

Illuminating The Path Forward

BITCOIN IN INSTITUTIONAL PORTFOLIOS

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EXECUTIVE SUMMARY

What goes through your head when you read words like Bitcoin, blockchain, distributed ledgers, or cryptographic one-way hash functions? For many, it's a mix of bewilderment, skepticism, and a dash of curiosity.

There is no lack of headlines around Bitcoin, whether it's government hand-wringing over how it should regulate the market, or evangelists heralding its world-changing potential and the underlying technologies that power it. However, amidst the din of these headline-grabbing stories, we have yet to see a rigorous evaluation of the benefits of including Bitcoin as a long-term strategic holding in an investment portfolio. This paper changes that.

We believe that investors need to include a wider array of non-traditional return streams to meet their long-term investment objectives. Going forward, stocks and bonds alone won't do it, and we believe that Bitcoin is one of the new return streams that should be considered. We believe that Bitcoin will not only play an important role in transforming how financial transactions are executed, but also in how investors store, protect, and grow their wealth.

There is something abstract and ethereal about Bitcoin which exists on a thing called a distributed ledger across a global network of computers. This currency does not represent an IOU of government, banks, or companies, and is not a precious metal you can hold in your hand. There is no legislative mandate that grants it status as legal tender, nor can people pay tax with it. At first glance, all of this makes it hard to rationalize its value. However, deeper thinking reveals that Bitcoin is no more abstract or ethereal than "traditional" financial assets today, including the balance in your bank account and the cash in your hand.

Consider how you feel when you withdraw cash from an ATM. The cash is a tangible embodiment of your hard-earned efforts. But what do you really have? These pieces of cotton, linen, and ink are not intrinsically valuable. They have value because you expect others to accept them for payment for a long time to come, as do those that do the accepting – it's a never-ending chain of belief. The same argument applies to the

"money" listed on our bank statements; in its most reduced form, this money is just certain arrangements of electrons whizzing around circuitry buried deep inside big computers at central banks around the world. These 0s and 1s that constitute your money are then "assigned" to you based on still other sets of 0s and 1s, which represent your unique account numbers and passwords. Financial assets today are simply abstract representations of value that allow society to better organize itself, from enabling more efficient transactions of goods and services, to better allocating capital from those sources best able to provide it, to those best able to spend it. (See Box Note 1 for a short history on the strangeness of money).

Once we acknowledge how abstract the basic notion of financial assets is, and the fact that there is virtually no link between financial and physical value, the idea that valuable assets can exist solely on computers isn't so strange. Bitcoin actually has much in common with "traditional" financial assets like stocks, and with traditional stores of value like gold. What are these characteristics precisely? And do they support an allocation in investment portfolios? To answer that, we address two fundamental and related questions in this paper:

QUESTION 1:

IS THERE A COMPELLING CASE TO INCLUDE BITCOIN IN A PORTFOLIO?

Two objectives we encourage investors to focus on are (i) finding risk premia that offer a positive return; and (ii) adding enough of them to diversify their portfolios. While this paper highlights many arguments questioning the long-term value and viability of Bitcoin, on balance, we believe that adding it to a portfolio satisfies these two criteria and can help investors store, protect, and grow their wealth. We believe Bitcoin.

- has a positive risk premium and long-term value that is underpinned by a natural role as "digital gold";
- offers a positive expected return relative to current valuation levels; and
- provides a powerful source of diversification both through time, as there is no obvious structural long-term relationship between Bitcoin and the performance of other assets, as well as at points in time, specifically by providing a potential tail hedge against local hyperinflation and broader geopolitical and systemic financial risks

QUESTION 2:

IF BITCOIN SATISFIES KEY CRITERIA FOR INCLUDING IN AN INVESTMENT PORTFOLIO, WHY SHOULD INVESTORS HOLD IT VS. HUNDREDS OF OTHER DIGITAL ASSETS?

Over the last several years, the digital asset industry has rapidly evolved, with hundreds of assets competing, entering, and exiting. The most well-known, Bitcoin (commonly abbreviated as BTC), has been explicitly designed to favor security and safety over technical novelty and flexibility. It also has an economic structure that directly addresses monetary policies that resulted from the financial crisis of 2008. This, along with its longevity, brand recognition, and persistent operation through varied economic, regulatory, and technological backdrops, have driven its market cap to be an order of magnitude larger than any other digital asset. Because of Bitcoin's unique characteristics and market dominance, we recommend that investor allocations be focused on it at the current time. As we'll show, for most investors, a small passive allocation to Bitcoin will allow them to enjoy the prospect of significant potential upside without incurring material downside risk at an overall portfolio level.

We are well aware that including Bitcoin in portfolios is not comfortable; Bitcoin embodies the very definition of "non-traditional." However, the most successful long-term investors see past hype and sensationalism and tirelessly search out additional sources of return and diversification. The light continues to shine out, illuminating a new investment horizon. Investors now need to have the courage to follow it.

BOX NOTE 1: THE (STRANGE) HISTORY OF MONEY

Memory was the first money. Before our ancestors exchanged shells, pebbles, or metals, they exchanged favors. I'll help feed you today if you help feed me tomorrow. Money is, and has always been, a fundamental part of how we live and cooperate with one another.

Memory as money works well enough within a small group you know and trust. But for a society to grow, it needs a way to transact with those they don't know, don't trust, and may never see again. Barter – peer-to-peer exchanges of goods – was an early breakthrough. It was inefficient, but allowed strangers to trade with strangers.

Throughout history, the tradeoffs inherent in two opposing forces have consistently driven the evolution of money: efficiency vs. risk. The development of societies has depended on people finding faster and cheaper ways to transact (efficiency) with those they have no reason to trust (risk).

Commodities like gold became money because they are more efficient than barter and can be exchanged without much trust. But they're still not that efficient: try buying things with gold bars. Ancient Babylonians had a breakthrough. They couldn't trust strangers, but they could trust "banks" – storehouses where they could deposit commodities and receive tablets granting the right to retrieve them. Since anybody who held the tablets could retrieve the gold, the tablets became the new money. They were easier to trade and easier to trust.

Other societies made further breakthroughs. The Chinese Song Dynasty moved from coins to paper money in the 11th century to avoid carrying heavy loads of copper. Paper money then made its way to Europe, and private banks issued their own money convertible to gold or silver. Eventually, governments took over. The Bank of England gained a monopoly to print money in 1694. The US National Banking Act of 1863 created a national currency to replace the notes of multiple banks in circulation.

For a very long time, commodity-based monetary systems ruled the world. Governments might deviate from them, but typically only in extreme situations, and they would often quickly revert. Still, as strong as the hold that commodity-based money had over policymakers and citizens, the flow of history towards more efficient forms of money is inexorable. By the time the US left the gold standard in 1971, gold hadn't been playing a meaningful role in transactions for some time; society had collectively made the mental leap that all that makes money valuable is that other people will accept it. Since then, most central banks have issued "fiat" money, named because it has value only because the government that issued it says so.

As the world becomes increasingly connected, one thing is certain: society will forever find ways to make money more efficient and strangers easier to trust. Our money is now just numbers in a bank's computers. We don't need to trust strangers – but we do need to trust governments not to inflate away the value of our money or confiscate it, and we need to trust banks to stay solvent enough to redeem our deposits when we want them. Should we?

