. Gilson & Reinier Kraakman, *The Mechanisms of Market Efficiency Twenty Years Later: The Hindsight Bias*, 28 J. CORP. L. 715, 722 (2003) (“[T]he market portfolio is operationally defined as a securities index like the S&P 500.”).

¹²⁷ *Cf. id.* at 718, 722 (explaining beta’s role in CAPM) (“In the end, a security’s beta does not predict its return very well.”).

¹²⁸ Here, the relevant “beta” is zero. *See* Alan Schwartz, *Priority Contracts and Priority in Bankruptcy*, 82 CORNELL L. REV. 1396, 1400 n.16 (1997) (“A project would have a zero beta if its revenues were uncorrelated with the return on any comparable asset set.”).

market portfolio and the bar-prep business are risky, but they are risky in *uncoordinated* ways. We should expect that the bar-prep business risk will be washed out by the market portfolio. In short, we can eliminate risk from the bar-prep course by diversification.¹²⁹

Imagine a different prep-course business, this one for the Chartered Financial Analyst (CFA) exam. The CFA credential targets financial professionals,¹³⁰ and we could expect the CFA prep-course business to have returns closely linked to the overall market. When the market is up, more financial professionals are drawn to the CFA exam (and the prep course). When the market is down, fewer are so drawn. Just for the sake of argument, assume that the CFA prep-course business returns 30% when the market is up and 0% when it is down. So, an investment in the CFA prep-course business will closely track the stock market. Adding it to a market portfolio does not reduce our risk.¹³¹ This time, the portfolio investor cannot avoid the investment risk by diversification.

We will now take these two examples and apply CAPM pricing principles. The CFA-prep business is effectively just as risky as the market portfolio. So, it should have the same expected return as the market portfolio.¹³² In our example, the expected return is 15% (the average of 0% and 30%). This is almost certainly higher than the expected return on the U.S. stock market, but we can ignore this discrepancy. The bar-prep business is effectively risk free. So, it should have the same expected return as risk free assets (such as U.S. Treasury obligations). Like the CFA-prep business, the bar prep business has an expected return of 15%, which is far greater than what risk free assets produce.

What does this tell us? The bar-prep business is a bargain, yielding a return much higher than the market would predict. A

¹²⁹ See Rebecca N. Morrow, *Accelerating Depreciation in Recession*, 19 FLA. TAX REV. 465, 491 n.120 (2016) (quoting STEPHEN A. ROSS ET AL., CORPORATE FINANCE 365 (10th ed. 2013) ("Because a security with zero beta has no relevant risk, its expected [future] return should equal the risk-free rate.")).

¹³⁰ See CFA Program overview, CFA INSTITUTE, <https://www.cfainstitute.org/en/programs/cfa> [<https://perma.cc/VSQ6-MQB7>].

¹³¹ Under CAPM, beta is the relevant risk measure. In this case, the asset has a beta of one since it has a 100% statistical relationship with the market portfolio. See generally Ira M. Millstein & Paul W. MacAvoy, *The Active Board of Directors and Performance of the Large Publicly Traded Corporation*, 98 COLUM. L. REV. 1283, 1309 (1998) (providing overview of CAPM equation).

¹³² *Id.*

savvy investor would want to invest in the bar-prep business before others in the market find out about it.¹³³ Once other market participants discover the bar-prep investment, they will bid up its price. Because the demand will be high and the supply will be limited, the market price will increase until the bar-prep course is no longer so attractive. Suppose that the bar-prep course currently trades at \$100 per share and produces returns of \$0 or \$30. At current pricing, the expected return is 15% (as discussed before). If risk-free assets produce returns of 3%, market participants will bid up the price of the bar-prep course until it reaches \$500, which produces an expected return of 3%.¹³⁴

In sum, the bar-prep course was underpriced, and CAPM provides a theoretical model for identifying this fact. With this model, a fiduciary investor could identify underpriced investments by comparing with the CAPM return with the actual market return.¹³⁵ As discussed below, we should be skeptical that fiduciary investors could routinely use CAPM to identify market anomalies.¹³⁶

D. Mean-Variance Optimization

CAPM has other potential uses for fiduciary investors. Recall that the UPIA requires fiduciaries to balance the return and risk of their investment portfolios.¹³⁷ The process of portfolio optimization uses CAPM principles to achieve this task. Portfolio optimization different portfolios, perhaps analyzing thousands using the aid of computers. A portfolio is suboptimal if any other portfolio has a better return with equal (or lower) risk. Similarly, a portfolio is

¹³³ See Ayres & Fox, *supra* note 80.

¹³⁴ Note that the market price does not affect the dollar amounts of the returns per share. The possible returns are \$30 or \$0 per share. This is the amount that the underlying business produces and shares with its investors. As the share price rises from \$100 to \$500, these dollar returns remain the same because the underlying business remains the same. So, when priced at \$500 per share, the returns are \$30 (6%) or \$0 (0%) for an average of 3%.

¹³⁵ See Ayres & Fox, *supra* note 80.

¹³⁶ See *infra* Part IV.E.

¹³⁷ See UNIF. PRUDENT INV. ACT § 2(b) (NAT'L CONF. OF COMM'RS ON UNIF. STATE L. 1994); W. Brantley Phillips, Jr., *Chasing Down the Devil: Standards of Prudent Investment Under the Restatement (Third) of Trusts*, 54 WASH. & LEE L. REV. 335, 355 (1997) ("[U]nder the prudent investor rule, trustees are free to utilize nearly any type of investment in creating a desirable balance between risk and return for a given trust.").

suboptimal if any other portfolio has lower risk with equal (or higher) return.¹³⁸

Once the fiduciary investor has eliminated all suboptimal portfolios, only efficient ones will remain.¹³⁹ Every efficient portfolio will make the risk / return tradeoff in a unique way. For example, one efficient portfolio might have a risk measure of 15% and an expected return of 8%. Another might have a risk measure of 9% and an expected return of 4%. The efficient portfolios, then, represent a menu of possibilities for the investor. None is inherently better or worse than another. The fiduciary investor must, however, take into account the needs of the beneficiaries when selecting the appropriate portfolio.¹⁴⁰

Portfolio optimization requires reliable data. One type of required data is the expected return for each investment asset that could be part of the portfolio.¹⁴¹ The only way we know that a portfolio has an expected return of 4% is by taking the weighted average of the return on each asset in the portfolio. Another type of required data is the correlation between component assets.¹⁴² As we saw when discussing diversification, the riskiness of a portfolio depends on the isolated riskiness of each component asset *and* the degree of relationship between those assets.¹⁴³

So, while portfolio optimization may sound like an ideal way for a fiduciary investor to make the risk / return tradeoff, it works only if we have reliable data about each component asset. As discussed later, obtaining this data for cryptocurrencies like Bitcoin may be impossible.

¹³⁸ See Ian Ayres & Quinn Curtis, *Beyond Diversification: The Pervasive Problem of Excessive Fees and "Dominated Funds" in 401(k) Plans*, 124 YALE L.J. 1476, 1534-36 (2015) (discussing mean-variance optimization).

¹³⁹ See *id.*

¹⁴⁰ See UNIF. PRUDENT INV. ACT § 2(c) (NAT'L CONF. OF COMM'RS ON UNIF. STATE L. 1994) (identifying circumstances relevant to a trust and its beneficiaries to be considered).

¹⁴¹ See Eric D. Chason, *Taxing Losers*, 18 FLA. TAX REV. 541, 576 (2016).

¹⁴² See *id.*

¹⁴³ See *supra* Part IV.B.

E. Market Efficiency

1. Market Price vs. Intrinsic Value

An earlier example illustrated how CAPM could identify mispriced investments. If we find an asset with an actual return that is higher than its CAPM predicted return, we should buy it. Put another way, we want to buy assets with an intrinsic value (measured by expected return)¹⁴⁴ that is higher than the market price. In our hypothetical about the bar-prep company, we observed a market price of \$100 but used CAPM principles to derive an intrinsic value of \$500. Market efficiency principles, however, suggest that such opportunities will be rare. Note that the information used in our hypothetical was available to all investors. We simply observed a high expected return and a low correlation with the market portfolio. In an efficient market, asset prices adjust rapidly to reflect all new information. Efficiency, then, refers to the ability of markets to process information.¹⁴⁵ In fully efficient markets, market prices (which participants can readily observe) will equal the intrinsic value (which is the value price it would have if all market participants rationally processed all existing information about an asset).¹⁴⁶

2. Forms of Efficiency

Different forms (or “strengths”) of efficiency are directed at different types of data. “Weak-form” efficiency holds that asset prices reflect all information from the market itself (such as past prices and trading volume).¹⁴⁷ A common form of investment analysis is so-called “technical analysis.” The technical analyst will

¹⁴⁴ See Wendy Gerwick Couture, *Price Fraud*, 63 BAYLOR L. REV. 1, 12 (2011) (“The accepted method of calculating a security’s fundamental value is to perform a discounted cash flow (DCF) analysis. In essence, this method calculates the net present value of the security’s estimated future cash flows.”) (footnotes omitted).

