Bitcoin and U.S. National Security

An Assessment of Bitcoin as a Strategic Opportunity for the United States

Matthew Pines

National Security Fellow, Bitcoin Policy Institute

Bitcoin Policy Institute

Executive Summary

Russia has shocked the world with its full-scale invasion of Ukraine. This crisis is a fraught moment of significant uncertainty, with both immediate implications for the global economy and cascading consequences for the international order. **President Putin's war of aggression is a transparent attempt to fracture the geopolitical status quo.** In the process, it has brought to the fore latent frictions in the global economic system and thrown into sharp relief the strategic challenges facing the U.S. and the western liberal order.

Western governments have imposed unprecedented sanctions on Russia, targeting Putin and his cronies personally, cutting Russian banks (including the Central Bank) and companies from U.S. and European financial systems, and imposing severe export controls and sanctions across a range of key industries, all while Western companies exit en masse. The goal is to impose immense economic and political costs on the Russian leadership and economy, isolating the regime from the western system.

Putin will likely retaliate in some fashion, and the potential for escalation is real. How the situation will evolve is hard to predict, but it is important to recognize that Russia's actions are taking place in a broader strategic context, as the culmination of larger macroeconomic and geopolitical shifts. These shifts may precipitate a reordering of—or at least a major challenge to—the dollar-based global economic system. **The U.S. must reassess, with renewed urgency, the durability of the rules-based international order, coming now under clear and direct assault.**

As part of this assessment, the U.S. must identify and develop innovative approaches to:

1) Bolster our enduring sources of national economic strength, and
2) Leverage all means to counter our strategic adversaries, while
3) Preserving and protecting the democratic values at the heart of our national ethos.

This paper offers a contribution to such an assessment and **identifies Bitcoin as a strategic national security opportunity for the United States that supports these objectives**.

More than just about any country in history, the United States has proven its ability to adapt and lead in times of challenge and change. Leveraging our enduring constitutional principles, open society, and natural bounty, we have transformed, sometimes radically, the fundamental architecture of our political and economic system. This has required innovative, sometimes controversial, thinking.

If we apply such innovative thinking, the U.S. will find itself exceptionally well-poised to take unique advantage of the opportunity presented by the emergence of Bitcoin, helping overcome our current challenges and promoting a more resilient and secure future.

The time for such thinking is now.

Summary of Bitcoin's Potential Benefits and Risks to U.S. National Security

Bitcoin may well change society's relationship with money and payments as profoundly as the internet did with information. Just as the internet introduced novel benefits and risks to U.S. national security, Bitcoin will likely do the same. The following is an overview of the opportunities and challenges explored in greater depth throughout this paper.

Potential Benefits

Properly appreciated, this paper argues that **Bitcoin can support three national security objectives** specifically identified by the Biden Administration's *Interim National Security Strategic Guidance*.

In particular, Bitcoin may help:

1. **Drive Economic Growth**
   - Bitcoin's growth can drive technology innovation and expand U.S. capital markets.
   - Bitcoin's Proof-of-Work mining may incentivize renewable energy generation and improve energy system resilience.
   - Bitcoin can foster increased economic inclusion.
2. **Counter Strategic Adversaries**
   - China is using the current dollar system against the U.S.
   - China's Belt and Road Initiative along with its digital currency project make it poised to outcompete America for influence in low and middle-income countries.
   - Bitcoin can counter China's efforts to internationalize its digital yuan.
3. **Promote American Values**
   - Illiberal and authoritarian states benefit from restricting the open flow of information and capital.
   - Bitcoin enables citizens of these nations to finance opposition to their governments and move capital into Western markets.

Potential Risks

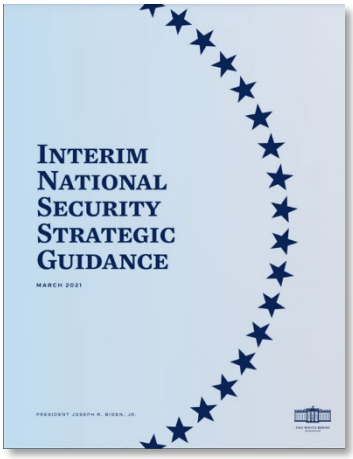
Bitcoin presents possible risks and challenges, including:

- Potential constraints on monetary policy flexibility;
- Future protocol changes;
- Domestic and international shifts in economic power;
- Reliance on overseas microchip fabrication;
- Unanticipated effects the domestic and international energy system;
- Vulnerability to adversary attacks; and
- Other unknown, unanticipated risks given Bitcoin's limited 13-year history.

While the benefits seem to outweigh the risks, a more comprehensive, ongoing, national-level assessment is needed to take full account of the national interests at stake. Such an assessment should chart a path forward to inform what is now urgently required: a **National Bitcoin Strategy**.

Contents

Introduction



"This moment is an inflection point. We are in the midst of a fundamental debate about the future direction of our world. To prevail, we must demonstrate that democracies can still deliver for our people. It will not happen by accident – we have to defend our democracy, strengthen it and renew it. That means building back better our economic foundations. Reclaiming our place in international institutions. Lifting up our values at home and speaking out to defend them around the world. Modernizing our military capabilities while leading with diplomacy. Revitalizing America's network of alliances, and the partnerships that have made the world safer for all of our peoples."
Interim National Security Strategic Guidance[i], March 2021

At a time when geopolitical and economic shifts threaten legacy institutions and power balances, Bitcoin is emerging as a potent national security advantage for the United States. Still nascent, this growing monetary asset -- and associated social and computational network-- may shortly become a major force on the global stage. Inspiring fear and derision, as well as devotion and hope, Bitcoin is a complex phenomenon that requires careful analysis and deep understanding.

Entering office amid a highly uncertain domestic and international environment, President Biden framed[ii] U.S. national security as resting on a core strategic proposition: "we must embrace and reclaim our enduring advantages, and approach the world from a position of confidence and strength." Properly appreciated, this paper argues that Bitcoin can help the U.S. achieve three national security objectives specifically identified[iii] by the current Administration:

1. **Defend and nurture underlying sources of national strength**, specifically by fostering domestic technology innovation, entrepreneurship, energy independence, deep capital markets, and broader economic inclusion.
2. **Promote a favorable distribution of power** to deter and prevent adversaries from directly threatening the United States and our allies, specifically by countering Chinese digital currency ambitions and exploitation of the global dollar system to finance the Belt and Road Initiative and by positioning the U.S. at the center of Bitcoin's monetary gravity.
3. **Realize and defend the democratic values** at the heart of the American way of life, specifically by enabling an ecosystem of technologies that enhance individual privacy and freedom of expression, disincentivize surveillance capitalism, and empower broad, democratic participation in the economic and monetary system.

Bitcoin is a rapidly emerging social and economic phenomenon. The time to think strategically and to position the United States to take maximum advantage is now, and avoid making ill-considered actions during this crisis situation. The stakes are potentially high: A world where Bitcoin fails is a world where U.S. retrenchment and decline is more likely. A world where Bitcoin succeeds is a world where our role in the global system, while changed, may long endure.

Such a world would see the values we claim -- freedom, inclusion, and innovation -- reinvigorated and empowered, supported by a global, distributed, decentralized, natively-digital, opt-in neutral reserve asset and associated peer-to-peer monetary network controlled by no one, but run by anyone — an open system with well-defined rules, but no rulers.

More than just about any country in history, the United States has proven its ability to adapt and lead in times of challenge and change. Leveraging our enduring constitutional principles, open society, and natural bounty, we have transformed, sometimes radically, the fundamental architecture of our political and economic system. The U.S. is exceptionally well-poised to take unique advantage of the opportunity presented by the emergence of Bitcoin and use it to help promote a more abundant and resilient future.

—

The following analysis is intended to provide a strategic primer on the national security implications of Bitcoin and to motivate policymakers to direct more specific, focused studies relevant to their areas of responsibility. In particular, the framework set out here should enable something akin to a "net assessment" of Bitcoin[iv], providing the basis for a long-term comparative assessment of key trends, competitions, risks, opportunities, and future prospects for U.S. national security capabilities relating to Bitcoin. But first, such an assessment must be informed by an accurate understanding of what, exactly, Bitcoin *is*.

What is Bitcoin?

Bitcoin is a cryptographically secured digital token whose programmatic issuance is fixed by a software protocol (at 2.1 quadrillion satoshis, or "sats", the smallest unit of the 21 million Bitcoin supply cap), with the rate of new issuance halving every 210,000 blocks (roughly four years). (See Figure 1) This protocol applies a mechanism of **distributed consensus secured by Proof-of-Work**, involving "miners" using special purpose computers that build blocks of new transactions onto a distributed ledger record of previous transactions as they compete for new token issuance by making an enormous number of computationally intensive guesses, or "hashes".

Every two weeks the protocol automatically readjusts the "difficulty level" of these "hash" guesses to target an average time of ten minutes between new blocks.