Taking the long view, Bitcoin represents a natural, evolutionary step in the history of money – a more efficient way to interact economically without needing to trust strangers, banks, or governments. Bitcoin can be designed to be transacted as quickly and cheaply as sending an email; as "peer-to-peer" as bartering; as stable as gold. The last point is important: with Bitcoin, there is no loss (and possibly a gain) when governments inflate away or confiscate people's fiat savings. This is something we might not sufficiently value as US citizens in 2020, but it is something that citizens of Venezuela or Argentina or Cyprus can't take for granted today (and something that Americans couldn't take for granted in the 1970s).



WHAT IS BITCOIN?

Bitcoin (BTC) was designed in the depths of the 2008-2009 financial crisis as an alternative to fiat money as the world teetered on financial collapse with the goal of applying technological solutions to create a “better” form of money.

What is meant by “better”? In economics parlance, two fundamental purposes of money are to serve as a **store of value** and a **medium of exchange**: that is, something that can be held long enough to facilitate transactions in the future or can be used to facilitate transactions today. Bitcoin has distinct advantages on both counts.

- **Store of value:** Bitcoin possesses a fascinating and powerful property revolutionary in the context of money: it can be created with a credible, enforceable “quantity commitment.” The supply of traditional currencies is set by a central bank or a similar institution that can run the printing presses. In contrast, the supply of Bitcoin is set programmatically – and strong incentives provide assurances that there will likely be no more than 21 million BTC ever created. Tragically, there are many examples throughout history of currencies that failed to retain the store of value property because of government-induced hyperinflation caused by the printing of too much money. Bitcoin does not have that risk.

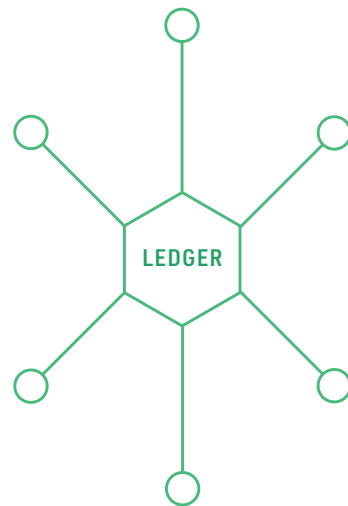
The volatility of Bitcoin today limits its desirability as a store of value. However, looking beyond this short-term volatility and focusing on the enduring structural characteristics of Bitcoin suggests it has several advantages as a store of value. We discuss the potential role of BTC as “digital gold” and the implications for investors in greater detail later in the paper.

- **Medium of exchange:** Traditional payments are dominated by a system of natural monopolies (e.g., Fedwire, SWIFT), and access to those networks is typically routed through institutions like banks. In our day-to-day lives, we don’t feel the costs of these networks. However, when trust becomes an issue – like when we want to transfer large amounts of money or make international payments – we quickly see how expensive big intermediaries can be. International remittances generally take days to settle and can cost up to 10% in transaction fees. Moreover, those institutions generally aren’t all that secure – by routing transactions through central intermediaries like banks, participants are exposed to security failures.¹
- In contrast, Bitcoin is stored and transacted on an open, decentralized network called a blockchain.² Instead of requiring transactions to be routed through big, expensive intermediaries, payments can be made peer-to-peer, like email or other digital exchanges. Bitcoin generally has no governing institutions; the underlying blockchain infrastructure is composed of computer servers that enter and exit the system at will and must follow rules set by a pre-defined protocol. Open-source, NSA-grade cryptographic methods ensure only valid transactions are processed, and like most things digital, they can be processed quickly at low cost. Moreover, the Bitcoin network is highly resilient to attacks; in contrast to “hub-and-spoke” models characteristic of traditional payments networks, there is no single point of failure. This makes Bitcoin extraordinarily difficult to hack at scale.

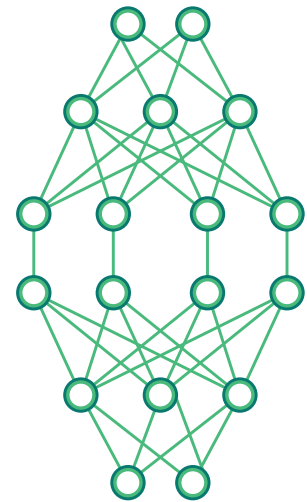
¹ Cyberattacks on the SWIFT network, for example, contributed to a \$101 MM theft from the Bangladesh Central Bank’s account at the New York Federal Reserve.

² Generally, the networks are “distributed ledgers,” in essence a spreadsheet that shows all accounts and their values. Blockchains are a subset of distributed ledgers defined by a certain cryptographic procedure by which transactions are grouped, verified, and “linked.” In general, you can think of blockchain networks as a large, decentralized group of computer servers that interact directly with each other, keep record of each transaction, and work together to validate and secure those transactions.

EXHIBIT 1
Centralized vs.
Distributed
Networks



CENTRALIZED NETWORK



DISTRIBUTED NETWORK

An important feature of the distributed network (blockchain) is that, through innovations in cryptography and game theory, the payments system can be trusted without needing to trust any individual computer on the network. The blockchain is a public database of transactions grouped together in “blocks”; new blocks are periodically created and linked to the database (the “chain”). The computers on the network compete for the right to add a new block of transactions to the database, and all other computers then verify that all the transactions in the new block are correct – i.e., that the right accounts are debited and credited. (A reader interested in greater detail on the underlying cryptographic and game theory concepts could start with the original white paper “Bitcoin: A Peer-to-Peer Electronic Cash System.”) Blockchain networks have gained significant attention since 2009 as a revolutionary way to create a trusted, secure network without requiring a “trusted third party” such as a bank or governing body.³

The concept of “social scalability” provides a lens through which we can understand the efficiency gained through Bitcoin. Bitcoin can be **cheaper at a societal level** because it can more easily allow us to interact with people we don’t know and trust. The insight starts with the observation that humans are physiologically limited in the number of relationships we can maintain with other people, and, by extension, the number of people we can know well enough to trust – the famous “Dunbar’s number.” Many of society’s most useful institutions help us exceed our limitations and interact with a broader group of people (e.g., think how courts allow adversarial parties to enter into agreements by acting as a trusted party to arbitrate contract disputes, how the FDA allows us to buy food from unknown producers and restaurants, or how banks allow us to make payments to strangers because we trust banks to clear the transactions). But those institutions are highly resource-intensive (e.g., banks need back-office accountants, analysts, lawyers, and computers) and context-specific (e.g., laws and contracts only apply in certain jurisdictions). Bitcoin replaces those institutions with an efficient, blockchain-based network of computers which interact according to transparent rules governed by mathematically verifiable cryptographic properties.

³ <https://bitcoin.org/bitcoin.pdf>

BOX NOTE 2: COMMON CONCERNS ABOUT BITCOIN ADDRESSED

Myth 1: Bitcoin can't be a store of value – it's just made up.

There is no external, objective reality that gives any particular form of money value; money's value lies in how well it meets society's needs. The fact is: all money is just "a social construct."