¹⁴⁵ See Ronald J. Gilson & Reinier Kraakman, *Market Efficiency after the Financial Crisis: It’s Still a Matter of Information Costs*, 100 VA. L. REV. 313, 321 (2014).

¹⁴⁶ See *id.*

¹⁴⁷ See Jonathan R. Macey & Geoffrey P. Miller, *Good Finance, Bad Economics: An Analysis of the Fraud-on-the-Market Theory*, 42 STAN. L. REV. 1059, 1077 (1990) (“The weak form of the ECMH postulates that a stock’s price is at least substantially independent of past price performance; whatever information is inherent in the historic progression of a stock’s price is reflected in the current price.”).

look for trends in the price of an asset, perhaps seeking to find a “floor” that a falling asset will hit before climbing in value. Weak-form efficiency holds that such analysis will not yield positive returns. We can express this result in a couple of different ways. One is that “floors”¹⁴⁸, and the like simply do not exist. Technical analysts are being “fooled by randomness” when they divine patterns in the movement of asset prices.¹⁴⁸ Alternatively, we might suggest that patterns can exist, but they are not profitable. With many participants analyzing market data, it might be difficult or impossible to find attractive opportunities that have been left unexploited by others. Generally speaking, empirical data supports the notion that developed financial markets (such as the U.S. stock market) possess weak-form efficiency.¹⁴⁹

Semi-strong efficiency holds that market prices reflect any information that is publicly available.¹⁵⁰ This information includes the financial market data discussed in connection with weak-form efficiency. In addition to financial market data, semi-strong efficiency incorporates other publicly available data, such as financial statements, earnings reports, and important news (like patent discoveries and merger activity). Companies subject to SEC disclosure requirements will produce an abundant store of such information.

Above, we linked weak-form efficiency with technical analysis, and we can link semi-strong efficiency with fundamental analysis of securities. Fundamental analysis focuses on financial statements, earnings reports, and so forth, to derive the intrinsic value of the asset.¹⁵¹ If the relevant market is semi-strong efficient, however, fundamental analysis would be pointless. Other analysts have already done this work, derived their own intrinsic values,

¹⁴⁸ Doug Colbert & Colin Starger, *A Butterfly in COVID: Structural Racism and Baltimore's Pretrial Legal System*, 82 MD. L. REV. 1, 39 (2022) (“[W]e run the risk of being ‘fooled by randomness’ if we discount the possibility observed mathematical relationships between two variables are coincidental.”).

¹⁴⁹ Michael C. Macchiarola, *Consciously Decoupling: A Response to Professors Barry, Hatfield, and Kominers*, 100 VA. L. REV. ONLINE 37, 43 n.33 (2014)

¹⁵⁰ See Macey & Miller, *supra* note 149, at 1077.

¹⁵¹ See Gilson & Kraakman, *supra* note 128, at 719 (“The ECMH took the attack one step further, calling into question not only the value of chartists (marginalized by weak form efficiency), but fundamental analysis as well (marginalized by semi-strong form efficiency).”).

made their relevant trades, and bid market prices up or down until they reach the intrinsic value. Empirical evidence supports the view that the U.S. stock market and other developed financial markets possess semi-strong efficiency.¹⁵²

Strong-form efficiency holds that asset prices fully incorporate all existing information, including private information.¹⁵³ Again, we can link this form of efficiency with a particular type of market behavior. Market insiders possess information that is not available to the public and might try to use inside information to their advantage. If, however, the market is strong-form efficient, inside information would not be profitable, perhaps because insiders have been actively trading based on the information already. Empirical evidence suggests that markets do not possess strong-form efficiency, implying that this insider trading can be profitable.¹⁵⁴

3. Efficiency and Fiduciary Investing

The UPIA and prudent investor rule are consistent with the presence of semi-strong form efficiency.¹⁵⁵ Fiduciary investors are typically outsiders and have no access to insider information. They do, of course, have access to earnings reports and the like. But, if the relevant markets are semi-strong efficient, then the fiduciary has little reason to engage in a fundamental analysis of that data. In other words, fiduciary investors would take market prices as a given. While the UPIA does not prohibit fiduciary investors from engaging in fundamental analysis, it does not require or encourage the practice either. It does, however, require fiduciaries to make a

¹⁵² See Mark Klock, *Are Wastefulness and Flamboyance Really Virtues? Use and Abuse of Economic Analysis*, 71 U. CIN. L. REV. 181, 199 (2002) (“While there are some notable exceptions, the still widespread consensus on the evidence regarding market efficiency among economists is that liquid U.S. equity markets pass the semi-strong test and weak tests.”).

¹⁵³ See Macey & Miller, *supra* note 149, at 1077-78.

¹⁵⁴ See Stephen Clark, *Insider Trading and Financial Economics: Where Do We Go from Here?*, 16 STAN. J.L. BUS. & FIN. 43, 53-54 (2010) (“[I]f insider trades are informative, then markets are not strong-form efficient.”).

¹⁵⁵ See Philip J. Ruce, *The Trustee and the Prudent Investor: The Emerging Acceptance of Alternative Investments as the New Fiduciary Standard*, 53 S. TEX. L. REV. 653, 675 (2012) (“The prudent investor rule gives a renewed emphasis to the trustee’s duty to avoid unwarranted expenses; this is due to the market efficiency concepts inherent in the rule.”).

risk/return tradeoff on behalf of beneficiaries.¹⁵⁶ Fiduciary investors will thus need to select the correct portfolio for the needs of their beneficiaries. Part of this process is ascertaining the available portfolios, but part is ascertaining the unique needs of the beneficiaries. These roles remain, even if the markets are efficient.

The mechanics of semi-strong efficiency rely on liquid and developed markets. Publicly traded stocks, for example, change hands constantly between traders and investors. All market participants are keenly interested in having an informational advantage. Whenever a market participant uses an informational advantage, the market price should move towards its fundamental advantage. If I know that Acme Inc. will have a great year, then my purchase of Acme stock will push the price higher towards its fundamental value.¹⁵⁷

Many assets, however, do not trade in markets with observable prices. Real estate is the clearest example. Different units of real property are usually unique in some way. Even if my one-acre lot is next to your one-acre lot, there might be some subtle reason why mine is better than yours. Of course, when those lots are in very different locations, prices will be radically different. One acre in Williamsburg, Virginia will be very different from one acre in the Williamsburg neighborhood of Brooklyn. As a result, real-estate investors cannot simply rely on “the market” to reveal a price. They must do their homework, so to speak, to determine the value of possible investments. Similarly, some equity investments do not publicly trade. A venture capital fund will typically invest in companies that have not yet gone public. At this stage, no market exists that can inform the fund about a “market price” of the stock.¹⁵⁸

¹⁵⁶ See RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. on prudent investing (AM. L. INST. 2007) (“The trustee has an obligation to make this strategic decision after careful consideration of the risk-reward tradeoffs involved and after considering the potential cash-need consequences of the risk element in that choice.”).

¹⁵⁷ See Gilson & Kraakman, *supra* note 128, at 720 (discussing effect of new information on market prices).

¹⁵⁸ Frank H. Easterbrook & Daniel R. Fischel, The Proper Role of a Target’s Management in Responding to a Tender Offer, 94 Harv. L. Rev. 1161, 1204 (1981) (“[T]he market for corporate shares is far more efficient than the market for parcels of real estate.”).