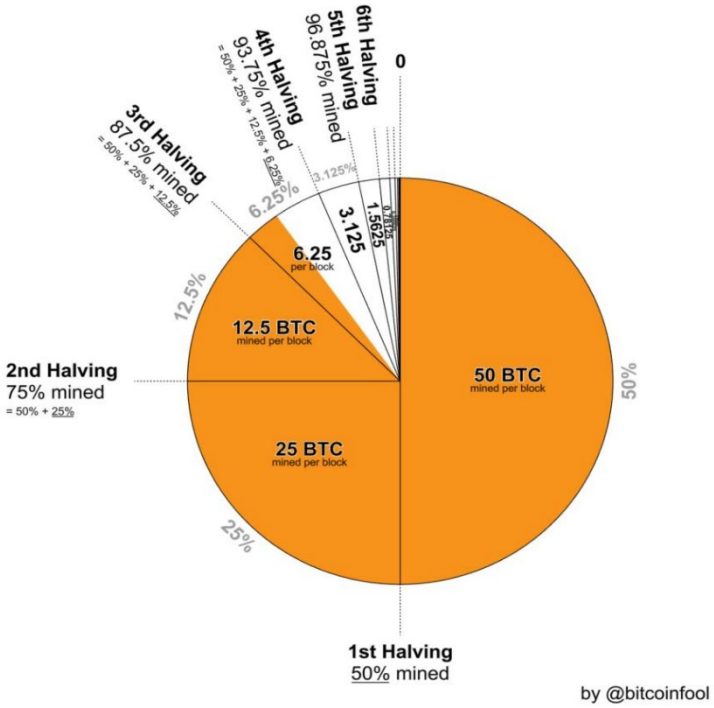


Figure 1: The issuance schedule for new Bitcoin is fixed by the protocol and drops by half roughly every four years.

Essentially, it is as if a gold mine made it harder to dig the more people tried to dig, adjusting this difficulty to ensure the amount of newly mined gold stayed constant. These dynamics make Bitcoin mining close to a perfectly competitive market[v] and drive miners to seek the most energy-efficient and cheapest (often wasted or non-marketable) forms of power.

Every ten minutes, the miners that win this computational lottery receive the block reward (currently 6.25 BTC, about $230K at the moment) plus transaction fees (ranging[vi] from ~1-20% of the block reward based on demand) and broadcast a new block containing a set of the pending transactions to the rest of the network. **This network consists of tens (maybe hundreds) of thousands of distributed nodes** (mostly using cheap, off-the-shelf hardware like a Raspberry Pi connected to a standalone hard drive), each running an independent version of the Bitcoin Core software. These nodes each store a live copy of the full ledger history of transactions and validate incoming blocks to ensure they follow the consensus rules of the protocol. All these key protocol elements were described in the 8-page Bitcoin white paper[vii] (see Figure 2) at inception.

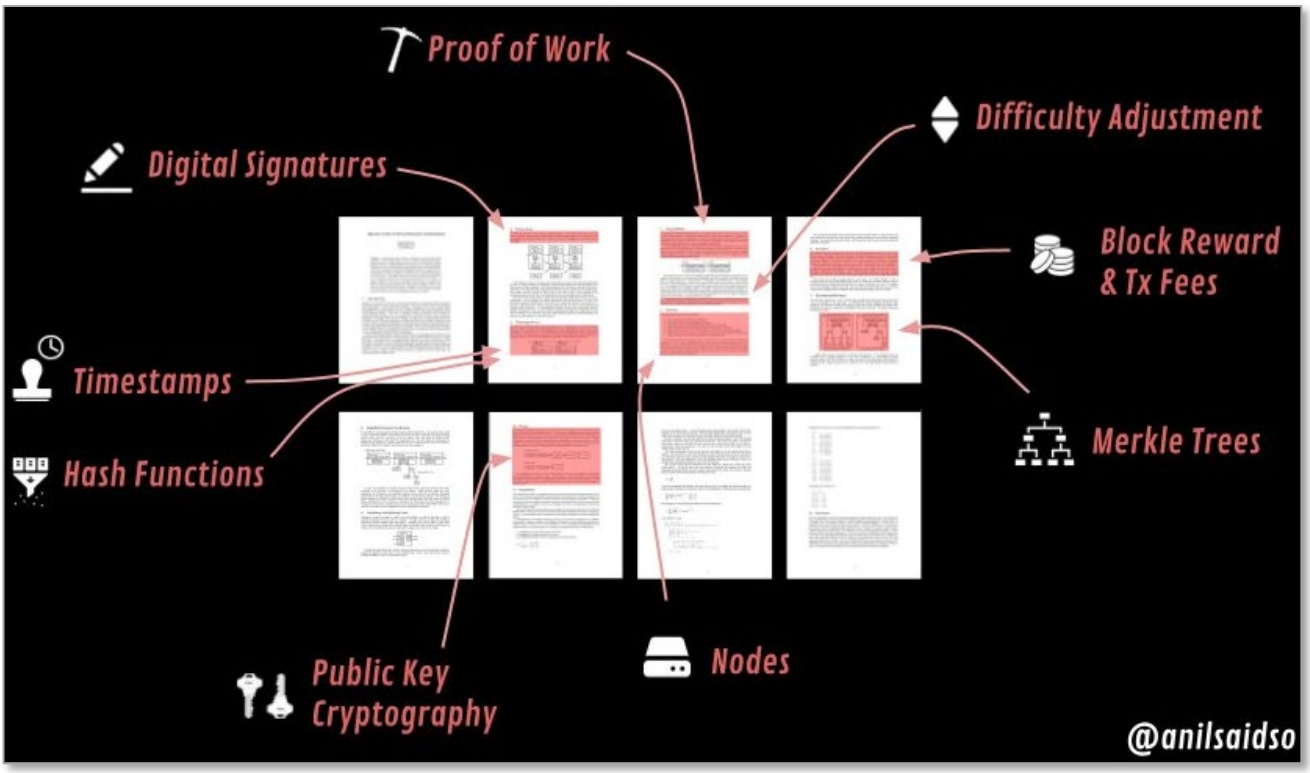


Figure 2: The Bitcoin white paper summarized all key aspects of the protocol and incentive design in a concise 8-pages.

One can think of the Bitcoin blockchain as a massively co-authored story[viii], where miners compete to publish new chapters and each node is free to decide to add those new chapters to their personal copy of the book. Individual nodes can choose different rules to add or reject new chapters, but if they want their book to accord with the vast majority of other copies, they are incentivized to only accept new chapters that keep a consistent story (e.g., run the same Bitcoin protocol, with its supply cap, issuance schedule, block size, etc.).

Each node is free to choose which version of the software they wish to run, and the rough consensus development model[ix] constrains updates to be backwards compatible, which allows nodes to run early software without breaking—or "hard forking"—from the network. Transactions are made by a user signing and broadcasting a transaction from their public address to another public address using their private key(s). These transactions are entirely visible on the public blockchain and typically take 30-60 mins to settle (as transactions are generally considered probabilistically final once 3-6 blocks have been stacked up).

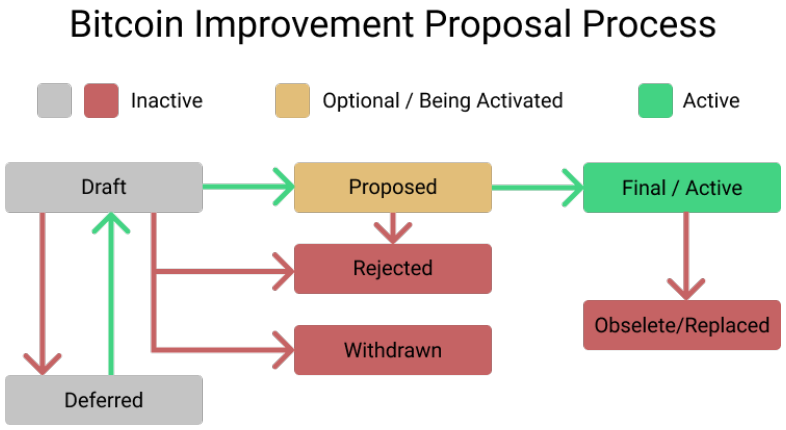


Figure 3: Changes to the Bitcoin protocol follow a "rough consensus" model used in other open source software projects.

Thus, Bitcoin is not entirely anonymous, but pseudonymous. The real identity of Bitcoin ownership can be linked to coins purchased on regulated exchanges that follow standard Know-your-customer (KYC) and Anti-money laundering (AML) procedures. There are "mixing" services and "coinjoin" mechanisms to complicate or obscure this link, but these are not always surefire, especially if performed incorrectly. In any event, there are legitimate reasons for transactional privacy and law enforcement have ample tools at their disposal to investigate and prosecute violations, as they do in other contexts. In fact, Bitcoin's very transparency gives legitimate law enforcement authorities powerful tools to track and trace[x] illicit activity, seizing[xi] ill-gotten gains by criminal groups and ransomware operations.