You can fit all the US dollar bills in circulation twenty-seven feet high on a football field. That pile of paper cost \$4.4 billion to print, but is worth \$1.5 trillion primarily for its transactional value – it is acceptable for all debts public and private. Importantly, the government requires taxes to be paid in US dollars, which gives it a built-in mechanism to help people believe in it. So people use it, which further ensures the self-sustaining nature of this belief.

However, we can't always believe in the value of all fiat currencies. For example, the Zimbabwe dollar lost essentially all of its value by 2009 as the central bank simply printed money. Or consider the German Weimar Republic of the 1920s, or excessive inflation in Argentina more recently, or the ongoing destruction of the Venezuelan Bolivar. Unfortunately, this kind of fiat devaluation – and its devastating impact on a country's citizens – is far from a rare event throughout history.

Inflation isn't the only thing that might make somebody question their belief in a form of money. Consider the money in your bank account – it isn't actually US dollars. It is more accurately thought of as bank dollars (think "Wells Fargo dollars" or "Bank of America dollars"). It's really just IOUs from your specific bank to you. In the US today, the distinction may seem academic. However, in many, perhaps even most countries, the distinction is very real. Consider Cyprus, where just a few years ago depositors sustained losses of more than 35% on their deposits over €100,000.

While Bitcoin addresses some of the risks common to traditional money, that alone is not enough to say it has value. At the risk of stating the obvious, for anything to have value, people need to value it. While history is littered with devaluations and hyperinflations, most fiat currencies enjoy a huge built-in advantage because they are legal tender and the only money that can be used to pay taxes. Bitcoin has no such legislative mandate, which means it has to rely exclusively on its ability to convince people that it is indeed a useful form of money and store of value. Bitcoin has powerful advantages in that regard. As noted, there are enforceable quantity commitments; there will likely never be more than 21 million BTC. And you can easily, digitally hold the actual asset, not an IOU. Bitcoin is far more "real" than other forms of money.

Myth 2: Bitcoin is a bubble.

What is the definition of a bubble? Most would say a bubble exists when the value of an asset is far above its intrinsic or fair value. We all know the story of the 17th-century Dutch tulip bulb mania and how that story ends. But what is the intrinsic value of green pieces of paper? And what is the intrinsic value of 0s and 1s in a bank's computers? A fundamental and vastly underappreciated characteristic of all money is that it can be thought of as a bubble that simply hasn't (yet) popped.

This bubble characteristic is, in fact, what allows money to most efficiently serve society; money has value only because we collectively agree to use it, not because of its (lack of) intrinsic value. So too can it be with Bitcoin. Yes, the market value of Bitcoin has grown significantly – just as the market value of gold has exponentially risen since its first discovery. But underneath it all, if Bitcoin succeeds in playing a transformative role in the modern economy, like traditional money or gold today, Bitcoin will be widely welcomed as "a bubble that hasn't popped."

Myth 3: Bitcoin is just for criminals.

In the early years, Bitcoin was indeed exploited by (very few) criminals, who were happy to transact in the thinly-regulated, cross-border ecosystem.

But, as in the early days of the internet, the legitimate users and uses of Bitcoin dwarf the illicit. As regulation adapts to and empowers the new technology, criminals will likely find that they prefer physical cash, since Bitcoin is auditable, if pseudonymous by design.

THE CASE FOR INVESTING IN BITCOIN

We believe that investors need to allocate to a much wider array of risk premia to help **grow** and **protect** their wealth. This means investing in asset classes that have positive expected returns and attractive diversification properties. Given the embryonic nature of the Bitcoin market and the hype surrounding it, shorter-term performance is likely to remain extremely volatile. This is the case with any new, potentially transformative technology. However, by focusing on the long-term role Bitcoin can play in the global economy, the outlook for investing in it becomes compelling. In our view, Bitcoin has attractive features that could make it an increasingly important part of a well-diversified portfolio. Namely:

- **Bitcoin can help protect wealth:** There is a strong case that Bitcoin is diversifying and uncorrelated with other return streams; anticipated demand for it cuts across geographies and industries, and there is no obvious structural relationship between it and the performance of equities, bonds or any other traditional or non-traditional financial assets. Moreover, while the history is limited, Bitcoin has demonstrated point in time diversification characteristics, rising in value at moments when trust in traditional institutions declines. This suggests that Bitcoin can serve a valuable role as a hedge against local hyperinflation and broader geopolitical and systemic financial risks.
- **Bitcoin can help grow wealth:** Over time, we believe Bitcoin will likely offer a positive return due to its unique property as a form of “digital gold” and the transformative role it can play in the global exchange of value:
 - Bitcoin has characteristics similar to gold, which will underpin its value over time. Gold is scarce and can’t be inflated away; those properties that make gold an effective store of value are major drivers behind the metal’s \$12 trillion global valuation⁴. Similarly, Bitcoin is designed to be just as scarce and difficult to inflate. A critical property of Bitcoin is the ability to credibly constrain supply, fixing it at a maximum level or allowing it to grow only at a pre-determined rate. Beyond the similarities to gold, Bitcoin has important structural advantages as a store of value: it is easier and cheaper to access and store, more portable and usable at distances, and has multiple uses supporting its value. If over time investors continue to substitute Bitcoin for gold to even a modest extent, the emerging shift will provide a strong tailwind supporting its value.
 - Bitcoin facilitates the transfer of value globally without having to trust financial intermediaries. It can reduce the cost of simply sending money, whether for international remittances or for commerce. It can also inspire new use cases or bring financial services to new corners of the globe.

In the sections that follow we go into greater detail on each one of these characteristics. We conclude that Bitcoin may benefit a portfolio as a source of positive expected returns while offering attractive diversification properties given its low correlation to other financial assets and potential tail hedging properties.

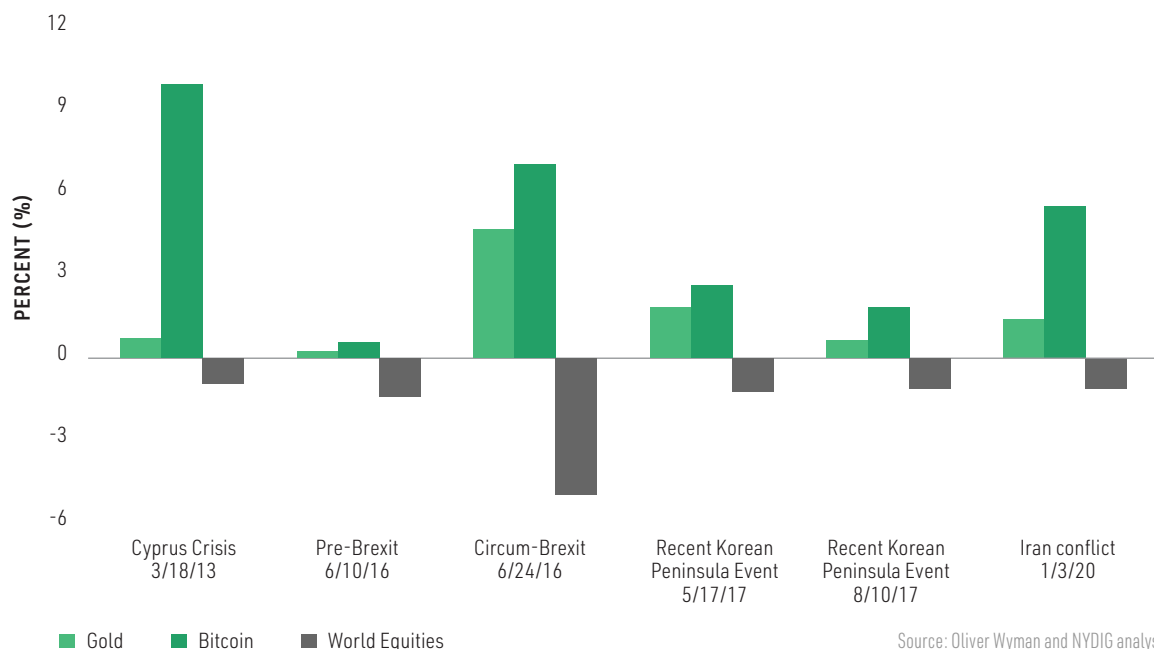
⁴ As of July 31 2020. Source US Geological Survey and London Bullion Market Association.