More controversially, some investors resist the notion of market efficiency, despite the empirical support from academic finance. They will continue to engage in technical and fundamental analysis of publicly traded stocks in the hopes of gaining an informational advantage. This advantage would exist if the investor arrived at a fundamental price that differed from the market price. Warren Buffet is a very successful investor who became one of the richest people in the world by engaging in fundamental security analysis inspired by the pre-MPT work of Benjamin Graham and David Dodd. Buffet once remarked, “Ships will sail around the world, but the Flat Earth Society will flourish. There will continue to be wide discrepancies between price and value in the marketplace, and those who read their Graham & Dodd will continue to prosper.”¹⁵⁹

Finally, market efficiency works only if some investors seek an informational advantage. Recall semi-strong efficiency, which holds that market prices incorporate all public information. If all investors shrugged their shoulders at news, then good or bad earnings reports would never affect the market price (even if the report affects the fundamental value). For semi-strong efficiency to hold, *some* market participants must be engaging in fundamental analysis. Otherwise, markets would not.

F. Discounted Cash Flows

Investors in inefficient markets need tools to derive the intrinsic value of an investment asset. Earlier, we saw how CAPM could be used to identify intrinsic value (or at least to identify underpriced assets). Another method would be to project the future cash flows from an asset and discount those to present value. This discounted cash flow (or DCF) method is particularly useful for

¹⁵⁹ See *The Flat Earth Society in a World Proven Round*, SUSTAINABLE INV. (Feb. 6, 2017), https://en.wikipedia.org/wiki/The_Superinvestors_of_Graham-and-Doddsville [<https://perma.cc/C6N7-ZPFY>]; Vitaliy Katsenelson, *The Modern Portfolio Theory Flat Earth Society*, INST'L INV. (May 14, 2014), <https://www.institutionalinvestor.com/article/b14zbknn8rm486/the-modern-portfolio-theory-flat-earth-society> [<https://perma.cc/GN4D-BBTA>].

valuing investments that do not have observable market prices, such as real property and pre-public start-ups.¹⁶⁰

DCF is simple in concept. If we can project expected future cash flows and choose the appropriate discount rate, we can find the intrinsic value of an asset. As a simple example, suppose we know that an asset will produce a one-time payment of cash in one year. The cash payment will be either \$1,100 or \$0, with equal probability. So, the expected *future* cash flow is \$550. We have also identified the appropriate discount rate as 10%.¹⁶¹ So, we discount the \$550 future value to present value using the 10% rate. Under these assumptions, the asset has an intrinsic *present* value of \$500.¹⁶²

According to some observers, DCF models are the best theoretical tools to determine the intrinsic value of investments.¹⁶³ Consider an investment in common stock, arguably the prototype of modern investing. The investor could determine the value of stock in a couple of different ways. The investor could look to what cash payments (typically dividends) that she expects the corporation to pay her. Alternatively, the investor could look to the inherent ability of the corporation to produce cash that could be distributed to investors like herself.

We can break that process down a bit more finely. First, we need a discount rate, which reflects the riskiness of the cash flows. For corporate stock, the discount rate could be determined by the capital asset pricing model, discussed elsewhere in this Article.¹⁶⁴ Second, the analyst needs to have a reasonable forecast of future expected cash flows. For equity investments like corporate stock, the cash flows could be the expected future dividends, redemptions, and other payments made by the corporation to its equity investors.

¹⁶⁰ See Israel Shaked et. al., *Playing the Market (Approach): Going Beyond the DCF Valuation Methodology*, 28 AM. BANKR. INST. J. 58, 58 (2010) (“Courts have long recognized the discounted cash flow (DCF) methodology as an important tool for valuing firms and assessing solvency. Some courts have gone so far as to call the DCF the “preeminent valuation methodology.”).

¹⁶¹ Identifying the discount rate is a particularly tricky part of the process. We do not need to explore those issues in detail. As we will see, cryptocurrencies do not lend themselves well to DCF analysis because they do not typically produce cash flows.

¹⁶² Note that \$550 is 10% greater than \$500.

¹⁶³ See *supra* note 160-161 and accompanying text.

¹⁶⁴ See *supra* Part IV.C.

Alternatively, the analyst could estimate the “free cash flows” of the entity.¹⁶⁵ These free cash flows would be the cash that the entity produces that could be distributed to suppliers of capital.¹⁶⁶

The DCF models are major analytical tools for value modern investing, but they have no obvious application to Bitcoin. As noted above, Bitcoin does not produce cash flows. Unlike a corporation, there is no underlying business that generates returns for investors. The owner controls computer data, having the right to transfer the Bitcoin to a new owner in exchange for consideration.

Of course, the Bitcoin investor expects future cash flows, but the context is very different from traditional DCF models, which look at the ability of the entity to produce cash flows. Traditional DCF models do not require the existence of secondary markets in the investment.¹⁶⁷ Bitcoin, in contrast, has no inherent ability to produce cash flows. The value comes solely from secondary markets. This failure of DCF models highlights a recurring theme of the Article: traditional investment tools do not work well when analyzing Bitcoin.¹⁶⁸

G. Procedural Prudence

1. Introduction

As noted already, the prudent investor rule requires fiduciary investors to make a tradeoff between expected returns and risk.¹⁶⁹ The Restatement elaborates on this process somewhat more, saying that trustees must pursue an “overall investment strategy, which

¹⁶⁵ See John L. Orcutt, *Valuing Young Startups Is Unavoidably Difficult: Using (and Misusing) Deferred-Equity Instruments for Seed Investing*, 55 TULSA L. REV. 469, 483 (2020) (describing free-cash flows and dividend discount models).

¹⁶⁶ See Blake W. Gipson, *The Disappearing Discount: Applying the Minority and Marketability Discounts to the Cost of Capital in Shareholder Appraisals*, 12 HOUS. BUS. & TAX. L.J. 129, 137 (2012) (“Free cash flows represent the portion of future income that is available to be paid out to the shareholders through dividends or reinvested in new projects with the intention of increasing the capital value of the shareholder’s stake.”).

¹⁶⁷ See, Frank Partnoy, *Market Prices vs. Fundamental Value: The Case for Using Discounted Cash Flow Analysis in Securities Class Actions*, 77 BUS. LAW. 1059 (2022) (“[I]n appraisal litigation under Delaware law, courts routinely use DCF analysis in situations where market prices cannot be relied on as evidence of fair value.”).

¹⁶⁸ See, Wulf A. Kaal, *Digital Asset Market Evolution*, 46 J. CORP. L. 909, 928 (2021) (“Bitcoin can be hard to value as it does not have any clearly identifiable cash flows nor is it even clear what its nature is.”).

¹⁶⁹ See Clark, *supra* note 154.

should incorporate risk and return objectives reasonably suitable to the trust.”¹⁷⁰ So far, much of the analysis has been on the risk-return tradeoffs of various investment strategies. The trustee must also determine which particular tradeoff is “suitable” to the trust. Put another way, fiduciary investors must identify the appropriate “risk tolerance” of the trust and its beneficiaries.¹⁷¹ Identifying these tolerances requires knowledge of the trust beneficiaries and their situation.

Because this Article focuses on the prudent investor rule, typical beneficiaries will be individuals who are beneficiaries of private gratuitous trusts. Individuals, as a class, may have different investing objectives than institutions (like universities and defined-benefit pension plans). Different individuals will, of course, have different characteristics based on their financial objectives, external wealth, and the like. A trust with young and wealthy beneficiaries may have different risk tolerances than a trust with an older beneficiary who needs distributions for support.¹⁷² Moreover, fiduciary investors under the prudent investor rule will typically have multiple beneficiaries (including those who will not receive distributions until a future time). In this case, the fiduciary will also have a duty of impartiality, requiring the fiduciary to consider and balance the interests of multiple beneficiaries.¹⁷³

Indeed, if markets are efficient, knowing their beneficiaries and their risk tolerances may well be the more important task for fiduciary investors. Faced with efficient markets, the trustee would broadly diversify the trust’s investments and avoid attempts at beating the market.¹⁷⁴ The trustee must still select from a wide

¹⁷⁰ RESTATEMENT (THIRD) OF TRUSTS § 90(a) (AM. L. INST. 2007).

¹⁷¹ See *id.* cmt. e(1) (“Risk tolerance largely depends on a combination of the regular distribution requirements of the trust and any irregular distributions that may in fact become necessary or appropriate.”).

¹⁷² See Jayne W. Barnard, *Deception, Decisions, and Investor Education*, 17 ELDER L.J. 201, 204 (2009) (“[P]eople’s risk tolerance declines with age. Risk tolerance, however, is as much a factor of wealth as of age.”).

