Paradigm

Bitcoin for the Open-Minded Skeptic

By Matt Huang, on behalf of Paradigm (May 2020)

Bitcoin has grown from idea (2008), to working system (2009), to its first real-world use at <$0.01 per coin (2010), to a global currency valued at $8K+ per coin and $150B+ in aggregate (May 2020).

Although Bitcoin is empirically one of the best investments of the past decade, it still remains controversial. Is it a new form of money? A speculative bubble? Or a bit of both?

Investors have well-established frameworks for evaluating assets like equities, credit, and real estate. But a new *monetary asset* such as Bitcoin appears so infrequently that no clear framework exists.

This paper outlines a simple and intuitive framework for Bitcoin as a new monetary asset.

Why Now?

In the course of our work, we are often in the position of explaining Bitcoin to investors and institutions approaching it for the first time. Never before have we seen more interest in Bitcoin and its potential as a digital companion to gold.

Financial crises stress the limits of existing systems and can highlight the need for new ones. This was true during the financial crisis of 2008 (out of which Bitcoin was born), and it is perhaps more true today with the unprecedented levels of monetary and fiscal stimulus being pursued by governments worldwide.

There has been no shortage of writing about Bitcoin over the past 11 years. This paper does not claim any novel insight. Instead, it is a summary of the conversation we often have with investors seeking to understand Bitcoin for the first time.

Money

> *"The two greatest inventions of the human mind are Writing and Money — the common language of intelligence and the common language of self-interest."*
> *—Mirabeau*

Money is an old and complex idea. Historically, it has taken many forms: from decorative axes and cowry shells to precious metals and representative paper. The last major shift was arguably in the early 1970s with the end of the US gold standard and the beginning of the modern fiat currency system.

We can think of money as a competitive market like any other. Gold dominated for centuries not by accident but by possessing important features such as being scarce and unforgeable. Today,

fiat currencies dominate largely through local monopoly power, but all monetary assets still compete globally, with gold, US Dollars, and Euros favored as reserve assets.

Like written language, money is a protocol standard with immense network effects. A new monetary asset can only emerge if it better fulfills the core functions of money, and it can overcome the adoption hurdle of a new money. We believe Bitcoin offers a compelling answer to both.

Store of Value

One of the primary functions of money is to be a store of value: a mechanism to transfer purchasing power across time and geography.

All successful money fulfills this function. If a monetary asset loses trust as a store of value, then savings quickly flow elsewhere, as seen in hyperinflationary economies like Venezuela.

Gold

Gold has been trusted as a store of value for millennia. Importantly, the supply of gold on Earth is scarce. Confidence in this scarcity rests in humanity's understanding of nature: that gold cannot yet be cost-effectively synthesized (despite alchemists' best efforts throughout history).

Gold also has many other desirable properties, such as being easy to recognize (no tarnishing), easy to divide, easy to measure (by weight), and easy to verify (through melting), so it is no surprise that gold replaced predecessors to become a global standard.

Paper Currency and the US Dollar

Paper currencies emerged to simplify the daily use of precious metals as a means of exchange (another core function of money). Although paper notes were initially linked to precious metals, today most paper currencies are free-floating and established by government fiat.

The US Dollar is the leading fiat currency and has been the global reserve currency for much of the last century (replacing the British sterling before it). In addition to being a trusted store of value, the US Dollar is the leading means of exchange and unit of account. A significant share of global trade is priced and settled in US Dollars, whether or not the United States is directly involved.

Confidence in the US Dollar rests on trust in the government (e.g., to wisely manage its monetary policy). There is great efficiency in placing such trust in a single institution, but there is also risk. Fiat currencies can lose credibility and be devalued through the actions of the government, who in times of crisis may face short-term pressures that outweigh concerns for long-term credibility. Countries like Venezuela offer an extreme precedent for currency value in the face of eroding trust: the currency becomes worthless.

Many investors, including central banks, own both gold and US Dollars (or US Dollar-denominated assets) because they offer complementary trade-offs. We can think of the US Dollar as a *centralized* monetary asset, which can be devalued by a single actor, and gold as a *decentralized* monetary asset, which cannot.