PROTECTING WEALTH: DIVERSIFYING OVER TIME AND PROVIDING TAIL HEDGES AT POINTS IN TIME

Investing in asset classes that have positive expected returns is just part of an investor’s task. Diversification and wealth preservation are just as critical. With respect to diversification, over the past several years, the return streams for Bitcoin have been completely uncorrelated with typical capital markets investments. For example, BTC has shown a 0.03 correlation with the S&P 500. We are suspicious of historical correlations for something this young and volatile, but the conclusion is conceptually sensible. Bitcoin has had no structural link to other markets and use cases are well diversified across geographies, industries, and objectives, as demonstrated in the previous section. Bitcoin should not be correlated to most changes in the markets, at least until it becomes a bigger part of the economy.

On the wealth preservation point, the evidence is already quite compelling. In particular, when markets experience a loss of confidence in the financial and economic system and when the perception of geopolitical risk suddenly rises, Bitcoin shines. Some of the biggest up days for BTC have been when the world has felt the most uncertain. For example, in 2013, news outlets published stories with headlines like “Bitcoin Bonanza: Cyprus Crisis Boost Digital Dollars.”⁵ In the weeks immediately after Cyprus announced it would impose a levy on bank deposits, BTC rose 60% and downloads of blockchain wallets (used to hold BTC) increased 70%.⁶ And in the past several years, BTC has risen on major events that have undermined confidence in the existing world order and central institutions, as highlighted in the exhibit below. Indeed, BTC has consistently been a more effective hedge than traditional gold.

EXHIBIT 2
Performance of BTC, Gold and Equities During Key Geopolitical Events



HOW BITCOIN CAN HELP GROW WEALTH

One way to assess how Bitcoin can help investors grow their wealth is to estimate what its future value might be relative to where it is valued today. To build this fundamental valuation argument, we focus narrowly on estimating the long-term value of Bitcoin that would be implied if it became a larger share of global payments, credit and savings networks – i.e., as a “better” form of money. By comparing this ultimate value to the current market value of Bitcoin, we can get a sense of what the potential upside looks like.

⁵ <https://www.cnbc.com/id/100597242>

⁶ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2690452&rec=1&srcabs=2685646&alg=1&pos=3



Long-term value as a “better form of money” in payments, credit, and savings networks

The vast majority of people that read this may be US citizens and probably perfectly happy with the money they use right now. US folks can go pretty much anywhere in the world, whip out Visa cards, and buy something in Euros or Yen or Pounds. And it’s hard for us to imagine not having a bank account.

But that’s a narrow view of the world. For many people, using money – saving it, transferring it, even spending it – is surprisingly hard. In the developed world, there are significant, but manageable hassles – merchants pay 2.5% to credit card processors, foreign transactions carry explicit and implicit fees, it can take days for a transaction to settle, and so on.

However, in the developing world, the hassles can be prohibitive – many people can’t even afford to use money. Half of the world is unbanked, primarily because banking is too expensive or they don’t have access. Money received from relatives abroad is “taxed” as high as 10% by money transfer operators. And, tragically, life savings can vanish in the blink of an eye as governments mismanage, inflate, or confiscate.

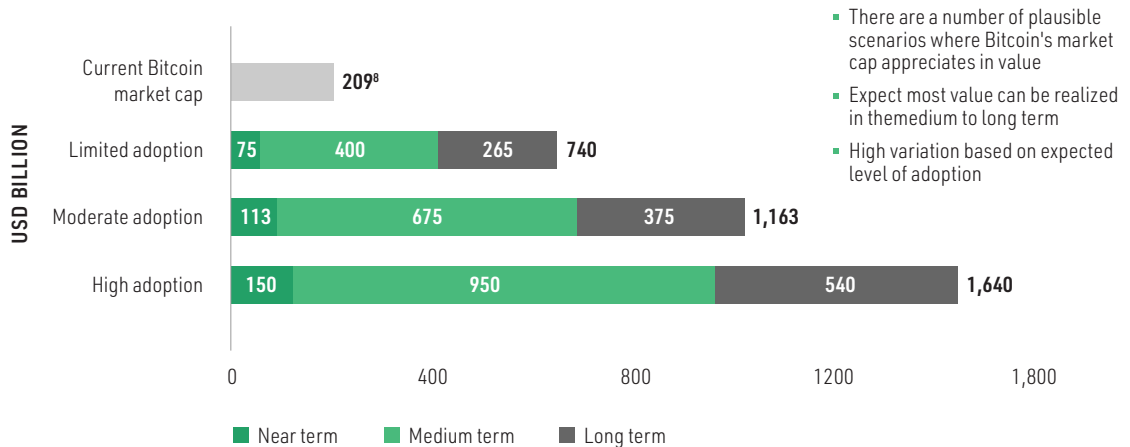
There is now an opportunity to rebuild the back-end of finance to create a system in which money moves securely, fast, and with nearly no cost. The potential value is enormous; we estimate the demand for Bitcoin as a better form of money on a blockchain network could range from **740 billion - 1.6 trillion dollars** depending on adoption rates across nine primary use cases in payments, credit, and savings.

Bitcoin as the foundation

Because Bitcoin relies on a decentralized blockchain, it sacrifices speed and cost for security. This means that it is not the best solution for payments where speed is important. However, there are many innovations being built on top of Bitcoin, that would ultimately use its blockchain as a settlement layer, making Bitcoin a faster, cheaper form of money. Some, such as the Lightning Network, are more “near-term” and are already being tested today. Some are “medium-term” and likely will not gain meaningful traction until Bitcoin becomes more established in peoples’ lives. Some are “long-term” and likely will not gain meaningful traction until Bitcoin is as familiar as services like PayPal or Venmo.