¹⁷³ See RESTATEMENT (THIRD) OF TRUSTS § 79(a) (AM. L. INST. 2007).

¹⁷⁴ See Stewart E. Sterk, *Rethinking Trust Law Reform: How Prudent Is Modern Prudent Investor Doctrine?*, 95 CORNELL L. REV. 851, 860 (2010) (“[I]f the ECMH is correct, no individual investor or firm can develop an investment strategy that consistently beats the market because the market price already reflects the information on which the investor acts.”).

range of diversified portfolios, choosing the one that best aligns with risk tolerances.¹⁷⁵ Thus, we might restate our question about the prudence of fiduciaries' investing in cryptocurrencies. The question is not only about Bitcoin and cryptocurrency in isolation. Instead, fiduciaries must ask whether cryptocurrencies are prudent as part of a particular portfolio held for a particular group of beneficiaries.

2. Investment Policy Statements

As we have seen, portfolio construction is thus a central responsibility of fiduciary investors.¹⁷⁶ Before creating the portfolio, fiduciaries should discharge their duties under the prudent investor rule by defining the investment objectives of the trust and its beneficiaries. The Restatement notes that "[t]he question of whether a breach of trust has occurred turns on the prudence and propriety of the trustee's conduct, not on the eventual results of investment decisions."¹⁷⁷ An investment policy statement (IPS) may detail this conduct by identifying the individualized process by which fiduciary investors construct the portfolio. A typical IPS would address the trust's investment objectives and any restrictions that the fiduciary must observe in creating the portfolio.¹⁷⁸

Investment objectives should be expressed in terms of the risk/return tradeoff, which is central to the prudent investor rule.¹⁷⁹ The IPS might even go so far as to identify relatively clear goals. For example, the IPS might say that the trust seeks a return of 6% with moderate risk.¹⁸⁰ While the return objective seems straightforward, it could be expressed in more flexible terms (4% to

¹⁷⁵ See *infra* notes 201-209 and accompanying text (discussing MVO).

¹⁷⁶ See *supra* note 6 and accompanying text.

¹⁷⁷ RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. b (AM. L. INST. 2007).

¹⁷⁸ See Edward A. Moses et al., *Using a Trust's Investment Policy Statement to Develop the Portfolio's Appropriate Risk Level*, 30 ACTEC J. 251, 252 (2005).

¹⁷⁹ See Easterbrook & Fischel, *supra* note 158.

¹⁸⁰ See *id.* at 254 ("[A] well-considered IPS ... would specify the trust's target rate of return consistent with the trust's goals and objectives."); ALISTAIR BYRNE & FRANK E. SMUDDE, PORTFOLIO MANAGEMENT: BASICS OF PORTFOLIO PLANNING AND CONSTRUCTION 4 (2023) ("The IPS should state clearly the risk tolerance of the client. Risk objectives are specifications for portfolio risk that reflect the client's risk tolerance.").

8%). The risk objective should be consistent. Thus, the IPS should seek a 6% return with moderate risk only if that objective is achievable by the market. The risk objective could be specified in a variety of ways. For example, the IPS might envision a portfolio that would not lose more than 10% of its value in any year (absent extreme market conditions). Or, the portfolio could seek risk and return that tracks external benchmarks developed by the investment industry.¹⁸¹

The risk / return tradeoff should relate to the needs and expectations of trust beneficiaries. For example, one trust might represent large wealth that is expected to grow primarily for the benefit of future, even unborn, beneficiaries. In this case, the fiduciary investor would pursue higher returns (and higher risk). Another might be a more modest trust that exists primarily to support a surviving spouse. In this case, the fiduciary investor would likely seek to control risk and earn returns subject to that constraint.¹⁸²

The IPS could further specify individual considerations and unique needs of the trust and its beneficiaries. Private gratuitous trusts are usually taxable, a fact that could affect investment strategy.¹⁸³ They require a certain amount of liquidity to be able to distribute funds to current beneficiaries. Moreover, they may hold personal-use assets (such as a family vacation home) that beneficiaries use or occupy. The IPS could also address environmental, social, and governance (ESG) considerations.¹⁸⁴

The IPS guides the process of portfolio construction.¹⁸⁵ The prior paragraph outlined some considerations: a 6% return, moderate risk, taxable status, some need for liquidity, and retention of a vacation home. The fiduciary investor would focus on creating an investment portfolio that meets these objectives. After creating the portfolio, the fiduciary investor would regularly review

¹⁸¹ See Byrne & Smudde, *supra* note 182, at 5 (“Some clients may choose to express relative risk objectives, which relate risk relative to one or more benchmarks perceived to represent appropriate risk standards.”).

¹⁸² See Moses et al., *supra* note 180, at 258 (discussing calibration of risk and return).

¹⁸³ See CHRISTOPHER J. SIDONI & VINEET VOHRA, PORTFOLIO MANAGEMENT: OVERVIEW OF PRIVATE WEALTH MANAGEMENT 8-9 (2023) (discussing tax considerations and strategies in portfolio management).

¹⁸⁴ See *id.* at 28.

¹⁸⁵ See Byrne & Smudde, *supra* note 182, at 2.

the IPS to ensure it reflects current markets and beneficiary needs.¹⁸⁶ For example, the trust may need more (or less) returns and liquidity for distributions depending on the personal situation of current beneficiaries. Ultimately, the IPS would develop a statement about asset allocation, specifying how portfolio assets should be invested in standard asset classes (stocks, bonds, etc.).

3. Effects of Procedural Prudence

Fiduciary investors have plenty of reasons to develop an IPS outside of legal considerations. Modern trustees, for example, are often subject to removal under a governing document or applicable law.¹⁸⁷ Lackluster investment performance is a common complaint of trust beneficiaries,¹⁸⁸ and an IPS could help the trustee develop and meet performance expectations.

This Article, however, is primarily concerned with the legal aspects of fiduciary investing. A thoughtfully prepared IPS could serve as a powerful defense if a fiduciary is ever sued for breaching the prudent investor rule.¹⁸⁹ For example, suppose a fiduciary investor invested trust assets in the common stock of 20 companies back in 2019. In 2020, however, three of the companies went bankrupt, resulting in a large loss to the trust. The beneficiaries sue, claiming a breach of the prudent investor rule. If the fiduciary investor developed and implemented an IPS back in 2019, a court could well rely on that fact to find for the trustee. Cast in terms of the Restatement, it is potential evidence of the “prudence and propriety of the trustee’s conduct” notwithstanding the poor “eventual results of investment decisions.”¹⁹⁰ The IPS is, in effect,

¹⁸⁶ See Sidoni & Vohra, *supra* note 185, at 30.

¹⁸⁷ See ROBERT H. SITKOFF & JESSE DUKEMINIER, *WILLS, TRUSTS, & ESTATES* 750-57 (10th ed. 2017).

¹⁸⁸ See Sheldon G. Gilman, *How and When to Use Trust Advisors Most Effectively*, 35 Est. Plan. 30, 31, 2008 WL 525757, 2 (describing common complaint about corporate trustees).

¹⁸⁹ See Moses et al., *supra* note 180, at 252; *but see* STEWART A. MARSHALL, 4 ADMINISTRATION OF TRUSTS IN FLORIDA: PRUDENT INVESTOR ACT (2022) (“Written investment policy statements cannot be generic or standardized. One cannot provide a form with a box to check for ‘growth,’ ‘income,’ ‘value,’ and so forth. These do not establish the primary focus of investments and will not create a “magic defense” in lieu of a properly crafted investment policy statement.”).

¹⁹⁰ RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. b (AM. L. INST. 2007).

evidence of the trustee's prudence, spelling out how the trustee attempted to comply with the prudent investor rule. If, by contrast, the trustee did not develop an IPS, then there may be scant evidence for why the trustee selected these 20 companies for investment. Without any clear justification for its investment choices, the trustee may find it difficult to defend them in court.