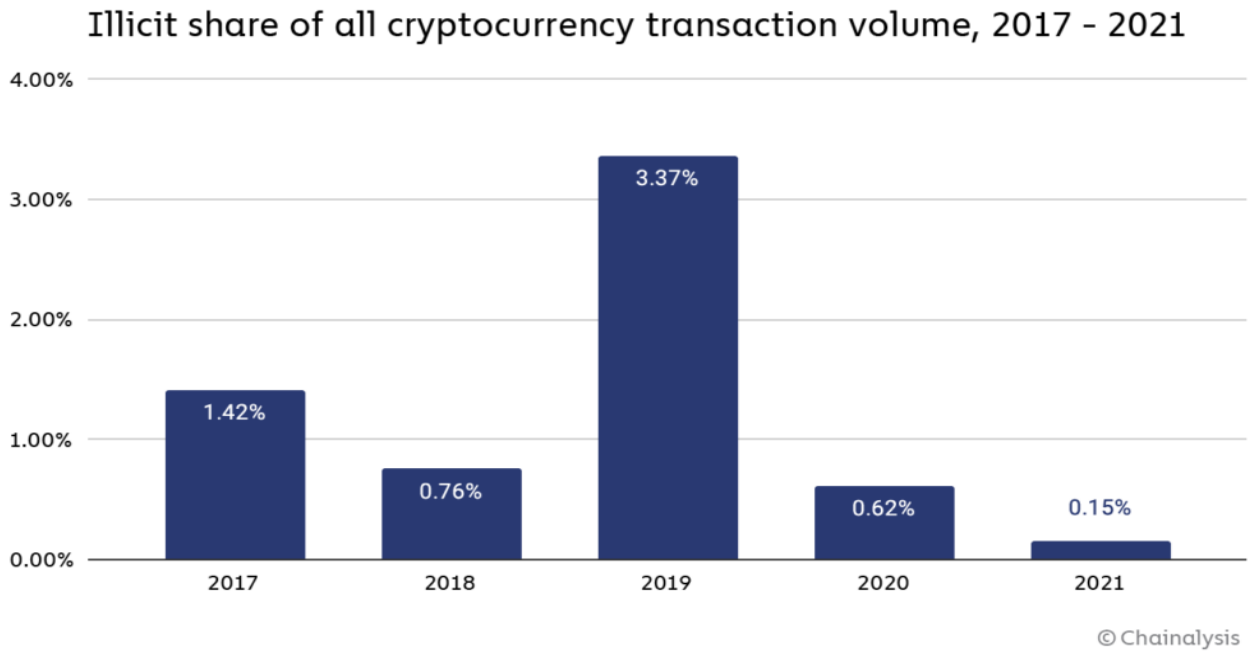


Figure 4: The very transparency of the Bitcoin ledger makes it a challenge for criminals to disguise transactions, which are a miniscule portion of the overall transaction volume.

For example, the largest U.S. exchange, Coinbase, provides detailed analytics services[xii] to U.S. agencies like the IRS, DEA, and the Intelligence Community that enable highly effective law enforcement and intelligence activities. **These analytics providers have shown that just 0.15%[xiii] of all cryptocurrency activity in 2020 was related to crime** (see Figure 4). Rather than Bitcoin, FinCEN is more concerned[xiv] about anonymity-enhanced cryptocurrencies ("AECs") like Monero and Zcash.

As a form of technology, money has co-evolved with human civilization. While the historical and anthropological literature debate the precise sequence of events and permutations involved, the essential properties of what makes a good money are well understood. **Specifically, to be useful as a medium of exchange and long-term store of value, good money should be durable, portable, fungible, scarce, divisible, and recognizable.**

The most technologically available material substance that best met these conditions tended to emerge as the dominant money in human societies (e.g., cowrie shells, glass beads, rai stones, silver denarii, gold florins, etc.). At the same time, these **"commodity monies"** often existed alongside ledger systems of increasing sophistication. The inherent physical limitations of commodity money led to concentration of precious metals among central custodians (e.g., imperial treasuries, merchant houses, church coffers) who, in the 14th century, invented double-entry bookkeeping.

This innovation created the infrastructure of modern capital (as the net of assets and liabilities denominated on each side of the banker's ledger) and led to an explosion of **"asset-backed monies"**. These paper notes circulated as "second-layer money" and carried value to the extent that holders remained confident they could be redeemed on demand for the underlying asset (typically gold).

Over time, these private money issuers became intertwined with state structures and war finance activities. Periodic crises struck economies when the issuance of these claims outstripped the underlying reserves and panics led to bank runs. The cumulative effect of bankruptcy and bail-outs/-ins led to increased centralization and management of national banking systems and the emergence of modern central banks.

Bitcoin emerged in 2008 as a technological innovation anchored at the end of this long chain of economic history. It represented an approximate solution to a long-standing problem in computer science, called the Byzantine Agreement Problem, on how to forge stable and enduring consensus among distributed, uncoordinated actors.

Satoshi Nakamoto, the pseudonymous creator of Bitcoin, synthesized decades of advances in distributed systems, computer science, game theory, and cryptography to develop an open source protocol to achieve enduring consensus on the entries of a distributed ledger. This protocol defined a finite issuance of monetary units and incentivized participants to mutually enforce the stability of the protocol.

Through the lens of monetary history, one can see Bitcoin breakthrough as an innovation that used modern computing, cryptographic tools, and communications technology to develop a new form of money that represented the best features of both commodity and ledger money. Bitcoin shares (and even improves on) the properties that made gold a good money, but none of the weaknesses that led to gold being concentrated and rehypothecated into paper liabilities.

As a bearer asset without counterparty risk Bitcoin can be stored and protected like gold. As a natively digital asset without portability constraints, it can be exchanged at the speed of the internet. Investment giant Fidelity released a report for its institutional clients that presented a helpful comparison chart of Bitcoin against gold and fiat (see Figure 5).

Satoshi made a number of design choices and fixed key parameters that maximized decentralization at the expense of transaction speed. Keeping the size of the blocks somewhat small ensures many individuals can keep a full copy of the ledger without trusting a centralized entity and can separately enforce the rules of the protocol.

This comes at a cost of transaction throughput (about 6-7 per second), which was taken as a point of criticism by early Bitcoin competitors. It led to hard forks like BCH and BSV that were mostly ignored and quickly lost market share.

As it happened, Bitcoin has matured into a "Layer 1" protocol for final settlement (more akin to FedWire and ACH than the Visa network), with "Layer 2" protocols like the Lightning Network managing vastly more transaction volume, allowing batching and settlement to the Bitcoin "main chain".

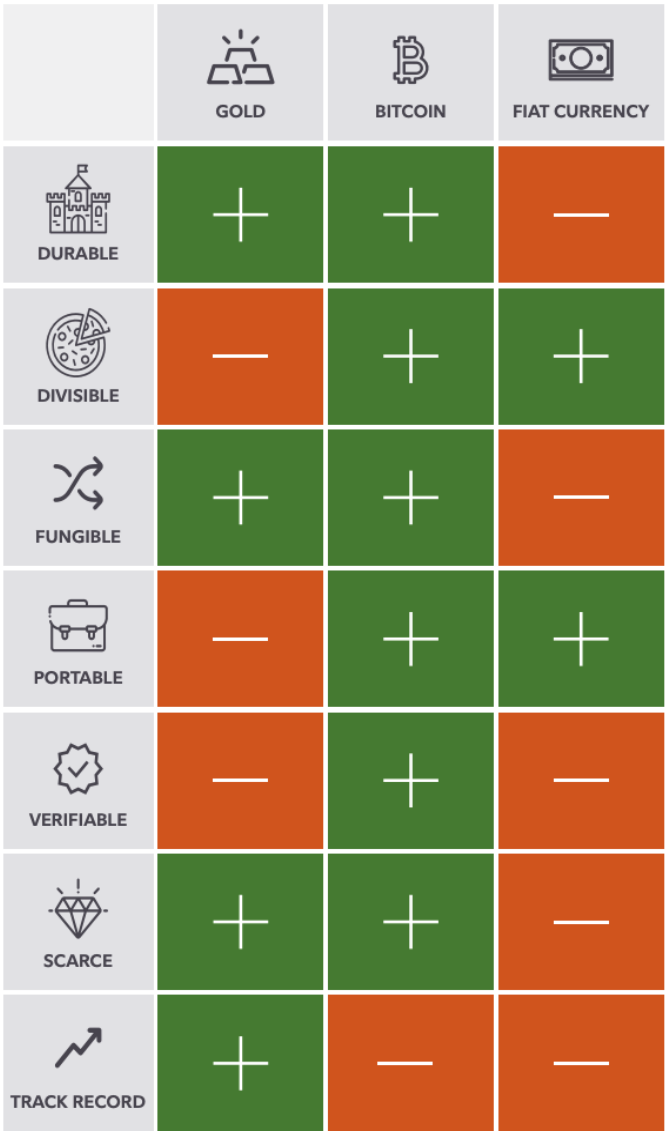


Figure 5: Bitcoin compared to gold and fiat against key attributes of a money.