Exhibit 3 shows our bottom-up analysis of the potential value of Bitcoin assuming different adoption levels in payments, savings and credit networks. From a top-down perspective, these estimates appear quite conservative compared to the \$695 trillion transferred over Fedwire in 2019.⁷

EXHIBIT 3
Hypothetical Bitcoin Economic Value



⁷ <https://www.frb services.org/resources/financial-services/wires/volume-value-stats/annual-stats.html>

⁸ As of July 31 2020. See: https://coinmetrics.io/charts/#assets=btc_left=CapMrktCurUSD_zoom=1577836800000,1597449600000

The following table details nine use cases that underpin our projections – both the pain points in the world today, and the solutions Bitcoin can offer.

TABLE 1
Detailed
“Better” form
of Money
Use Cases

		THE WORLD AS IT IS	THE WORLD AS IT COULD BE	ESTIMATED VALUE (\$B)
PAYMENTS USE CASES	1 International Remittances	Remittances to developing countries totaled \$551 billion in 2019. That money is critical for health, education, and food, one of the most effective tools to reduce poverty. ⁹ A significant portion – 7.6% – is lost to correspondent banks and uncompetitive money transfer operators. In Sub-Saharan Africa, fees near 10%. ¹⁰	Most estimates suggest Bitcoin reduces fees to ~1%, placing global savings potential at \$36 billion/year. Sub-Saharan Africa could save \$3 billion – equivalent to clean water for 35 million people. ^{11,12} There is strong economic pressure for Bitcoin to gain adoption in international remittances.	75-150
	2 International Aid	How do you make sure money goes where you want it to go? If your intended recipients don't have bank accounts? If they're in remote or disaster-struck areas? With no banks or ATMs? Answer: You invest in lots of audit and monitoring. You coordinate with payment providers to make sure you have the same recipient lists. You use cash. You wait.	Bitcoin is secure and auditable. Transfers are direct, instantaneous, and verifiable. No banking infrastructure is required. The World Food Programme, operated by the U.N. is experimenting with Bitcoin for cash transfers, slashing overhead from 3.5% to 1%. Those savings may compel other organizations to adopt Bitcoin.	0.75-2
	3 Small Value International Trade	Micro-, small-, and medium-sized enterprises employ the vast majority of adults, yet disproportionately bear friction in international payments. Payment fees are 200-400 bps for these types of businesses – higher where markets are illiquid and uncompetitive (e.g., not lots of Niger-Thailand FX). Merchants take on foreign exchange risk due to delays between when customers pay for products in local currencies and when merchants are credited in home currencies. Settlement delays strain cash flows.	Bitcoin can enable real-time, low-cost settlement, without FX risk. Trading via a common Bitcoin improves liquidity and competition. Simplified cross-border payments breaks dependence on local markets and can stem “brain drain” where the most skilled members of a community leave. A developer in Senegal can easily be paid by customers in the US.	250-625
	4 E-commerce	In 2019, e-commerce represented \$587 billion in volume in the US alone. ¹³ Globally, it's closer to \$3.5 trillion, mostly paid using credit cards. ¹⁴ Credit cards involve many parties – acquirers, networks, issuers – who split a transaction fee. Visa and MasterCard charge up to 2%; American Express and Discover charge as much as 3%. That's why many stores don't accept credit. 2-3% is a hefty tax on \$3.5 trillion of payment volume – it adds up to \$70 to \$105 billion per year, usually eaten by merchants.	Bitcoin bypasses the credit card infrastructure. Payments are direct from customer to merchant with only the cost of accessing the blockchain and “cashing out” to fiat currencies, ~1%. ¹⁵ Using Bitcoin in place of cards would yield \$35-\$70 billion savings per year – a powerful incentive for merchants to adopt it. In the longer-term, some “digital natives” may decide never to “cash out.” If you never cash out, the cost of transacting in Bitcoin can be close to free.	70-140

⁹ World Bank studies conducted in the 1990s suggest international remittances helped lower poverty by 11 percentage points in Uganda, six percentage points in Bangladesh, and five percentage points in Ghana.

¹⁰ Just two companies, Western Union and MoneyGram, account for two-thirds of remittances to Africa.

¹¹ Hong Kong-based BitSpark, for example, charges about \$2 for transactions, less than the about \$150, which is more typical.

¹² US Census Bureau.

¹³ Overseas Development Institute (ODI).

¹⁴ Oliver Wyman Survey: three times as many consumers use credit versus debit cards for online payments.

¹⁵ Using BitPay and Coinbase as benchmarks.



	USE CASE	THE WORLD AS IT IS	THE WORLD AS IT COULD BE	ESTIMATED VALUE (\$B)
	5 Retail Purchases	In 2019, there were \$21.5 trillion of bricks-and-mortar retail purchases globally and \$5.5 trillion in the US, excluding travel and event tickets.	As with e-commerce, Bitcoin bypasses the old payments network; merchants and consumers mostly pay to exchange into traditional currencies. Savings potential in excess of \$100 billion provides an incentive for merchants to prefer Bitcoin.	250-500
	6 Micropayments ¹⁶	<p>Many internet companies follow a model developed by newspapers and television: study your audience and sell them for ads. Facebook is "free", but we're the product.</p> <p>In a way that's a little surprising. Newspapers and television networks earned all the revenue but they created all of the content. On the internet, normal people create most of the content – they write blogs, post pictures and videos, etc. Facebook and Google get compensated for providing the platform, but nobody is compensated for actual content. Does that need to be the case?</p>	Netflix produces content and charges directly for it – it isn't run on advertising. What if people followed Netflix: upload short videos and charge \$0.01 per view? A new way to monetize content opens possibilities for those in rich and poor countries alike to sell to the broader world. Micropayments haven't been possible before; you can't charge \$0.01 if fees are \$0.25. Euros are no good if the artist is in Chile. Solutions on top of Bitcoin are cheap and global enough to make micropayments possible	0.5-1.25
CREDIT USE CASES	7 Alternative Lending	<p>Credit is key to invest in education, establish and build businesses, and weather unexpected road bumps in both rich and poor countries.</p> <p>For the over 2 billion adults without a bank account, many of whom live far from any branch, obtaining credit is unrealistic. Even in rich countries, lenders struggle to rate people without long credit histories.</p> <p>Obstacles often involve insufficient data or infrastructure to perform a credit risk assessment, lack of financial institutions to assess and disburse credit, or lack of channels to service and collect loans.</p>	Credit provision is risky, especially to those in remote places with limited financial history. But consider a world in which people are comfortable with Bitcoin and even maintain a permanent account, if only for online transactions. Users build easily reportable transaction histories as alternate data to assess creditworthiness. Borrowers connect with a global network of lenders who can lend in Bitcoin itself – no bank branch or FX needed. Even collection can be automated, with contracts structured to enforce payment. ¹⁷	75-150
SAVINGS AND INVESTMENT USE CASES	8 Gateway Financial Product	Over 2 billion adults don't have any financial account – a critical step to financial inclusion. ¹⁸ Two major reasons people lack basic financial accounts are that financial services aren't affordable for low-income users or bank branches are too far away.	<p>Financial inclusion is easier if opening a "bank account" only requires downloading a "wallet."</p> <p>Internet access isn't universal, but it spreads faster than banks. There are 170 million smartphones in West Africa today, up from 139 million in 2017.¹⁹ In contrast, fewer than 120 million are banked.</p>	10-12

¹⁶ Micropayments are a long-term and transformative use case. While compelling, it is difficult to anticipate exactly how it will work or how much traction it will get. The psychological barrier to paying even \$0.01 for something may render micropayments infeasible in certain contexts.