IV. CRYPTOCURRENCY UNDER THE PRUDENT INVESTOR RULE

A. Diversification

Initially, we will assume that the trustee has invested trust property in Bitcoin. It is the largest cryptocurrency in terms of market capitalization.¹⁹¹ Beyond this basic premise, we also assume that investment has suffered a loss, and a beneficiary has sued the trustee. While trustees surely have motives beyond avoiding legal liability, this Article focuses its analysis on whether the trustee should be held responsible for the loss. While this Article has summarized MPT only briefly,¹⁹² we can still gain important insights into prudence under the UPIA and Third Restatement of Trusts. Expected returns are “good” and should be pursued; risk is “bad” and should be avoided. Broadly speaking, however, some risk is unavoidable if investors want to earn higher returns.¹⁹³

Nevertheless, investors can avoid some risk by spreading their portfolio across many different assets that are not strongly correlated.¹⁹⁴ Thus, we can break diversification down to two related principles. Primarily, the investor should not hold a concentrated position in one asset. What constitutes a “concentrated position” is debatable, though we might observe some rules of thumb that would allow concentrations of 3% to 5% before triggering special scrutiny.¹⁹⁵ Relatedly, whether a position is

¹⁹¹ See *supra* note 19 and accompanying text.

¹⁹² See *supra* Part IV.

¹⁹³ See *supra* note 80 and accompanying text.

¹⁹⁴ See *supra* Part IV.B.

¹⁹⁵ Some sources suggest that courts and trustees should scrutinize concentrations of three to five percent. See Ayres & Fox, *supra* note 80, at 490-91 (“During volatile periods, concentrations of the trust corpus in individual stocks of more than about 3 percentage points over the firm’s share of the market as a whole should usually be considered not

concentrated turns not only on the percentage allocation (1% vs. 20%) but also on its correlation to the rest of the portfolio.

For purposes of diversification, Bitcoin should be treated like a large-cap stock. In terms of market capitalization, Bitcoin is about as big as Meta Platforms (Facebook). Both have market capitalizations of around half a trillion dollars in early 2023.¹⁹⁶ To put this comparison into better perspective, we can note that Meta is the eighth largest stock in the U.S stock market. Interestingly, both Bitcoin and Meta suffered dramatic price declines in 2022.¹⁹⁷

For purposes of the duty to diversify, investment in Bitcoin could readily be analyzed like an investment in the stock of a very large corporation. Is a 10% allocation to Bitcoin too large to satisfy the duty to diversify? At first blush, the question is equivalent to asking if a 10% allocation to Meta stock is too large to satisfy the duty. However, given the rules of thumb described above (3% to 5%), either allocation should receive scrutiny from an investing trustee and a reviewing court. Moreover, the investment of the remaining 90% is particularly relevant. Before allocating 10% to Bitcoin, the trustee should examine the absolute risk of the remaining 90% along with its correlation with Bitcoin. One possibility, discussed above,¹⁹⁸ is that the remaining 90% is invested in standard balanced portfolio favored by fiduciaries. Another is that the remaining 90% is invested in a riskier portfolio consisting of common stock in 30 different issuers. Neither scenario lends itself to an easy answer, but they do frame how courts should deal with diversification. In general, courts should view Bitcoin like an investment in a single, large-capitalization stock, evaluated as part of the overall portfolio.

diversified, triggering an explanation from the trustee.”) (footnotes omitted); SITKOFF & DUKEMINIER, *supra* note 189, at 640 (“[A] good rule of thumb is that a concentration in a single security of more than 5 percent requires explanation.”).

¹⁹⁶ See *Bitcoin to USD Chart*, *supra* note 2 (noting Bitcoin’s market capitalization); but see *Largest American Companies by Market Capitalization*, COMPANIESMARKETCAP, <https://companiesmarketcap.com/usa/largest-companies-in-the-usa-by-market-cap/> [https://perma.cc/QB99-9V3Y] (noting Meta’s market capitalization).

¹⁹⁷ See *Meta Platforms, Inc. (META)*, YAHOO! FINANCE, <https://finance.yahoo.com/quote/META/history/?period1=1640995200&period2=1703980800> [https://perma.cc/SX4N-EW6F] (last visited Feb. 28, 2023).

¹⁹⁸ See *supra* Part I.

B. Prudence and the Lack of Traditional MPT Tools

Above, we saw that courts could separate the duty to diversify from an overall duty of prudence.¹⁹⁹ Separation of the duties could occur if the settlor of a trust expressly waived the duty to diversify.²⁰⁰ In this case, a beneficiary could not criticize a 10% allocation to Bitcoin on the grounds that it was too concentrated. Similarly, a court might view a 10% allocation as sufficiently diversified to satisfy the duty to diversify. Nevertheless, the court should remember that it is evaluating a 10% investment in Bitcoin. If Bitcoin is an imprudent, wasteful investment, then the trustee should still be accountable for making it.

While this Article has summarized MPT only briefly, we can still gain important insights into prudence under the UPIA and Third Restatement. Expected returns are “good” and should be pursued; risk is “bad” and should be avoided.²⁰¹ Investors should seek portfolios that are efficient in the following sense. Suppose a particular portfolio has expected return of 10% and risk (measured by standard deviation) of 30%. The portfolio is *inefficient* if the investor can identify an alternative with the same 10% but lower standard deviation.²⁰² Moreover, the portfolio is inefficient if the investor could identify a portfolio with the same risk (20% standard deviation) but a higher return. In both cases, the investor has identified an alternative portfolio that is clearly better than the one being tested. If no superior alternative exists, we can think of the tested portfolio as being efficient.²⁰³

¹⁹⁹ *Id.*

²⁰⁰ *Cf.* UNIF. PRUDENT INV. ACT § 1(b) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994) (“The prudent investor rule, a default rule, may be expanded, restricted, eliminated, or otherwise altered by the provisions of a trust.”); RESTATEMENT (THIRD) OF TRUSTS § 91(b) (AM. L. INST. 2007) (imposing “a duty to conform to the terms of the trust directing or restricting investments by the trustee”).

²⁰¹ *See* RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. e(1) (AM. L. INST. 2007) (“Insofar as the term ‘risk’ is used (as it commonly is in economic literature) to refer to volatility of return, risk management by a trustee requires that careful attention be given to the particular trust’s risk tolerance, that is, to its tolerance for volatility.”).

²⁰² *See* Andy Kirkpatrick, *A Global Approach to Diversification*, 22 PROB. & PROP. 45, 46 (2008) (“[R]ational investors should only accept portfolios that lie along the “efficient frontier” of possibilities (so-called mean-variance optimization (MVO)).”).

²⁰³ *See* Jeffrey N. Gordon & Lewis A. Kornhauser, *Efficient Markets, Costly Information, and Securities Research*, 60 N.Y.U. L. REV. 761, 776 (1985) (“A risk-averse investor will evaluate asset performance in a portfolio rather than in isolation. She will

Many efficient portfolios exist under MVO. For example, suppose that investor identifies two efficient portfolios. One has expected return of 10% and risk of 30%. The other has expected return of 6% and risk of 10%. Neither is inherently better than the other. They simply represent different tradeoffs between risk and return. Returning to fiduciary investors, we can identify two tasks. One task should be to avoid inefficient portfolios. The other is to select a risk/return tradeoff that is “suitable to the trust.”²⁰⁴ The challenge for cryptocurrencies is executing the first task and identifying an efficient portfolio. We can call this task “mean-variance optimization” or MVO.²⁰⁵ (Mean returns to the expected return; variance refers to the risk.)

While the mathematics of MVO are beyond the scope of this Article, we can still sketch the basic approach. The investor starts the process with quantitative inputs for each asset: the asset’s expected return, the asset’s riskiness measured outside of a portfolio, and each asset’s correlation with the returns of other assets. The investor would also need a quantitative estimate of her risk preferences. Armed with this information, the investor can then create an optimal portfolio. It will be efficient in the sense described above. Thus, no other portfolio is inherently better. It will also represent the best risk/return tradeoff, given the investor’s risk preferences.

Despite its age, MVO remains a commonly used tool for investors planning modern portfolios.²⁰⁶ Note, however, that it requires extensive information about asset returns. Suppose we are analyzing 100 assets. For the first asset (A_1), we need to identify its expected return (μ_1), its volatility (σ_1), and its correlation with all

select an ‘efficient portfolio’—a collection of assets such that for a given level of risk, the investor receives the greatest expected return.”); JEAN L.P. BRUNEL ET AL., *PORTFOLIO MANAGEMENT: PRINCIPLES OF ASSET ALLOCATION* 5 (2023) (“Efficient asset mixes are combinations of the assets in the opportunity set that maximize expected return per unit of expected risk or, alternatively (and equivalently), minimize expected risk for a given level of expected return.”).