Bitcoin

Bitcoin is a new *decentralized* monetary asset, akin to gold. It combines the scarce, money-like nature of gold with the digital transferability of modern currency. Although it remains relatively nascent, Bitcoin has great potential as a *future* store of value based on its intrinsic features.

As with any monetary asset, Bitcoin must be scarce, portable, fungible, divisible, durable, and broadly accepted in order to be useful. Bitcoin rates strongly across most of these dimensions, except for broad acceptability:

- Scarcity: Bitcoin supply is scarce, and asymptotically approaches 21 million coins. Achieving scarcity in digital form was Bitcoin's great technical breakthrough (building on decades of computer science research).
- Portability: Bitcoin is extremely portable, especially relative to gold. Arbitrary amounts of value can be held in a USB stick, or digitally transported across the globe in minutes.
- Fungibility: Any two Bitcoins are practically interchangeable, although each Bitcoin has a distinct history on the public ledger.
- Divisibility: Each Bitcoin can be divided into 100 million smaller units (called "satoshis").
- Durability: Bitcoins are durable and do not degrade over time.
- Broad Acceptability: Bitcoin's primary weakness: it is far less broadly accepted than gold or US Dollars, although it has made impressive strides over the past decade. We can think of broad acceptability along two dimensions, both of which are important: the % of people who trust and accept Bitcoin, and the % of wealth that trusts and accepts Bitcoin.

Beyond these classic monetary features, Bitcoin is also:

- Digital: Digital money like Bitcoin is cheaper to store and easier to transfer than gold, which is physically cumbersome. Bitcoin is also instantly verifiable, whereas gold can require a slow and manual verification process.
- Programmable: Bitcoin is programmable, which has subtle but far-reaching implications. Today Bitcoin scripting enables applications like escrow or micropayments. Over time we may be surprised by what can be built with Bitcoin (much as we were surprised by the Internet, another programmable substrate).
- Decentralized and Censorship-Resistant: The rules of the Bitcoin network (such as its monetary policy) are governed by a decentralized peer-to-peer network, involving a disparate and global user base of consumers, investors, companies, developers, and miners. It is impractical (if not impossible) for a single actor to unilaterally influence the rules of the system. This affords Bitcoin holders a special kind of confidence: that Bitcoin cannot be devalued by arbitrary monetary policy decisions, and that they will always be able to hold and transfer their Bitcoin freely. This could be valuable not just to individuals

and companies but also to governments whose foreign currency reserves may be subject to the whims of foreign entities.
- Universal: Similar to physical bearer assets like US Dollar bills or gold, Bitcoin is a digital bearer asset that anyone can hold and transfer. The same is not true of digital US Dollars (which require a bank account that supports US Dollars) or digital exposure to gold (which requires a brokerage account).

A broadly accepted store of value with the above features would represent a significant improvement over gold, but Bitcoin still lacks broad acceptance and remains nascent as a store of value (as compared to gold's millennia of history and credibility). A better product is not enough—Bitcoin must have a go-to-market strategy to reach broad acceptance.

Bitcoin as a Bubble

Since Bitcoin's inception, many intelligent investors have observed that it appears to be a bubble. They are more right than they know.

If we define a bubble asset as one that is *overvalued relative to intrinsic value*, then we can think of all monetary assets as bubble assets. By definition, a store of value is an intermediate asset that people demand, not for its direct utility, but for its ability to be valuable in the future. This value is reflexive: people will believe in a store of value if they expect others to believe in it (who in turn should expect others to believe in it, and so on).

This phenomenon is distinct from other asset classes, which have utility-based demand, with speculation occurring around this underlying utility. For monetary assets, the utility is in the collective speculation itself.

As Nobel-laureate Robert Shiller observes: *"Gold is a bubble, but it's always been a bubble. It has some industrial uses, but basically it's like a fad that's lasted thousands of years."* This is not an argument against gold (or Bitcoin) as a valuable monetary asset, but an astute insight into the bubble-like, reflexive nature of money.