¹⁷ One of the major innovations related to Bitcoin is the "smart contract," which allows financial instruments like loans to be represented as computer programs. Just as you might have written a contract and hired a lawyer to interpret it, you might write the same contract as a computer program that is interpreted by the computer. You could have an integrated lending system that lets you loan Bitcoin to somebody and also write a smart contract that restricts the use of the loan to certain pre-agreed purposes and automatically pays back the principal or interest to your account at a pre-specified date or under pre-specified conditions.

¹⁸ The World Bank notes, "For most people a formal account serves as an entry point into the formal financial sector. Having a formal account facilitates the transfer of wages, remittances, and government payments. It can also encourage formal saving and open access to credit."

¹⁹ Further, in 2015, Pew estimated 37% in developing economies owned a smartphone; 54% had internet access.



	USE CASE	THE WORLD AS IT IS	THE WORLD AS IT COULD BE	ESTIMATED VALUE (\$B)
9	Stable Currency in Unstable Countries	<p>One risk of fiat currencies is that bad governance leads to high inflation, quickly wiping out savings. Examples are well known – the Weimar Republic, Zimbabwe, Venezuela, and so on. Excessive inflation sometimes seems more like an expectation, rather than an exception.</p> <p>How do you save when currency keeps losing value? Some buy gold. Some exchange to US dollars as soon as possible. In failed states like Somalia, "counterfeiters" issue currency worth as much as the paper it's printed on.</p>	<p>Bitcoin can be an attractive alternative. In contrast to gold, it can be conveniently exchanged. Further, it can be converted almost instantly, mitigating the "fire sale" rush to convert USD.</p> <p>There are challenges. Bitcoin is volatile. Governments that debase their money are likely to be the same governments that restrict the use of Bitcoin – though they also are the governments that restrict USD. At least Bitcoin is harder to censor.</p>	5-12.5

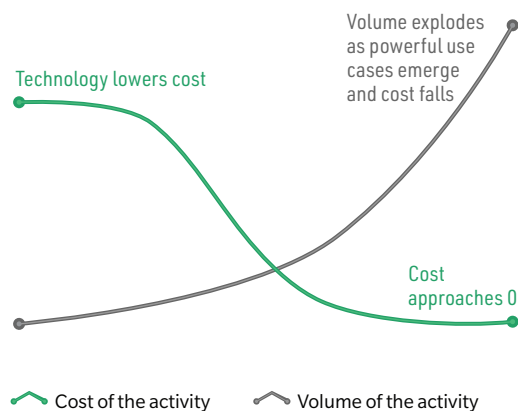
The above analysis assumes the current size of and set of use cases for the global payments market. However, when the transaction cost of an activity approaches zero, volume explodes, and new, previously inconceivable use cases emerge. We send 150 billion letters a year – but, with SMTP, 74 trillion emails. Mankind took 80 billion photographs in all of history through 2000 – but, with HTTP and smartphones, we will share 1.4 trillion photographs in 2020. Yes, \$973 trillion of global payments each year is a huge number, but how might that change when payments are essentially frictionless?

The takeaway is this: if Bitcoin achieves even conservative levels of adoption in payments alone, demand will far outstrip what is implied in BTC market valuation today of \$209 billion. Values may be significantly higher after factoring in the promise of other potential applications and the fact that transaction volumes themselves are likely to increase as Bitcoin drives transaction costs down.

Of course, the assumptions underlying these estimates are just that – our best guess of what the future might look like, an exercise inherently fraught with large estimation errors. However, in making a case that Bitcoin could play a helpful role in investor portfolios, we feel it is important to inject some analytical, bottom-up valuation methods to complement the more conceptual arguments and help investors rise above the cacophonous din that so often dominates this debate.

EXHIBIT 4
Activity Volume as Transaction Costs Approach Zero

COST VERSUS VOLUME



	TRADITIONAL	DIGITAL
Letters/emails	150 BN/year	74 TN/year
Photographs	80 BN (all time through 2000)	1.4 TN (in 2019 alone)
Payments	\$973 TN / year	??



Long-term value as a "better form of gold"

For many, the idea of holding gold to protect wealth from suddenly evaporating is somewhat foreign. After all, in most developed countries, especially recently, simply holding cash has been good enough. This recent relative stability and developed-world myopia, however, makes it easy to forget that most money is a remarkably poor store of value. It usually takes big events to remind us how easy it is for wealth we thought was secure to flitter away: hyperinflation in Venezuela, haircuts on bank deposits in Cyprus, or even the runs on the most troubled US banks during the 2008/2009 financial crisis. Were it not for unprecedented government action, large chunks of people's savings at certain banks would have been wiped out. Investors know gold has generally been a good hedge against such events. Gold is scarce and can't be inflated away, which are major drivers behind the metal's \$12 trillion global valuation.

Bitcoin clearly has an enormous distance to travel before it can contend for the world's preferred store of value. It is volatile and not widely understood, and gold has more than a one thousand year head start. Still, Bitcoin has tailwinds vs. gold: it is easier to access and store, more portable and usable at distances, and has multiple uses underpinning its value. Considering the narrow payments use case analysis alone suggested a potential valuation of over \$1.6 trillion, the additional valuation upside should Bitcoin take some share of the \$12 trillion gold market appears significant. We believe this shift is already well underway.

OVERCOMING HURDLES TO ADOPTION

The case for a positive expected return on Bitcoin relies on the assumptions that demand for it, through its role as a better form of money, and/or through its ability to provide an alternative store of value to cash or gold, will increase to such an extent that its future value will be sufficiently in excess of its current value. While there are many reasons why demand is likely to go up, we see several significant hurdles to that demand materializing:

CRITICAL MASS OF ADOPTION	PERFORMANCE AND SECURITY	REGULATORY COMPLIANCE
<ul style="list-style-type: none">■ Bitcoin is worthless if nobody uses it - challenges include:<ul style="list-style-type: none">□ Lack of awareness□ Inertia/high switching costs□ Perceptions that Bitcoin is insecure, dangerous, complex, volatile, or hard to use	<ul style="list-style-type: none">■ Bitcoin needs to be ready to take on new users:<ul style="list-style-type: none">□ Performance: Provide required robustness and performance□ Security: As more money flows to Bitcoin, it will increasingly become a target of hacking□ Competitors: New solutions may arise (unpredictable)	<ul style="list-style-type: none">■ Regulators are still catching up to the technology, creating challenges:<ul style="list-style-type: none">□ Lack of regulatory clarity□ Potential bans from economic powers could handicap growth□ Potential government competitors (central bank Bitcoin) could undercut growth

The first two hurdles can be overcome with time and should be familiar to those who remember the internet in the 1990s. Many recall the famous 1995 article in Newsweek, "Why the Web Won't Be Nirvana" which argued that the internet wouldn't penetrate our day-to-day lives because it had too few users and searches often returned messages like "Too many connections, try again later." In 1998, the Nobel Prize-winning economist Paul Krugman's brilliant insight was that "by 2005 or so, it will become clear that the Internet's impact on the economy has been no greater than the fax machine's." For Bitcoin, Jamie Dimon has called Bitcoin "a fraud," Larry Fink calls it "an index of money laundering," and Howard Marks believes Bitcoin is "nothing but an unfounded fad."