²⁰⁴ See RESTATEMENT (THIRD) OF TRUSTS § 90(a) (AM. L. INST. 2007).

²⁰⁵ See BRUNEL ET AL., *supra* note 203, at 3-4.

²⁰⁶ See Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952) (first introducing MVO); see BRUNEL ET AL., *supra* note 204, at 3 (acknowledging Markowitz and referring to MVO as “perhaps the most common approach used in practice to develop and set asset allocation policy.”).

other assets ($\rho_{1,2}$, $\rho_{1,3}$, ..., $\rho_{1,100}$).²⁰⁷ That is 101 pieces of statistical information that we need for just the first asset. Typically, the investor would look to historical returns on the various asset to estimate these required inputs.²⁰⁸

An investor could readily find historical data on Bitcoin's returns to estimate future returns. Unfortunately, the expectations would be highly dependent on the period used. Looking back over a 10-year period, we can see that Bitcoin has experienced an annual return of almost 100%. If that was Bitcoin's true expected return, an investor might reasonably invest in nothing else, even if the position was not diversified. Looking back over a one-year period, however, we see a loss of almost 50%. If that was Bitcoin's true expected return, an investor should never invest in it.²⁰⁹

These differences are dramatic, but stocks can sometimes exhibit similar disparities based on the look-back period. Even with a uniform look-back period (e.g., five years), the historical data may still lead to bizarre results.²¹⁰ Some stocks will have a track record of losses, while others will have a record of extraordinary gains. A naively constructed MVO portfolio might consist only of stocks that have historically had extraordinary gains. In practice, it is unreasonable to expect such historical patterns to extend into the future.²¹¹ Thus, many observers believe that historical data on assets returns is inherently unreliable. Yet, without an estimate for an asset's return, the investor cannot use the MVO to create an optimal portfolio.

Over the years, investment practitioners and academics have developed alternative models for portfolio optimization. For example, the Black-Litterman model allows the investor to create an optimal portfolio with limited information. A typical Black-Litterman process would not use expected returns for individual assets. Using more sophisticated assumptions than MVO, Black-

²⁰⁷ See BRUNEL ET AL., *supra* note 203, at 21.

²⁰⁸ See *id.* at 28.

²⁰⁹ See Ryan Browne & Arjun Kharpal, *Bitcoin's Trading has Become 'Boring' — but That's Not Necessarily a Bad Thing*, VIRTUSE (Nov. 6, 2022) <https://www.virtuse.com/bitcoins-trading-has-become-boring-but-thats-not-necessarily-a-bad-thing/> [<https://perma.cc/36UG-YD7F>] (describing historical volatility).

²¹⁰ See BRUNEL et al., *supra* note 203, at 4.

²¹¹ See *id.* at 19.

Litterman is able to produce an optimal portfolio relying primarily on the correlations between assets (or asset classes).²¹²

These more sophisticated models are still not well equipped to deal with Bitcoin and other cryptocurrencies. While Black-Litterman does not need expected return data, it does need correlations between assets (or at least asset sectors). We are not asking for certainty about future prices. Instead, we want to know if Bitcoin will tend to move up when the overall market moves up. Such information is at the heart of the Black-Litterman model, and we cannot reliably estimate the relationship between Bitcoin and non-crypto assets.²¹³ During its early years, Bitcoin exhibited a low degree of correlation with the overall stock market. More recently, however, Bitcoin has shown a higher degree of positive relationship.²¹⁴

We could, of course, look beyond historical data to estimate how Bitcoin will behave in the future. An analyst might conceivably examine the economics around Bitcoin to arrive at an estimate for how it will behave in the future. However, the analyst would have to sort a variety of competing theories of Bitcoin. Some contend that it is simply a sham that will soon be forgotten. Others claim it is the future of money itself. An analyst could hardly parse these and other theories to determine which one is correct. Thus, while the investor cannot rely on historical data, she probably cannot rely on theoretical, qualitative expectations either.

Despite these apparent deficiencies, Bitcoin remains an important asset (even if diminished from its all-time highs). Investors must hold some expectations about why future markets will assign positive value to Bitcoin. An investor might think a variety of outcomes are possible. It is possible that Bitcoin will become the world currency. It is possible that Bitcoin will fill some niche role future markets (e.g., as a store of value that is insulated

²¹² See *id.* at 23-26.

²¹³ See Mark Humphery-Jenner, *Three Useful Things to Know About Bitcoin Risk, Returns and Diversification*, BUSINESS THINK (Apr. 29, 2021), <https://www.businessthink.unsw.edu.au/articles/bitcoin-returns-risk> [<https://perma.cc/FM7L-TFBY>].

²¹⁴ See Bao Doan et. al, *Cryptocurrency Systematic Risk Dynamics*, Economics Letters, Aug. 2024, at 3, <https://doi.org/10.1016/j.econlet.2024.111788> [<https://perma.cc/X4W3-CCPW>].

from inflation).²¹⁵ The various theories are not ones that can be readily expressed in terms of expected returns and probability.

What does all of this mean for a portfolio investor? First, the lack of correlation and expected return estimates means that standard portfolio tools cannot accommodate Bitcoin.²¹⁶ Second, despite the lack of traditional metrics, Bitcoin has current market value, presumably based on the possibility of future use cases.

As discussed more below, courts and fiduciary investors should place special emphasis on procedural prudence when analyzing Bitcoin investments. Most likely, a trustee could not defend a Bitcoin investment based on MVO, Black-Litterman, or the like. Bitcoin does not possess the market metrics to make those models usable. The lack of these metrics, however, should not mean that Bitcoin has no place in a prudent portfolio. Trustees should be able to invest in Bitcoin if they can articulate their reasons, even if those reasons are inherently qualitative.

C. Form of Ownership

Most of this Article has focused on the risk of loss associated with Bitcoin's volatile price. Depending on the form of ownership, fiduciaries could subject their trusts to other types of losses.²¹⁷ Consider, for example, a hypothetical trustee who invested in Bitcoin through the FTX exchange. When FTX received cash (e.g., dollars) from customers, it should have invested those dollars in assets as directed by the customer. If customers held 10,000 BTC through FTX, then FTX should have bought 10,000 BTC to back these customers. FTX did not, however, safeguard customer money in this way, using it instead to shore up losses at a related company.²¹⁸

²¹⁵ See Henry S. Zaytoun, *Cyber Pickpockets: Blockchain, Cryptocurrency, and the Law of Theft*, 97 N.C. L. REV. 395, 397-98 (2019) (noting "the undeveloped nature of [Bitcoin] use cases").

²¹⁶ Of course, the investor can simply specify her personal expectations about Bitcoin to arrive at a portfolio.

²¹⁷ See Adam J. Levitin, *Not Your Keys, Not Your Coins: Unpriced Credit Risk in Cryptocurrency*, 101 TEX. L. REV. 877, 880 (2023) ("This Article argues that the risks cryptocurrency exchanges and similar platforms pose for their customers are both substantial and poorly appreciated by many cryptocurrency investors.").

²¹⁸ See English, *supra* note 53 ("FTX holds billions of dollars in outstanding claims against one of Sam Bankman-Fried's other companies, Alameda Research. Alameda

After FTX collapsed, the hypothetical trustee would not own Bitcoin. Instead, it would own a claim in the FTX bankruptcy proceedings.²¹⁹ In early 2023, the value of such claims is uncertain, though media outlets have reported customers' selling their FTX claims for less than 10 cents on the dollar.²²⁰ In all likelihood, our hypothetical trustee would have incurred a significant loss. What is different is that the loss is not from a price drop in Bitcoin. Instead, it is from the fact that the trustee was relying on FTX to hold Bitcoin on its behalf.

Should the hypothetical trustee be liable for these losses? FTX was not the first failed cryptocurrency exchange. In 2014, the early Bitcoin exchange known as Mt. Gox collapsed. Mt. Gox's primary problem was lax security, but the result for customers was the same as with FTX. Customers relied on Mt. Gox to hold Bitcoin for them, and Mt. Gox did not live up to this expectation.²²¹ Even if an investment in Bitcoin is prudent, holding Bitcoin through a poorly run exchange could be considered imprudent. This Article does not attempt to evaluate the integrity of various cryptocurrency exchanges, but trustees would need to do so.