The future evolution of Bitcoin will see it process and settle a relatively small number of transactions where each transaction involves a large amount of value. Capacity in the Lightning Network has tripled in less than a year and has become a substantial component of the broader Bitcoin ecosystem (see Figure 6).

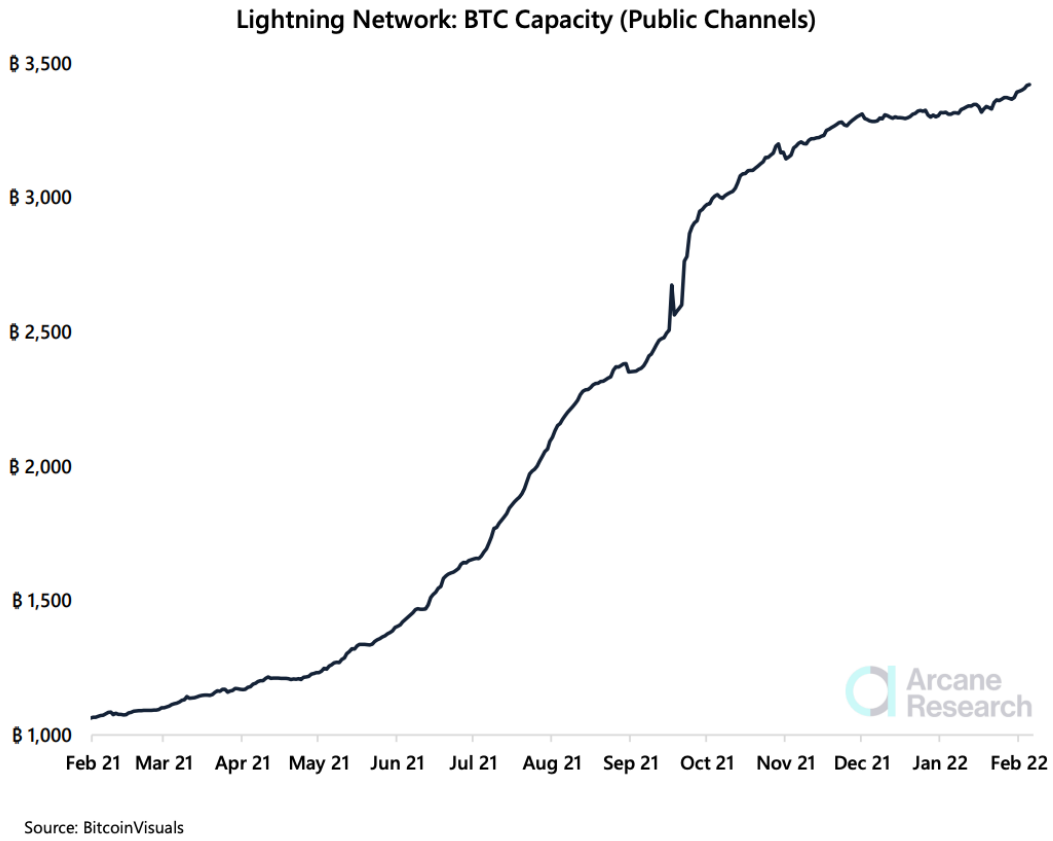


Figure 6: The capacity of Bitcoin's "2nd-layer" Lightning Network dramatically increased in 2021.

This peer-to-peer network is providing the rails for novel financial solutions like immediate, low-cost, global remittances (e.g., using Strike[xv]), streaming payments (e.g., using Breeze[xvi]), social media tipping (e.g., integrated on Twitter[xvii]), and many other emerging applications. There is a reason why Visa[xviii] and Mastercard[xix] are looking to, somewhat belatedly, interoperate with Bitcoin, as protocols like the Lightning network threaten to dramatically undercut the interchange and processing fees (~1-3%) they impose on global merchants.

In this sense, **the Bitcoin protocol is serving as a foundational network protocol for a decentralized value transfer system in much the same way as TCP/IP serves as the foundational network protocol for the decentralized information transfer system we call the Internet,** with higher-level, integrated, and cross-compatible protocols built at the application layer on top for specific purposes (e.g., HTTP, DNS, etc.) (see Figure 7). The Bitcoin and Lightning network protocols can thus be seamlessly integrated into a wide array of software and hardware platforms, enabling "Layer 3" applications like social media anti-spam (posting Bitcoin as surety), E-commerce[xx] (global frictionless payments), decentralized identity[xxi] (DiD), monetized internet-of-things (IoT) devices, among others. It's only a matter of time until most of the major U.S. internet companies (and others to come) will be forced by competitive pressures to connect their technology into this interoperable open-source protocol and develop innovative and differentiated products and services.

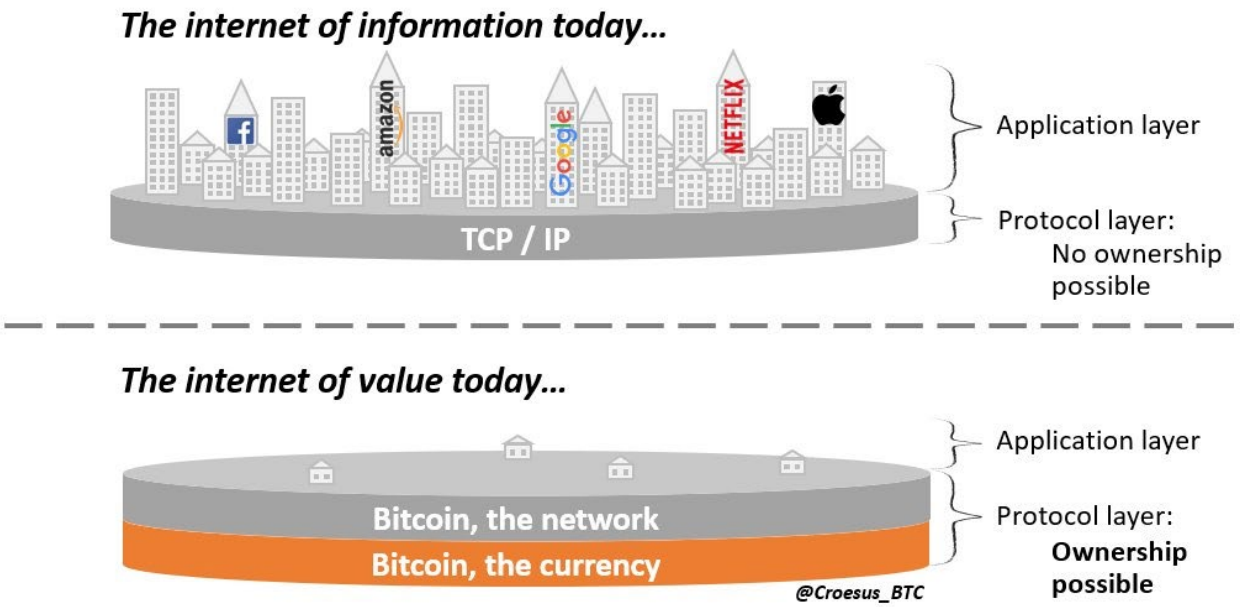


Figure 7: While mostly viewed as a monetary asset, the computational nature of the network draws apt comparisons to the structure of the internet and associated economic development.

Individuals can buy Bitcoin on regulated exchanges (e.g., Coinbase, Kraken, FTX, and Robinhood among many others) or through neobanks (e.g., PayPall, CashApp, Strike). While many users choose to leave their Bitcoin with these institutions, there is a broadly shared ethos among dedicated Bitcoin adopters to take self-custody (reinforced by the oft-repeated mantra, "Not your keys, not your coins"). These users can take physical possession of their Bitcoin by storing the private cryptographic keys in a dedicated software application on their phone (e.g., Bluewallet, Muun, among many others) or hardware wallet (Ledger, Trezor, and Coldcard are the most popular). The latter is usually recommended for significant amounts, which keeps the private keys off any internet-connected device for increased security.

These individual private keys can also be backed-up by a seed phrase (consisting of either 12 or 24 English words and an optional passphrase), allowing the individual to regain access to their Bitcoin in case their hardware or software wallet is lost or damaged. These seed phrases are often stored separately, with the letters punched or imprinted into resilient material like steel plates or washers. It is a feature of Bitcoin as a "digital bearer asset" that enables this form of direct, physical self-custody, but it also imposes a unique burden on the user to take security practices and personal responsibility seriously. Lost keys without a backup are gone forever.

There are also more sophisticated, "multi-signature" arrangements that require a majority quorum of separate private keys (typically 2-of-3, or 3-of-5) to jointly sign and broadcast a transaction. U.S. companies like Casa and Unchained Capital have emerged with services that offer these multi-signature setups with a smooth user interface and customer support. There are also a range of companies (e.g., Coinbase, Fidelity, Kingdom Trust) that provide high-grade custody[xxii] services to institutional or high-net worth customers.