There are indeed serious hurdles to widespread adoption of Bitcoin. As Dante Castiglione, an Argentinian Bitcoin broker (whose business has boomed as the peso loses large amounts of its value every year) put it: "If people don't use it, it will go in the trash, like anything that isn't used in this world."²⁰ And scalability is a challenge for Bitcoin, which is designed to be increasingly costly as more people use it. While the security of the system is unparalleled, users may find the speed and cost tradeoffs unacceptable.

However, there are solutions. Bitcoin is innovating on a second layer for small transactions, which are instantaneous and cheap, but which settle only periodically on the blockchain. The ultimate user-preferred solutions remain to be seen.

Another hurdle – regulatory challenges – represents an additional source of uncertainty. Unfavorable regulatory developments could hinder the growth of Bitcoin. There's precedent for governments interceding when monetary policy is at risk: in 1933, President Roosevelt signed Executive Order 6102, criminalizing possession of monetary gold, but in this case the gold/USD exchange rate was set by fiat. No such mechanism exists for controlling the exchange rate of Bitcoin, and in fact, as we will detail shortly, in periods of political unrest or financial panic (the type of situation accompanying a major government attempt at wealth confiscation) Bitcoin becomes the favored store of value, and its price tends to rally. For

Bitcoin investors concerned about the impact of the US "outlawing Bitcoin," we'll note that in the time since Roosevelt's 1933 decree outlawing private possession of gold, its price has been resilient, increasing from \$21 per troy ounce immediately before the ban, to nearly \$2,000 today.


In that context, we believe Bitcoin is likely to prove resilient to regulatory heavy-handedness. Governments can force activity underground for a time (in China, where exchange trading in Bitcoin has previously been banned, people arranged meetings in alleys to exchange physical RMB for Bitcoin), but Bitcoin is highly durable. We are more concerned with government's power to destroy the value of traditional currencies (see Venezuela) than about governments (lack of) power to destroy Bitcoin. In fact, it seems more likely that eventually governments will embrace the legitimate benefits of Bitcoin as highlighted in Box Note 3. In Box Note 3, the former head of New York's Department of Financial Services, Benjamin Lawsky, shares his experiences around how he helped establish the standard for regulating Bitcoin in New York that today provides an excellent balance between consumer and market protection, without stifling innovation in nascent technologies.

BOX NOTE 3: PERSPECTIVES ON (NOT OVER) REGULATING BITCOIN²¹

I ran New York's Department of Financial Services from 2011 until June 2015. We regulated New York's financial services industry with an agency of roughly 1400 people overseeing institutions with more than \$7 trillion in assets. Our regulatory mandate was broad, ranging from classic bank and insurance supervision, to anti-money laundering investigations, to stamping out predatory payday lending. In the course of this work, it became quite clear to me that new technologies were beginning to change the financial services industry in very significant and possibly revolutionary ways. And it was striking that the pace of these changes was accelerating exponentially.

²⁰ <https://www.nytimes.com/2015/05/03/magazine/how-bitcoin-is-disrupting-argentinas-economy.html>

²¹ Ben Lawsky is the Head of Regulatory Affairs at Stone Ridge and NYDIG.



With all of these innovations, from marketplace lending platforms to modern payment systems to Bitcoin, we observed a fundamental collision of two worlds – the dynamic and largely unregulated world of new technology and the slower, very highly regulated world of financial services. At the time, no one really knew how this collision would play out. The question was how would we reconcile the desire to promote smart and efficient technological innovations with the need to promote a stable financial system that protected consumers, investors, and other participants in the system.

We first heard about Bitcoin in 2013 because some companies in the space appeared to be engaging in money transmission, an area we both licensed and regulated. So the question from the very beginning was less whether to regulate Bitcoin but how to do it the right way. Our money transmission laws

and regulations had been crafted around the time America was exploring the Western frontier – long before there was an Internet, let alone Bitcoin. Applying those antiquated rules to Bitcoin felt like jamming a square peg into a round hole.

We concluded pretty quickly that it made the most sense to see if we could craft a new set of rules that were modern and geared toward Bitcoin itself. Our goal was to put in sufficient guardrails to protect consumers, investors, and the financial system itself while at the same time not stifling innovation. Easy to say, very hard to do.

In doing so, we realized we needed to do a lot of homework to more fully understand what we were trying to regulate. Because of the complex and rapidly evolving technology surrounding Bitcoin, we took an “open source” approach to regulation. We listened carefully to all the stakeholders and made the rulemaking process as open to input (and yes, criticism) as possible. As regulators, we had to approach this rulemaking with a sense of humility, knowing that the space would likely look very different five, ten, or fifteen years out.

Writing the regulations was a challenge, and we went through several iterations. The process began in 2013 when we created a team to study Bitcoin. Then in January 2014, we held two days of live hearings where we heard from entrepreneurs, venture capitalists, technologists, vendors, and other actors within the space.

We learned a lot from that hearing and from the public comments we received. All of the feedback helped us realize the potential of Bitcoin to revolutionize the financial system, but it also underscored the responsibility we had to get our regulations right since they would likely serve as a model for other states and even other nations.

The heart of those regulations, now known as the “BitLicense,” requires companies who act as financial intermediaries in the digital currency space to have adequate capital, robust disclosures to protect consumers, cybersecurity protections to address the hacking threat, and sufficient anti-money laundering procedures.

We were also very much aware of the risk of stifling innovation in a nascent industry where entrepreneurs needed the space and flexibility to develop this new technology. In response to these concerns, the final regulations built in an on-ramp for startups and made clear that we were only regulating companies that hold the money or Bitcoin of others – those acting like banks or money transmission businesses. Users or miners of Bitcoin, or software providers were not regulated.

It would be foolish to expect that an attempt to create a regulatory framework for something so new and dynamic as Bitcoin would be perfect from the start or have no unintended consequences. And I think it is still too soon to judge all of the impacts our work in this area has had.

Since the final version of the BitLicense was released just over six years ago, we have seen enormous growth in the Bitcoin space, and more regulators are realizing that this new technology is likely going to become an important part of our financial system. It is encouraging to see regulators in other states and at the federal level take a careful, calibrated approach that seeks to balance promoting innovation while upholding the obligation to protect consumers and investors. It is a promising sign that the regulatory environment around Bitcoin is maturing, and that can only help the industry achieve mainstream adoption more quickly.

My hope remains that the framework we created will promote an environment where companies both innovate and also strive to meet the regulatory requirements resulting in increased consumer and investor confidence. As more firms see that the well-regulated Bitcoin businesses in New York are more trusted and safe and thus successful, more companies will seek a BitLicense resulting in a perpetually increasing level of smart, safe and innovative Bitcoin activity in New York – what we like to call a race to the top. Hopefully, that will then be a pattern that is repeated about the country and around the world.