Fiduciary investors that hold cryptocurrencies indirectly are, in effect, delegating responsibility for the private keys to a third party. Modern law allows trustees to delegate investment functions to third parties provided that the delegation itself is prudent. The UPIA, for example, allows for delegation of central trust functions but requires the delegation to be prudent.²²² These delegation requirements should apply to trustees holding cryptocurrencies indirectly through an exchange. The trustee should exercise reasonable care in selecting an exchange or other third party to

Research is a hedge fund which seems to have received a series of loans from FTX, raising questions of ethics and liability for both FTX and Alameda.”).

²¹⁹ See *id.* (“Similar to the expectation that a parking garage does not own your car simply by the fact you parked it there, FTX’s terms of service, on their face, establish no claim to your cryptocurrency.”).

²²⁰ See Morgan Chittum, *FTX Customers Are Reportedly Taking Huge Losses on Their Outstanding Investments so They Don’t Have to Wait Months for Bankruptcy Claims*, BUSINESS INSIDER (Dec. 29, 2022, 2:12 PM), <http://markets.businessinsider.com/news/currencies/sam-bankman-fried-ftx-customers-take-losses-selling-bankruptcy-claims-2022-12>.

²²¹ See generally Debler, *supra* note 39.

²²² See UNIF. PRUDENT INV. ACT § 9(a)-(b) (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1994).

control private keys, and it should periodically assess the third party to ensure that the selection remains prudent.²²³ Similarly, a court should look to these delegation provisions when deciding if a trustee should be responsible for losses incurred by an exchange.

Alternatively, trustees could hold their cryptocurrencies directly.²²⁴ Owning Bitcoin directly simply means controlling private keys, which are alphanumeric sequences (akin to passwords). Without the private keys, no one could transfer or sell the associated Bitcoin. It would simply be locked in place on the blockchain. With the private keys, the possessor could transfer the Bitcoin to anyone.

A trustee holding private keys would need to take some precautions and additional steps. For example, the trustee would need to earmark the Bitcoin investment as trust property. Usually, fiduciaries discharge the duty of earmarking when opening financial accounts, indicating the form of ownership with the financial institution. While the blockchain contains an immutable record of ownership, the record reflects only the alphanumeric address of the owner. It does not reflect the form of ownership. A trustee would need to take some extra care to earmark the Bitcoin. For example, the trustee might make a record of the relevant addresses and communicate them to trust beneficiaries.²²⁵

In broad terms, direct ownership has two risks that need to be balanced: the risk of theft and the risk of loss.²²⁶ Let us first consider the risk of loss. Suppose that Alice holds 1,000 BTC directly and as a trustee. Keenly aware of the theft risks from lax security, she carefully copies the private keys to paper and erases any record of the private keys from her computer. Alice then hides the paper in her house, telling no one else where the paper is. Alice has done a very good job of protecting the Bitcoin from theft. Nevertheless, she has exposed the trust to a very significant risk of loss. If Alice dies or becomes disabled before selling the Bitcoin, the

²²³ *Id.* § 9(a)(1), (3) (requiring prudent selection and monitoring of an agent).

²²⁴ See Levitin, *supra* note 217, at 886-89.

²²⁵ See *supra* Part II.A.

²²⁶ See Gerry Beyer, *What Estate Planners Need to Know About Cryptocurrency*, 46 EST. PLAN. 24, 26 (2019) ("If the owner of cryptocurrency forgets, misplaces, or loses the private key and seed phrase, there is no way the owner can recover it. There is no 'forgot password' link that the owner can use to recover the private key or seed phrase.").

Bitcoin might simply be lost forever. Similarly, a house fire could destroy the paper. Without the private keys, no one can access or transfer the Bitcoin. Since Bitcoin is decentralized, there is no “password reset” feature that rightful owners can use to recover their Bitcoin. The Bitcoin is simply lost.²²⁷

More accessible private keys can be more easily stolen,²²⁸ as happened with the Mt. Gox collapse.²²⁹ If access becomes too difficult, however, the private keys could become lost and inaccessible.²³⁰ By holding cryptocurrencies directly, the fiduciary investor could be exposing the trust to a risk of loss. As with the discussion of FTX²³¹ and Mt. Gox, the risk is not due the investment volatility of the asset itself. The difference is that the trustee’s own actions or inaction could cause the loss. In the language of trust law, the trustee has a duty to safeguard investments in cryptocurrency. A fiduciary investor could certainly discharge this duty prudently. Cryptocurrency investors have a variety of options to safeguard private keys. Still, the fiduciary investor would need to possess or acquire the expertise to use them.

D. Other Cryptocurrencies

Up to now, this Article has focused its attention on Bitcoin. While Bitcoin is the largest cryptocurrency, several others exist. Ether is the cryptocurrency used on the Ethereum platform and is ranked as the second largest cryptocurrency in terms of market capitalization.²³² Most of what this Article said about Bitcoin as an investment applies to Ether. It is not backed by any external assets, and it displays significant price volatility.²³³ While individual cryptocurrencies warrant individual analysis by investing trustees,

²²⁷ See *id.*

²²⁸ See generally Zaytoun, *supra* note 215, at 407-08 (describing mechanics of Bitcoin theft).

²²⁹ See Debler, *supra* note 39 and accompanying text.

²³⁰ See *supra* notes 24-25 and accompanying text (describing millions of dollars of Bitcoin lost in a Welsh landfill).

²³¹ See Zhang, *supra* note 40 and accompanying text.

²³² See *Today’s Cryptocurrency Prices by Market Cap*, COINMARKETCAP, <https://coinmarketcap.com> [<https://perma.cc/MEG9-VXTD>] (last visited Feb. 22, 2023).

²³³ Iris H-Y Chiu & Alan H. Brener, *Protecting What Matters: Reflections on A Central Bank’s Role at Times of War*, 55 VAND. J. TRANSNAT’L L. 875, 912 (2022) (referring to the “volatility of major cryptocurrencies such as Bitcoin or Ether”).

the differences between Ether and Bitcoin are not sufficiently large to warrant separate analysis in this Article.

Beyond Bitcoin and Ether, the world of cryptocurrency investing becomes somewhat bewildering. A major class of cryptocurrency is so-called “stablecoins,” cryptocurrencies pegged to the value of the U.S. dollar or some other governmental currency.²³⁴ The saga of TerraUSD illustrates some of the risks associated with some stablecoin projects. On paper, the creators of TerraUSD focused on adoption of TerraUSD as a medium of exchange, envisioning a world in which folks pay their rent and grocery bills using TerraUSD rather than with bank transfers and credit cards.²³⁵ In reality, there was never such an adoption. While there must have been enthusiasts who paid for goods and services using TerraUSD, such use was rare and could not explain the multi-billion-dollar market capitalization of TerraUSD as it rapidly grew from 2019 to 2022.²³⁶

What, then, explains TerraUSD’s rise if not use as a medium of exchange? As a stablecoin, TerraUSD could be useful as a way to facilitate trading in cryptocurrencies. Some cryptocurrency exchanges do not deal directly in U.S. dollars or other sovereign money. Some crypto exchanges simply let participants exchange one cryptocurrency for another (e.g., Bitcoin for Ether). Without actual dollar accounts, the exchange may not provide adequate price discovery, particularly for assets that are not widely traded elsewhere. By adding stablecoins, such exchanges can provide better price discovery in terms of the U.S. dollar. Perhaps more importantly, participants on the exchange would have access to a stable asset without needing to exit the exchange altogether.²³⁷ For example, traders who expect the broader crypto market to decline in value would want to move their holdings into a stable asset.

²³⁴ See Ryan Clements, *Built to Fail: The Inherent Fragility of Algorithmic Stablecoins*, 11 WAKE FOREST L. REV. ONLINE 131, 134 (2021) (“Stablecoins are crypto-assets that attempt to peg their value to another asset (or basket of assets including reserve currencies or highly-liquid government bonds).”).

²³⁵ See Terra Whitepaper, *supra* note 57, at 1.

²³⁶ See Mia Wright, *If It Looks Like A Duck: The Case for Regulating Stablecoins As Money Market Funds*, 18 J.L. ECON. & POL’Y 430, 439-40 (2023).

²³⁷ See Press Release, U.S. Dep’t of the Treasury, President’s Working Group on Financial Markets Releases Report and Recommendations on Stablecoins (Nov. 1, 2021) (accessible at <https://home.treasury.gov/news/press-releases/jy0454> [<https://perma.cc/43JJ-5735>]).