The three key agents in the Bitcoin network—**miners, developers, and node operators**—are bound together in a mutually reinforcing framework of incentives that game-theoretically steer self-interested behavior towards maintenance of the rules of the protocol. Nodes enforce the rules on miners who are handsomely rewarded for following these rules, and developers must convince the vast majority of node operators and miners to accept new software updates (always in a backwards compatible fashion). While this consensus model was tested several times in the first half of Bitcoin's existence (reaching a crescendo during the "Block Size Wars" in 2017[xxiii]), it has reached a point of stability with considerable protocol ossification and social embedding. Early copy-cats of Bitcoin have faded from prominence, and Bitcoin has reached overwhelming dominance[xxiv].

Within the broader "cryptocurrency" market, Bitcoin is treated as the foundational asset, used as the most demanded form of collateral, and the measure by which other tokens reference their relative increase or decrease in value. However, there is considerable controversy and regulatory uncertainty over the legal status of these other tokens (especially the recent variety of projects that have emerged under the banner of "decentralized finance [DeFi]").

It is the view of this author that the vast majority of these other tokens may be viewed as securities (especially in light of comments[xxv] by SEC Chair Gary Gensler), given that they typically have a centralized group of founders, developers, and venture capital funders with a disproportionate share of the initial token issue (called a "premine") and the ability to roll-back or enforce minority-views on protocol changes. Further, many of these protocols have manifested vulnerabilities or suffered hacks that resulted, just in the past year, of over a billion dollars[xxvi] of lost or stolen user funds. Bitcoin, on the other hand, has never been hacked and has maintained the continuous, uninterrupted integrity of its blockchain since the Genesis block (though there are some debated episodes[xxvii] involving bugs and vulnerabilities in its early years).

As a result, this essay draws a bright line between Bitcoin and the rest of the "cryptocurrency" market. The legality, regulatory path, and long-term viability of the latter is in question. That said, Bitcoin's legal status is clearly defined (by the IRS and CFTC, for example), with regulated futures exchanges (e.g., the CME) and Exchange Traded Funds (Futures in the U.S. and Spot in several other countries around the world). There are numerous publicly listed corporations with Bitcoin on their balance sheet (e.g., MicroStrategy, Tesla, Square, Coinbase) and/or a part of their core business (e.g., miners like Riot, Marathon, Hut8, and others). Bitcoin is traded 24/7 against almost every currency in the world on dozens of exchanges, and is by far the most liquid cryptocurrency market.

There are likely over 150 million Bitcoin users in the world at the moment, including over 47 million Americans[xxviii]. **Altogether, 16 percent of American adults[xxix] today have money in cryptocurrencies like Bitcoin and Ethereum (the same percentage of adults buying bonds).** A recent survey[xxx] found that more U.S. respondents viewed "cryptocurrencies" (22%) as having long-term value (i.e., their value will increase or remain stable for several decades or longer) than individual bonds (19%). Only equities and real estate ranked higher.

A recent NYDIG survey[xxxi] found that over 80% of Americans would be interested in buying Bitcoin through their bank if the bank offered it.

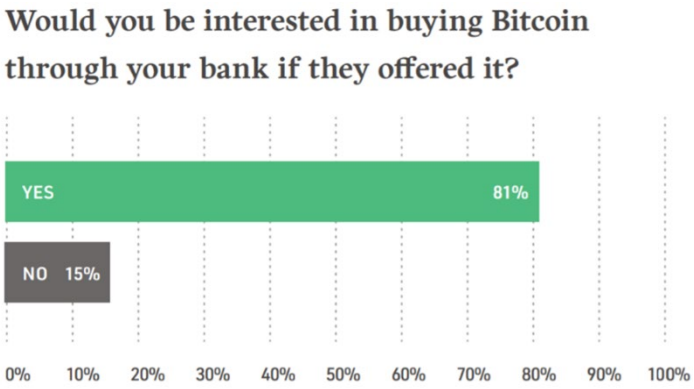


Figure 8: A NYDIG survey found a large majority of customers would be interested in buying Bitcoin

At current rates of adoption[xxxii] (growing proportionally faster than the internet in the late nineties), Bitcoin is likely to reach 1 billion users by 2024. The Bitcoin market, like any financial market, includes short-term traders and speculators, but also contains a unique cohort: self-identified "HODLers" who take an explicitly long-term view with a mindset that ignores the extreme short-term volatility of the nominal USD price. This growing cohort sets an effective (and rising) floor for the market price that has manifested over each of Bitcoin's two major market cycles in 2013 and 2017 (which correlate with the four year halving cycle of programmed Bitcoin issuance). It is an open question whether the price will continue to follow this historical pattern, but it is likely that increasing global adoption (from the developing world[xxxiii] to elite Wall Street institutions[xxxiv]) will continue apace, following growth curves seen in similar novel technologies until saturation.

The above is meant to provide an initial primer. Bitcoin is a novel technology, monetary network, and social phenomenon that is not easy to fully understand. Its assessment requires investigation of public-private key encryption, open-source software development practices and norms, distributed consensus mechanisms, the nature and history of money, energy production and distribution, chip fabrication, macroeconomic and geopolitical conditions, monetary policy, international regulatory regimes, and many other topics. The reader is encouraged to explore further resources:[xxxv],[xxxvi],[xxxvii],[xxxviii].

There are well-worn objections and critiques of Bitcoin that take a typical form: "uses too much/dirty energy", "is a Ponzi scheme", "is for criminals", "is unfairly distributed", "is too volatile/bad medium of exchange", "has no intrinsic value", "isn't scalable", "is a Tether pump and dump scheme", "is controlled by miners/large holders/China", "is not backed by anything", "is vulnerable to quantum computing", and many others. It is not the objective of this essay to debunk all of these, so the interested reader is encouraged to review specific analysis and treatments of these issues[xxxix]. That said, there are areas of risk that need proper attention and analysis. This paper closes with a review of some of these and calls for further investigation on an ongoing basis.

We have never before witnessed the real-time monetization of a novel monetary good, so it is understandable that its emergence would be difficult to model and understand. It should be expected that this process would be highly volatile. **Nevertheless, humans rarely, if ever, un-invent new technology. Bitcoin is here to stay. It's time national security decision-makers understood the implications.**

But first, the national security analysis of Bitcoin must begin with a review of the economic arrangements which have sustained U.S. power since World War II. To properly understand Bitcoin's potential value and relevance to U.S. national security, we must reckon with the evolution and current instability of the global economic system and related international order.

Summary of Post-War Global Economic System and International Order

The core pillar of U.S. national strength is our economic strength. The Bretton Woods[xl] arrangements formed post-WWII centered U.S. financial interests and the US dollar at the core of the global system. This **gold-backed dollar system** and tight web of western trade and alliance institutions helped finance early strategic competition with the Soviet Union. However, as we ran up structural deficits with expanded domestic programs (e.g., Johnson's Great Society) and proxy wars (e.g., Korea, Vietnam), Europeans began calling in their gold claims.

After these claims reached a tipping point threatening U.S. gold solvency, Nixon decided[xli] to suspend gold-dollar convertibility in 1971. As the world adjusted to this shock, an oil embargo triggered by the Yom Kippur War in 1973 spiked inflation[xlii]. Shortly thereafter, Kissinger and Simon engineered a deal[xliii] with the Kingdom of Saud to denominate the global oil market in dollars.

This reset the global monetary system as a "**petrodollar**" regime with the USD dominating energy markets and most international trade, and national fiat currencies freely floating against one another. The transition to this new system coincided with high inflation and economic stagnation in the 1970s, leading to the "Volcker Shock[xliv]" in 1980 when the Federal Reserve hiked interest rates up to 20% to get the U.S. out of a wage-price spiral. Given that U.S. debt service was relatively low, this radical policy was effective at stamping out inflation, but precipitated a structural change in the domestic economy.

High (but secularly declining) interest rates from the Volcker era drove a shift of capital from investment in labor intensive fixed assets like factories into financial assets. This inaugurated a multi-decade boom in stocks, bonds, and real estate at the same time as increasing productivity growth became decoupled[xlv] from labor income and set the U.S. on a path of de-industrialization and growing income inequality.

Following the stagflationary 1970s, the 1980s period of relative economic strength and capital inflows gave the U.S. a decisive advantage in the expensive arms race against the decaying Soviet system, precipitating the latter's final collapse[xlvi] in 1991.