We can think of money as a bubble that never pops (or that hasn't popped yet) and the value of fiat currency, gold, or Bitcoin as relying on collective belief. Other factors like a government's power, the industrial utility of gold, or the robustness of Bitcoin's codebase can help reinforce this belief, but belief is critical.

Such large amounts of value emerging from collective belief may seem circular and non-fundamental. However, there is real value in the social and economic coordination that monetary assets facilitate (much as there is real value in common language). Moreover, such collective belief cannot arise around any arbitrary asset—a successful monetary asset must compete to earn this belief based on intrinsic features. Having superior intrinsic features explains why gold is preferred to silver or fur pelts and Bitcoin is preferred to any number of Bitcoin copycats.

Bubbles as a Go-To-Market Strategy

If Bitcoin succeeds in becoming a trusted store of value, then its end state is to be a bubble. Bubbles are also how Bitcoin gains broader acceptance.

Throughout Bitcoin's 11-year history, there have been at least four Bitcoin bubbles of note.

- 2011: From ~$1 (Apr 2011) to ~$31 (Jun 2011) to ~$2 (Nov 2011)
- 2013: From ~$13 (Jan 2013) to ~$266 (Apr 2013) to ~$65 (Jul 2013)
- 2013-2015: From ~$65 (Jul 2013) to ~$1242 (Nov 2013) to ~$200 (Jan 2015)
- 2017-2018: From ~$1000 (Apr 2017) to ~$19500 (Dec 2017) to ~$3500 (Dec 2018)

Each bubble has a familiar pattern. High conviction investors start buying when Bitcoin is boring and unloved. The resulting rise in Bitcoin price attracts media attention, which then attracts investors (or speculators), many with lower conviction and shorter time horizons. This drives the price of Bitcoin higher, which drives further attention and investor interest. This cycle repeats until demand exhausts and the bubble crashes.

Although painful for those involved, each bubble leads to broader awareness and motivates Bitcoin's underlying adoption, gradually expanding the base of long-term holders who believe in Bitcoin's potential as a future store of value. This dynamic is evident in the successively higher price floors that Bitcoin reaches during times of maximum disillusionment: ~$2 in 2011, ~$200 in 2015, and ~$3500 in 2018. Broader awareness also encourages the building of Bitcoin infrastructure by startups like Coinbase and incumbents like the CME and Fidelity, further improving Bitcoin's liquidity and utility as a monetary asset. Through successive bubbles, Bitcoin reaches greater levels of scale in users, transaction volumes, network security, and other fundamental metrics.

The Future of Bitcoin

As Bitcoin becomes more broadly accepted, what will its future look like? Some wonder whether people will be earning salaries or making everyday payments in Bitcoin. While these behaviors may exist to some degree, Bitcoin seems unlikely to challenge the US Dollar as the leading means of exchange and unit of account (at least anytime soon). Instead, Bitcoin is likely to earn a place alongside gold as a sensible part of many investment portfolios. This has already begun with an early-adopter, tech-forward crowd, and we expect it to grow to include a broader set of investors and institutions over time. Eventually, central banks may come to view Bitcoin as a complement to their existing gold holdings.

Ultimately, monetary assets rise and fall on timescales that stretch beyond human lifespans, making them a challenge to forecast. There was a time before the US Dollar reigned when the reserve currency was British, or French, or Dutch, or further into ancient history, Greek or Roman. Similarly, there was a time before the adoption of gold when more primitive forms of money were dominant. The idea of a fiat currency like the US Dollar being untethered to gold is itself a recent phenomenon that seemed unthinkable half a century ago. In the future, it seems

likely that the global monetary order could change in ways that would be unthinkable to us today, with digital currencies such as Bitcoin playing a significant role.

Market Size

As a decentralized store of value, it is most natural to consider Bitcoin's market size relative to gold, whose aggregate value is estimated to be ~$9T (May 2020) between central bank reserves (17%), private investment holdings (22%), jewelry (47%), and other miscellaneous forms (14%). Some but not all of this value is addressable by Bitcoin.