Liquidating their holdings for actual dollars might be costly. Instead, the traders could exchange their holdings in stablecoins. In short, stablecoins allow traders to park their crypto investments during market downturns without having to convert to actual dollars.²³⁸

Facilitating crypto trading is a substantial use case for stablecoins. But it probably does not explain the rise of TerraUSD either. The true driver was decentralized finance (DeFi) and the allure of returns dramatically higher than market. For example, until its collapse, TerraUSD served as the gateway to annual, *fixed* returns of 20%.²³⁹ In a world of low-returns on savings accounts, a 20% return is extraordinary.²⁴⁰ Almost certainly, these returns were the best use case for TerraUSD.²⁴¹ In the aftermath of TerraUSD's collapse, observers characterized these returns as unstable and hallmarks of a Madoff-style pyramid scheme.²⁴²

While this Article avoids speaking in absolutes, the TerraUSD debacle does highlight a risk for trustees. Before May 2022, a trustee might have viewed the 20% returns on certain DeFi projects as a golden opportunity. Ultimately, those returns were too good to be true, and an investing trustee would have lost any TerraUSD investment. The collapse illustrates the need for additional investigation before investing in cryptocurrencies other than Bitcoin, Ether, and a handful of others with established track records.

²³⁸ See Mitsutoshi Adachi et al., *The Expanding Functions and Uses of Stablecoins*, EUR. CENT. BANK (Nov. 2021), https://www.ecb.europa.eu/pub/financial-stability/fsr/focus/2021/html/ecb.fsrbox202111_04~45293c08fc.en.html [https://perma.cc/EM7T-5QH3].

²³⁹ Muyao Shen, *Terra's Promise of 20% Return Raises Sustainability Concern* (1), BLOOMBERG L. (Mar. 23, 2022, 1:43 PM), <https://news.bloomberglaw.com/crypto/terras-promise-of-20-defi-return-raises-sustainability-concern> [https://perma.cc/ZV5W-YGAC].

²⁴⁰ See Gian M. Volpicelli, *Terra's Crypto Meltdown Was Inevitable*, WIRED <https://www.wired.com/story/terra-luna-collapse/> [https://perma.cc/PLK7-53TQ] (May 12, 2022, 3:14 PM). See Taylor Locke, *Bill Ackman Calls Terra a 'Pyramid Scheme' and Warns that 'Hyping' this Kind of Token 'Will Destroy the Entire Crypto Industry'*, FORTUNE <https://fortune.com/crypto/2022/05/17/bill-ackman-calls-terra-ust-luna-pyramid-scheme-crypto-regulation-herbalife/> [https://perma.cc/FH5M-U83S] (May 17, 2022, 9:51 AM).

²⁴¹ Gian, *supra* note 240.

²⁴² Locke, *supra* note 240.

E. Procedural Prudence

Because MPT has uneven application to cryptocurrencies, it may have little application to cases challenging crypto investments.²⁴³ Trustees (and experts) would struggle to place Bitcoin in traditional tools like mean variance optimization (MVO) and discounted cash flows (DCF).²⁴⁴ Ultimately, however, courts must determine whether a trustee acted prudently in constructing a portfolio, not whether the portfolio produced the desired outcomes.²⁴⁵

Despite the influence MPT has had on it, the prudent investor rule is not a command to follow MPT. On the one hand, courts would not give trustees the sort of deference given to corporate directors under the business judgment rule. On the other hand, courts should not insist on strict adherence to MPT unless required by the prudent investor rule.²⁴⁶ Trustees could prudently follow other investment paradigms. In a rough way, courts could look at MPT as creating a default portfolio or safe harbor for fiduciary investors.²⁴⁷

In practice, many investing strategies often deviate from MPT. For example, the semi-strong form of market efficiency suggests that fundamental analysis of publicly traded securities is wasteful.²⁴⁸ Indeed, active management of publicly traded securities would produce suboptimal results under semi-strong efficiency because active management incurs higher fees than passive, index-style investing.²⁴⁹ Nevertheless, the Third Restatement allows trustees to pursue an active-management style of investing as follows:

²⁴³ See *supra* Part V.B.

²⁴⁴ See *supra* Part IV.B.

²⁴⁵ See Sterk, *supra* note 176 and accompanying text.

²⁴⁶ Edward A. Moses et. al., *Measuring the Effectiveness of a Trust Portfolio's Diversification*, 35 ACTEC J. 303, 303 (2009) ("While there is no explicit requirement that the fiduciary use the mechanics of MPT, constructing a portfolio using business judgment alone is difficult to explain and support satisfactorily. A more defensible practice would be for the fiduciary to begin with the portfolio recommended by MPT.").

²⁴⁷ See *id.*

²⁴⁸ Frederick C. Dunbar & Dana Heller, *Fraud on the Market Meets Behavioral Finance*, 31 DEL. J. CORP. L. 455, 463–64 (2006) (noting inconsistency between fundamental analysis and semi-strong efficiency).

²⁴⁹ See *supra* Part IV.A.2.

Active strategies, however, entail investigation and analysis expenses and tend to increase general transaction costs.... Additional risks also may result from the difficult judgments that may be involved and from the possible acceptance of a relatively high degree of diversifiable risk. These considerations are relevant to the trustee initially in deciding whether, to what extent, and in what manner to undertake an active investment strategy and then in the process of implementing any such decisions.

If the extra costs and risks of an investment program are substantial, these added costs and risks must be justified by realistically evaluated return expectations. Accordingly, a decision to proceed with such a program involves judgments by the trustee that:

- a) gains from the course of action in question can reasonably be expected to compensate for its additional costs and risks;
- b) the course of action to be undertaken is reasonable in terms of its economic rationale and its role within the trust portfolio; and
- c) there is a credible basis for concluding that the trustee—or the manager of a particular activity—possesses or has access to the competence necessary to carry out the program[.]²⁵⁰

To date, the quoted language has not been relied upon by courts, but it has received recent scholarly attention.²⁵¹ It could serve as a guide for courts and fiduciaries who are evaluating investments in cryptocurrencies. They are risky and (possibly) expensive, and MPT tools do not provide a ready yardstick for analysis. Nevertheless, fiduciaries should be allowed to pursue these investments if they develop “realistically evaluated return expectations.”

The emphasis should be on “realistically evaluated.” Did the fiduciary actually evaluate the expected returns for Bitcoin or some other cryptocurrency? Was this evaluation memorialized in some way so that the fiduciary could demonstrate its existence to a beneficiary or court? While courts should not insist on a formal IPS, they should insist on a record of reasoned decision-making (which could be contained in an IPS).

²⁵⁰ RESTATEMENT (THIRD) OF TRUSTS § 90 cmt. h(2) (AM. L. INST. 2007).

²⁵¹ See Ayres & Fox, *supra* note 80, at 496-97.

Similarly, the evaluation should be “realistic.” To be realistic, any evaluation should acknowledge Bitcoin’s historic variability and its on-again, off-again correlation with the larger markets.²⁵² These factors push Bitcoin outside of MPT, making it harder to analyze and less attractive. Just like an active investor, the trustee should be expecting some extraordinary return on Bitcoin. Documenting and substantiating these expectations should be a primary goal of trustees before they invest in Bitcoin.

CONCLUSION

Bitcoin and cryptocurrencies have suffered from cycles of boom and bust. Nevertheless, they seem to have growing reach among investors as a new investment class that offers potentially high rewards outside the usual stocks and bonds. As trustees inevitably invest during booms, they will also suffer losses during the busts. This Article has attempted to outline the limitations of current law and financial theory. Bitcoin does not fit neatly within modern portfolio theory, making analysis difficult under the prudent investor rule. Courts should resist the temptation to use this fact to characterize Bitcoin as speculative and imprudent *per se*. Instead, they should place heightened focus on areas where trustees can establish prudence: diversification and process. As for diversification, courts can simply view Bitcoin like a large-cap stock of comparable size. This analysis does not, however, answer whether a diversified portfolio containing Bitcoin is prudent. MPT does not offer any easy answers. Thus, courts and trustees should pay particular attention to the process by which trustees made their Bitcoin investments.

²⁵² *Supra* Part V.B (analyzing Bitcoin’s variability and correlation statistics).