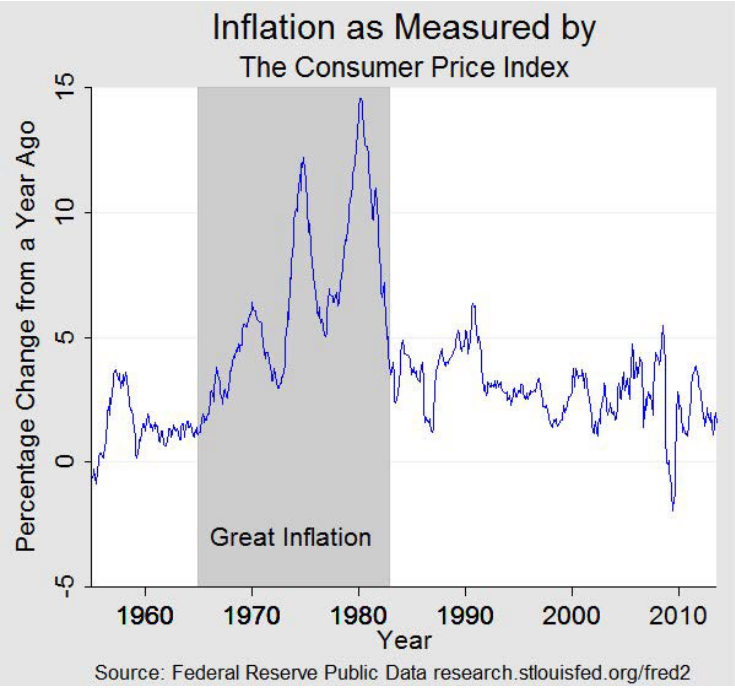


Figure 9: The post-war Bretton Woods system broke down in the late 1960's as inflation took hold and the U.S. suspended gold-convertibility and birthed the petrodollar.

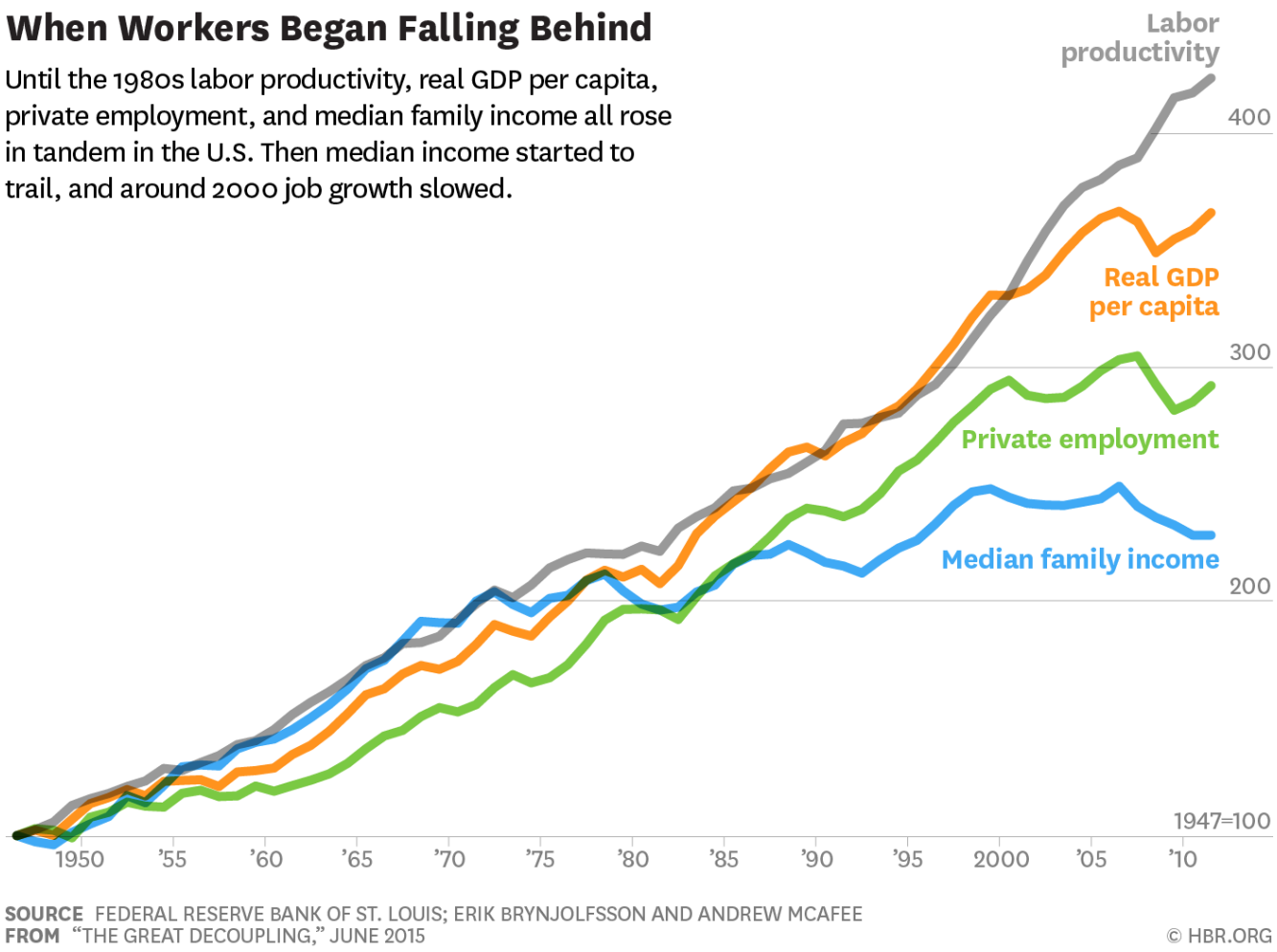


Figure 10: The 1970s move to a floating fiat exchange system marked a breakdown in the relationship between labor productivity, private employment, and median family income.

This ushered in a period of unprecedented dominance for the U.S. as the sole "hyperpower" bestride the world economic system, riding a powerful wave of trade globalization (NAFTA), technology (the internet), market financialization (derivatives), and structurally declining interest rates. At the same time, a strengthening dollar against various inflexible exchange rate regimes triggered currency crises[xlvii] in just about every other major economic region of the world, with the near-breakdown of the European Exchange Rate Mechanism in 1993, the Latin American Peso Crisis in 1994, the Asian Financial Crisis in 1997, and a Russian default in 1998.

This series of rolling crises put the U.S. in position to steer favorable response actions (typically involving further dollarization and debt-leveraging of emerging markets) via its dominance of institutions like the World Bank and the International Monetary Fund.

Three events at the turn of the Millenium signaled a shift in regime: the Dot Com Bubble Crash, the 9/11 attacks, and the entrance[xlviii] of China into the World Trade Organization. The first forced the Fed to drop its Fed Funds Rate below 2%[xlix] for the first time since 1961. The second put the U.S. on a path of costly and polarizing "Overseas Contingency Operations[l]". The third, and arguably most significant event, set the table for China to quickly rise as a strategic competitor.

In particular, trade agreements and globalization shifted much of the U.S. manufacturing base to Asia. Our need to continuously supply a dollarized world with USD further shifted our domestic economic pattern towards services and imported goods consumption (mostly on credit). **A resurgent China accumulated dollar reserves recycled into U.S. treasuries to maintain its currency peg and sustain an aggressive mercantilist policy.**

The housing bubble and extreme financialization of investment activities threatened to collapse the world economy in 2008, forcing politically toxic bailouts and a dramatic transformation of Federal Reserve policy and market interventions. The alphabet soup of emergency fiscal and monetary programs injected massive amounts of liquidity to stave off cascading defaults in the tightly coupled global dollar-debt system.

It is no coincidence that the pseudonymous inventor of Bitcoin, Satoshi Nakamoto, embedded in the hash of the first, "Genesis[li]", block of the blockchain the following string: "The Times 03/Jan/2009 Chancellor on brink of second bailout for banks".

The Great Recession inflicted deep economic damage, but perhaps more importantly, fundamentally altered perceptions of the dollar system built on the Treasury market. In particular, foreign buyers of U.S. sovereign debt took notice after the "Taper Tantrum" in 2013 proved that the Fed was boxed in. China, the largest foreign investor in our bonds, saw their holdings[lii] of Treasuries peak in 2013.

Hedge funds running relative-value arbitrage trades, regulated domestic institutions (pensions, insurance companies, and money market funds), and the Fed itself have had to make up the difference. In 2021, the biggest marginal foreign buyers[liii] of Treasuries were the UK, Luxembourg, Ireland, Cayman Islands, & Switzerland (i.e., known entities associated with hedge funds and tax shelters).

These Treasuries serve as the base funding collateral (rehypothecated from counterparty to counterparty) to finance massive chains of mostly offshore dollar-derivatives. Global growth (in nominal GDP terms) requires the continuous expansion of this debt system, which given its opaque and complex construction, is vulnerable to sparks of mistrust that can ignite a cascade of defaults that threaten to bring down the world economy.

The only solution to these recurring financial crises is to "kick-the-can" by reinflating debt creation through monetary and fiscal expansion. This works, up to a point. The existential question for the U.S. (and other major economies) is when we will hit that point.

Meanwhile, China has emerged as the one of the world's largest creditors[liv] and supplanted the U.S. as the dominant trading partner[lv] for the world, with two-thirds of countries (128 out of 190) trading more with China than the United States. China controls seven of the ten largest container shipping ports in the world.