Over time, the market demand for assets like gold and Bitcoin could expand to exceed ~$9T, especially given the prevailing direction of global monetary policy. According to the IMF, total international reserves reached ~$13T in 2019 between gold (11%), foreign currency reserves (86%), and IMF-related assets (3%). If foreign governments (some of whom already bristle at their dependence on US Dollar FX reserves) begin to adopt Bitcoin as a complement to existing gold holdings, the market size for Bitcoin could expand significantly.

Beyond complementing gold's investment demand, Bitcoin may also address broader store of value markets indirectly. Consider, for example, people who hold fiat currencies with eroding credibility such as the Argentine Peso or the Turkish Lira, but who may have difficulty accessing US Dollars or gold. Or consider various collectibles like art or gemstones, some of which are owned primarily as stores of value. Or consider the empty NYC apartment that is owned by a foreigner interested in storing value outside his or her native country. Bitcoin could plausibly address subsets of these behaviors more effectively.

Deferring a precise estimate of market size, we believe it is clear that Bitcoin has significant headroom if it continues to gain broader acceptance.

Risks

Although it has come a long way in 11 years, many risks remain for Bitcoin:

- Crossing the Chasm: Bitcoin has gained credibility with early adopters, including some large institutional investors, but it remains niche relative to incumbent monetary assets like gold. There is risk that Bitcoin never achieves the broad acceptance that its proponents hope it will. Of course, therein also lies the opportunity. If Bitcoin were already a broadly accepted store of value, then it would likely be worth orders of magnitude more with relatively little remaining upside.
- Volatility: Bitcoin has been (and continues to be) quite volatile relative to US Dollars. There is risk that this volatility limits adoption or prevents investors from considering Bitcoin as a credible store of value. For better or worse, this volatility may be inherent to the process of Bitcoin adoption as natural swings in investor confidence (as faced by any early-stage upstart) are reflected in Bitcoin prices. Bitcoin’s bubble-like adoption process exacerbates this effect. As Bitcoin matures and becomes more broadly accepted as a monetary asset akin to gold, investor confidence and Bitcoin prices should stabilize.

- Regulation: Bitcoin is a new currency and payment rail that sits outside of existing systems, posing a potential challenge to existing regulatory frameworks. Similar to early Internet regulation, there is hope that governments pursue nuanced regulation(s) that allow innovative use-cases to prevail. However, there is risk that regulation is onerous and ultimately hinders broader Bitcoin adoption. One mitigating factor is that Bitcoin is a global, decentralized network like the Internet, which is difficult to control for any single government, although governments can plausibly limit access to Bitcoin in various ways.
- Technical Risk: The Bitcoin codebase and network have been battle-tested for over a decade, but it continues to evolve and there remain some open questions about how the system might behave in the long run (for example, when the Bitcoin supply approaches its asymptote and miners must be compensated primarily with transaction fees rather than block rewards).
- Competitive Risk: Other cryptocurrencies could compete with Bitcoin, as could digital fiat currencies sponsored by governments. Relative to other cryptocurrencies, Bitcoin has a strong first-mover advantage in acceptance, security, and credibility that will be difficult for competitors to overcome. Relative to digital fiat currencies, Bitcoin remains differentiated in its scarce, gold-like nature. Digital US Dollars or digital Renminbi would still be subject to local monetary policy decisions, although they have the benefit that they are currency units people already know and use.
- Unknown Unknowns: We must acknowledge that a digital monetary asset such as Bitcoin has never existed before. We are in uncharted territory with more uncertainty than is typical.

Conclusion

Bitcoin is a new monetary asset that is climbing an adoption curve. Although it is not *yet* a broadly accepted store of value, Bitcoin has great potential as a *future* store of value based on its intrinsic features.

Since monetary assets do not arise frequently, Bitcoin is likely to challenge our ordinary intuitions, and it has stirred (understandable) controversy in the investment world.

Therein lies the opportunity, of course. We believe Bitcoin offers a compelling risk/reward profile for patient, long-term investors willing to spend the time to truly understand Bitcoin. We hope this paper provides a helpful starting point.

About the Author

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