PUNCHING ABOVE ITS WEIGHT

Bitcoin is volatile with a massive right tail, so investors do not need much exposure in their portfolio to have an impact. To illustrate this point, we ran simulations looking at thousands of potential future return paths comparing a pure 60/40 portfolio (of 60% stocks/40% bonds) to a portfolio where a small initial amount was allocated to Bitcoin. We constructed a traditional portfolio that, at the beginning, was allocated 59% equities/39% bonds/2% Bitcoin. We rebalanced the equity/bond portion of this portfolio to always be in the same proportion, but we did not rebalance the Bitcoin allocation, although we capped it at 10% of the portfolio to maintain diversification. We assumed the investor starts with \$1 million at age 62 and withdraws \$35,000 per year (inflation adjusted), which is the amount that an investor holding the 60/40 portfolio could withdraw over 30 years and be at least 95% confident he or she won't run out of money.

While the expected return for Bitcoin was assumed to be positive and in excess of the risk-free rate, we assumed a high volatility to reflect the relatively nascent state of the market and the high experienced volatility to date. This ensures a reasonable likelihood of the asset losing value, which is an outcome that must be contemplated given the uncertainty around the long-term future performance of Bitcoin.

So what does a 2% allocation to a high volatility, high potential return asset mean for an investor?²²

- **On the upside**, a mere 2% allocation to Bitcoin provides the investor exposure to significant upside. In our base case, where Bitcoin continues to grow network adoption and capture a meaningful share of the gold market, we estimate returns of approximately 20% compounded annually, which means that an investor starting with a 2% allocation to Bitcoin has over \$450,000 more after 30 years than an investor allocated only to equities and bonds. There is also a positive skew: the 2% is small, which

²² For equities, return expectations are 5% with an annual volatility of 14.75%. For bonds, expected returns are 2% with a 6.3% annual volatility.

means the downside is limited, but given the high average returns and upside potential around that, the impact the allocation can have is significant. Specifically, in the best 10% of cases for both the 60/40 and the portfolio with a 2% allocation to Bitcoin, the investor with an allocation to Bitcoin will end up having almost \$1.5 million more on average after 30 years.

- **On the downside**, in periods where investment returns are low and Bitcoin performs poorly as well, the average performance of the portfolio with a Bitcoin allocation is only slightly worse than without. In particular, in the bottom 10% of outcomes for the portfolio, the portfolio with the Bitcoin allocation is a little more than \$130,000 worse off, reflecting that in those scenarios, the allocation becomes extremely small, limiting the impact. In short, relative to the average case and upside potential, the downside is well-bounded.

TABLE 2
Potential Portfolio Impact of a 2% Allocation to Bitcoin

SURPLUS PORTFOLIO BALANCE OVER 60/40 AFTER 30 YEARS

AVERAGE	TOP 10%	BOTTOM 10%
\$460,000	\$1,500,000	(\$135,000)

Assumptions:

Starting portfolio value: \$1 MM

Risk tolerance: Low (requires less than 5% likelihood of running out of money)

Investor: Age: 62; Years in retirement: 30; Annual withdrawals: \$35,000 (inflation-adjusted) Fees: 75 bps equity fund, 10 bps bond fund, 50 bps for Bitcoin fund and custody

Bitcoin: 20% annual return with 45% annualized volatility reflecting a blend of historical volatility (approximately 70%) and long-term volatility estimates around 30%

Based on this analysis, a small initial allocation to a highly volatile asset class with high long-run expected returns and no correlation provides a significantly skewed set of outcomes in the investor’s favor: the upside is substantial in those scenarios when Bitcoin performs well, but because of the small allocation, even if the value of the Bitcoin allocation shrinks, the overall portfolio impact is immaterial.

CONCLUSION

We believe that investors have to change their investing mindset and turn the whole notion of what a typical portfolio should look like on its head. There are significant secular headwinds facing investors and as such, investors are advised to maintain an open mind and seek out a wide range of diversifying return streams to meet their long term objectives.

Allocating to Bitcoin in a portfolio may feel like moving through a strange, and unfamiliar world. In fact, the path before investors is well illuminated, and owning Bitcoin is part of the journey to a successful destination.

APPENDIX A

MARKET SIZING METHODOLOGY

We conducted a high-level market sizing exercise to estimate the marginal contribution of certain high-value use cases on digital asset economic value. Broadly, market sizing employed the following methodology:



For each use case, the following parameters were estimated:

In-scope transaction volume

Where relevant, we estimated the total volume of money associated with each use case over a one-year period. In well-established markets, we benchmark to high-quality data sources such as the World Bank, the United Nations, the US Census Bureau or other reputable organizations. For example, for international remittances, we benchmark to a 2016 World Bank study that estimated \$600 billion of transfer volume.

In markets where data quality is somewhat poor or where the market itself is not yet well established, we make an estimate with respect to the qualitative size of the market (small, moderate, or large). However, for conservatism, we do not include such use cases in the quantitative market sizing. As an additional layer of conservatism, we do not project market growth into the future (i.e., we assume long-term market size stays flat at 2017 levels).

Money velocity

Money velocity is a critical component to estimating currency demand. If \$100 billion of payments flow through an economy each year, that does not mean the demand for money is \$100 billion – the same money can be used in multiple transactions. If, on average, \$1 is exchanged twice over the year, the velocity would be “2,” and the money demand would be \$50 billion.

We conservatively assume Bitcoin velocity is 2.0 for all use cases. It is somewhat more conservative than US broad money supply velocity (approximately 1.5).

Bitcoin penetration

For each use case, we estimate the potential share of the market that may flow through Bitcoin. We assess each use case based on (i) competitive dynamics; (ii) Bitcoin value-proposition, as quantified by potential efficiency savings or security enhancement; and (iii) barriers to market entry. Based on that assessment, we assign each use case a “Bitcoin opportunity rating” – either “low opportunity,” “moderate opportunity,” or “high opportunity.” Finally, we assign a market penetration range based on the opportunity. We estimate 5-10% penetration for “low opportunity” use cases; 10-25% penetration for “moderate opportunity” use cases; and 25-50% penetration for “high opportunity” use cases.

EXHIBIT 6
Summary of
Use Cases and
Anticipated
Demand

		USE CASE	TIME HORIZON	VOLUME (\$)	CURRENCY DEMAND (\$)	PENETRATION	ESTIMATED VALUE (\$B)
PAYMENTS	1	International Remittances	Near-term	600 billion	300 billion	High	75 - 150
	2	International Aid	Near-term	15 billion	7.5 billion	Moderate	0.75 - 2
	3	Small Value International Trade	Medium-term	5 trillion	2.5 trillion	Moderate	250 - 625
	4	E-commerce	Medium-term	1.5 trillion	750 billion	Moderate	75 - 175
	5	Retail Purchases	Long-term	10 trillion	5 trillion	Low	250 - 500
	6	Micropayments	Long-term	10 billion	5 billion	High	0.5 - 1.25
CREDIT	7	Alternative Lending	Medium-term	3 trillion	1.5 trillion	Low	75 - 150
	8	Gateway Financial Account	Long-term	200 billion	100 billion	Low	10- 25
	9	Stable Currency	Long-term	50 billion	50 billion	Low	5 - 12.5
TOTAL							750 - 1,600
USD (PHYSICAL CURRENCY)							1,930
MINED GOLD							12,000

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