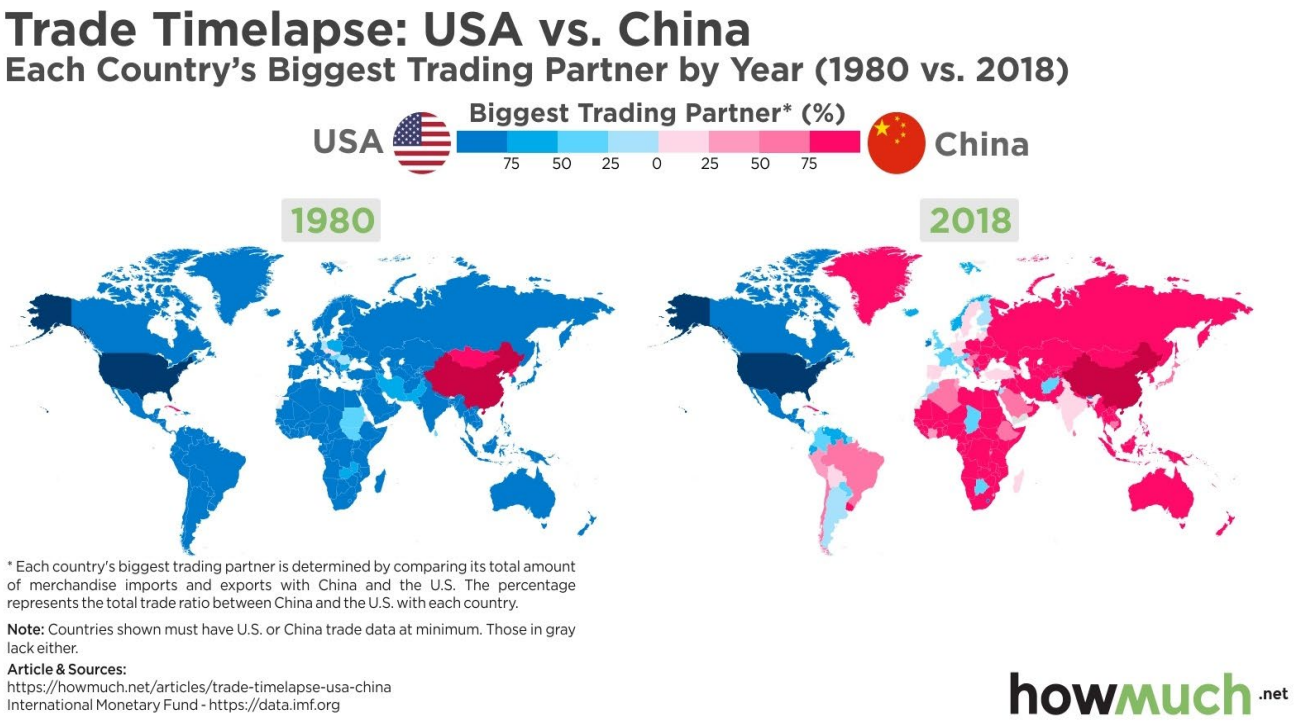


Figure 11: China has emerged as the one of the world's largest creditors and supplanted the U.S. as the dominant trading partner for the world.

It's no coincidence that the year China's holdings of Treasuries peaked is the same year (2013) that Xi Jinping unveiled the Belt and Road Initiative, a massively ambitious program of oversees (dollar-denominated) lending to spread Chinese influence and secure access to critical transport infrastructure and natural resources across Central and South Asia, the Middle East, and Africa.

As this initiative has grown to include over 145 countries[lvi], China and Russia (and other states in their respective orbits) have formed a closer strategic partnership, including direct bilateral trade that bypasses the dollar, increasingly denominating commodity and energy trade in yuan, ruble, and euros.

In the vacuum left by the failure of the U.S-led Trans-Pacific Partnership, China has driven its own free-trade agreement, the Regional Comprehensive Economic Partnership (RCEP). The RCEP brings Australia, Brunei, Cambodia, China, Japan, Laos, New Zealand, Thailand, Singapore and Vietnam together in an association that may cover almost 50 percent of global GDP by 2030[lvii], helping to expand exports of Chinese products while helping speed up China's industrial transformation.

No better example of the strategic contrast of our respective approaches to international influence is Iraq. While the U.S. sank blood and treasure into that military misadventure in failed nation-building, China has followed-up with hard capital investment, recycling U.S. dollars into the war-torn country making it the third-largest recipient of BRI lending[lviii]. Straddling the long-standing sectarian divide in the Middle East, China also signed a 25-year cooperation agreement with Iran[lix], committing to invest over $400 billion in return for reliable and discounted oil. Meanwhile,

China is challenging our traditional sphere of influence (at least as understood since the formulation of the Monroe Doctrine), signing BRI agreements with 20 countries in Latin America and the Caribbean, and bilateral local currency swap agreements[lx] that bypass the dollar.

More recently, **a number of markers have emerged that indicate key international actors are hedging their geopolitical bets as hints of a multi-polar world system emerge**.

Just a few examples from February 2022: Saudi Arabia rebuffing[lxi] U.S. pressure to increase oil production, sticking to a deal with Russia; Israel blocking[lxii] U.S. transfer of the Iron Dome missile defense system to Ukraine so as to not antagonize Russia; Brazilian President Bolsonaro seeking guarantees[lxiii] from President Putin to lift export restrictions on fertilizer to Latin America; Germany demanding an energy exemption[lxiv] in proposed US dollar sanctions on Russia and holding back support[lxv] for Lithuania as the small Baltic nation comes under intense Chinese pressure.

While the U.S. has run structurally high deficits[lxvi] (and become the world's largest debtor nation) ever since the 2007-09 crisis required countercyclical federal spending, the COVID-19 pandemic forced a step-function increase.

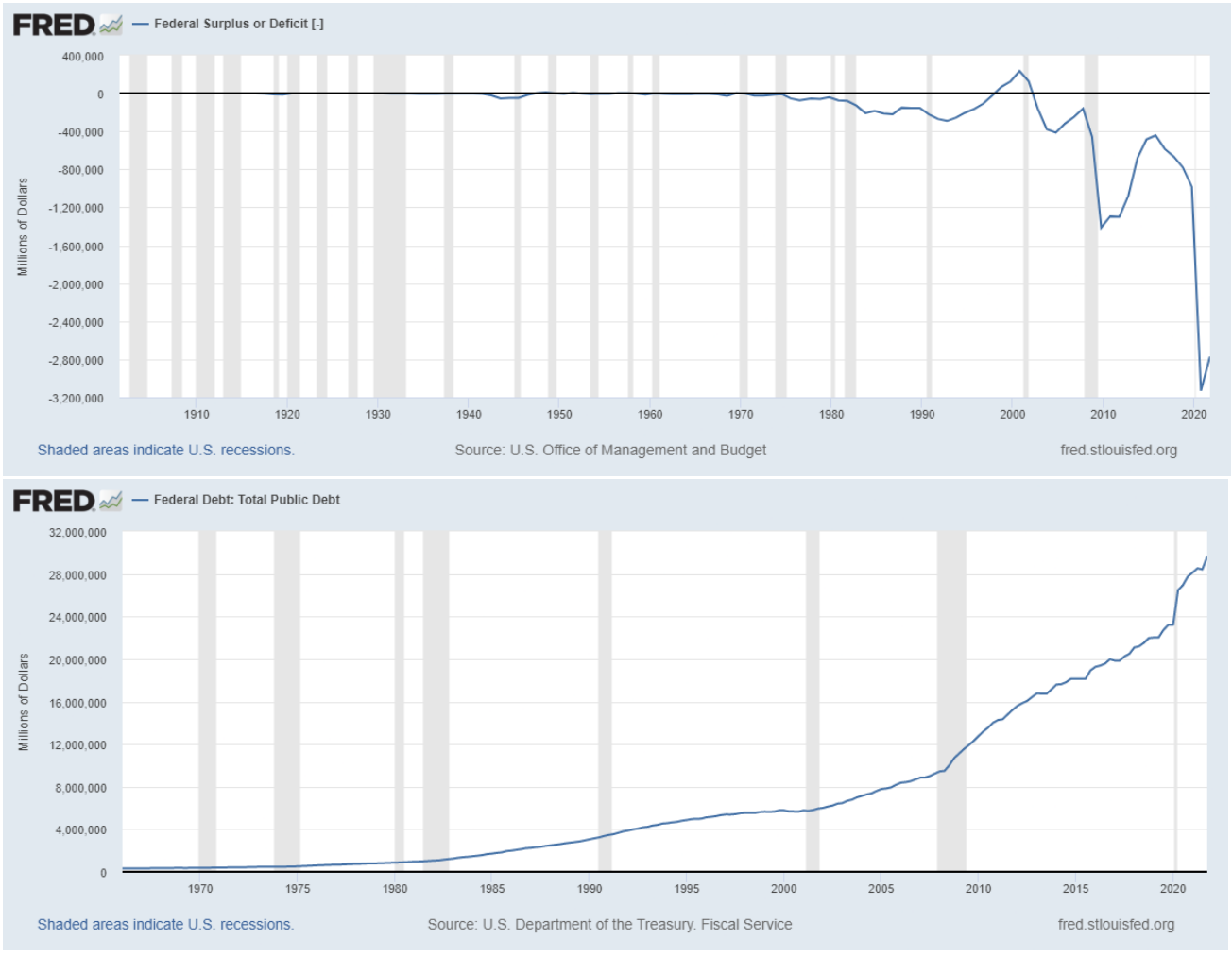


Figure 12: The fiscal position of the U.S. has seen a dramatic deterioration in the past decade.

In only six fiscal quarters (from Q4 2019 to Q2 2021), total public debt as a percentage of GDP[lxvii] increased by 18.5% to over 125%. This measure peaked at 130%, a level historically associated as a "point of no return", exceeding levels attained as a result of WWII. Since 1800, 51 of 52 times[lxviii] a country's debt reached this level, it led to restructuring, devaluation, inflation, and/or outright default. **The last time a reserve currency issuer's debt was this high was the United Kingdom in the 1920's. It didn't end well.**

Japan is the sole exception – their strong social cohesion and relatively stable political system helped their population accept an extended period of low growth. In addition, Japan benefited from a positive net international investment position[lxix] and a favorable period of cheap commodities (for a country very dependent on these imports) while conducting (then radical) experiments in expansionary monetary policy. In 2020, the Bank of Japan became the largest owner[lxx] of Japanese stocks. I'm not sure most U.S. observers are prepared to go down that particular road.

Aside from the immense human toll, the COVID-19 pandemic triggered the deepest recession[lxxi] since the end of WWII. The highest share (over 90 percent[lxxii]) of countries since the Great Depression experienced a simultaneous contraction in per capita GDP. Global fiscal support to respond to the sudden pandemic shock reached $16 trillion in 2020[lxxiii] alone (15 percent of global GDP).

It is hubris to expect that U.S. economic strength (and related national power) will not be affected by such a large-scale shock. Further, it is apparent that this recent sequence of events has followed a well-studied[lxxiv] pattern whereby: 1) private debts surge prior to a banking crisis, 2) private debts become public debts after the crisis, and 3) public debts after such banking crises precipitate sovereign debt crises. We now find ourselves at the end of this ominous series.

In particular, as hedge fund billionaire (and pioneer of the risk-parity portfolio model) Ray Dalio has noted, the United State is coming to the terminal stage of what he calls the "**Long Term Debt Cycle**[lxxv]", the last of which ended destructively in the 1930s. This current cycle has seen an accumulation of debts as a result of periodic credit expansions in response to typical business cycle recessions. Each recession is met with policy and fiscal actions that reduce interest rates and increase debt creation to restimulate growth, but these interest rates never renormalize. As a result, the total debt load structurally increases and interest rates fall until they hit the zero-bound.

The pattern has repeated over the past several decades, and the latest crisis (COVID-19) pushed us hard again against the zero bound, forcing even more unconventional fiscal injections (proverbial "helicopter" money) and monetary policy (more QE, swap lines, and Fed backstop of the corporate debt market). It's commonly acknowledged that we are now in "uncharted waters[lxxvi]". **Historical analogues are few and far between, and no policy-maker currently living has witnessed a global macroeconomic and monetary situation such as they now face.**

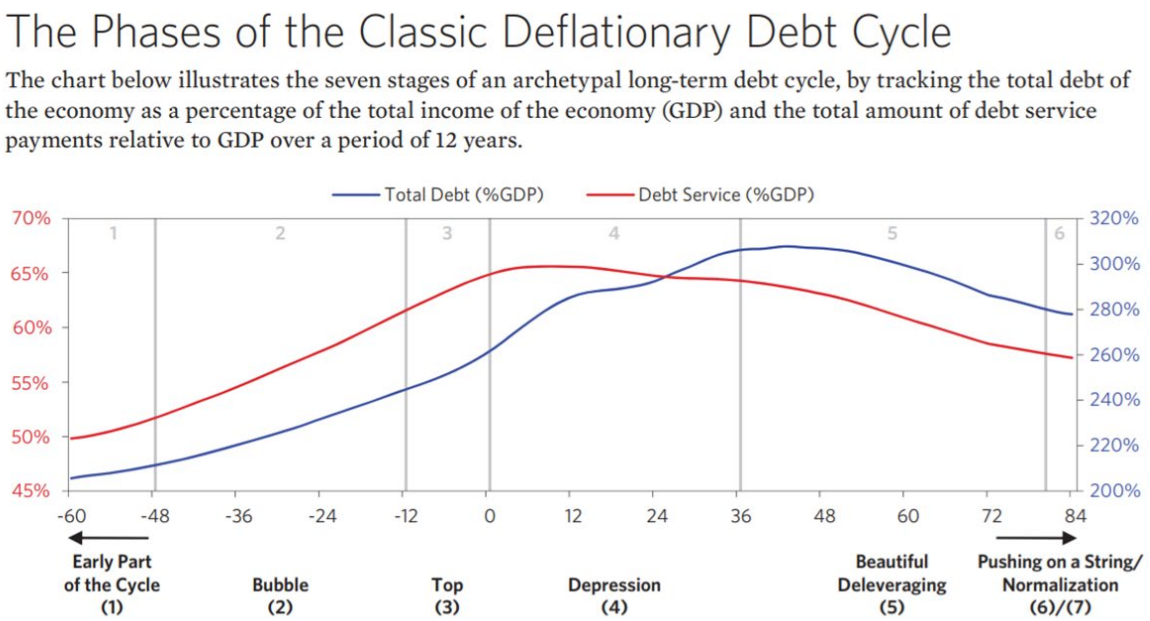


Figure 13: Debt crises follow a known pattern.

The 20th Century witnessed several monetary regime shifts, as the international system "evolved from a gold standard to a gold exchange standard, to a gold-dollar standard, and then to a dollar standard."[lxxvii] Bretton Woods codified the post-war order in 1944, which held through the creation of Special Drawing rights in 1967 and the two-tier gold market in 1968 until the Smithsonian Agreement in 1971 inaugurated a transition by 1973 to the flexible exchange rate system that has lasted mostly unchanged to present day.

While most people living have only experienced a world under a dollar-standard, the century started with multiple reserve currencies. Before WWI, the British pound, the French franc, and the German mark each held sway in their respective trade and imperial orbits. The pound was dominant, but the other currencies had strong relative roles. The interwar period saw the pound and the dollar share the stage, with the dollar emerging from WWII with singular strength. This strength, powered by our demographic and industrial might relative to the wreckage of the rest of the world, drove dollar dominance, making it the currency of choice for international credit, trade, and central bank reserves. As these strengths compounded over the decades, the dollar's share of globally disclosed foreign exchange reserves reached 59% at the end of 2020, even though the U.S. economy only contributed 24.8% of nominal world GDP.[lxxviii]

As trade becomes increasingly multi-lateral, with regional blocs forming their own arrangements, it is reasonable to expect a relative decline in the dollar's status over time. Nations that trade with and borrow with each other will increasingly seek to hold those regional currencies as reserves (e.g., euros, yuan). The dollar may still remain dominant, but less so on a relative basis.

That said, changes in currency regimes can happen fast. As Berry Eichengreen notes, "In 1914, approximately zero percent of global reserves were in the form of dollars. Zero percent of global

trade was financed and settled in dollars. Even U.S. exporters and importers went to London to obtain trade credit in sterling. But only ten years later, in 1924, the dollar was the leading reserve. More trade finance was obtained in New York than London and accounted for by the dollar than the pound."[lxxix] This isn't necessarily a warning, but a lesson – one present policy makers should understand.

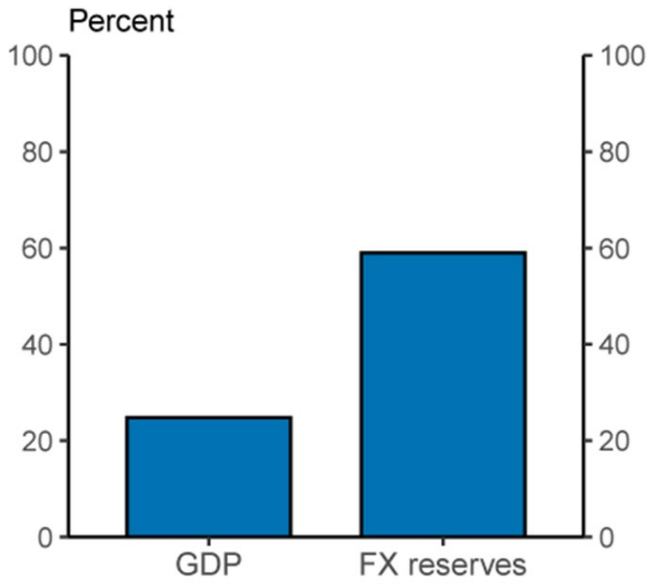


Figure 14: the dollar's share of globally disclosed foreign exchange reserves reached 59% at the end of 2020, even though the U.S. economy only contributed 24.8% of nominal world GDP.

It is important to note that the bulk of these official dollar reserves are held in the form of U.S. Treasury securities. However, as the recent sanctions on the Russian Central Bank have shown, this "reserve asset" is subject to the political whims of U.S. authorities. A recent WSJ headline captures the significance of this move: "*If Russian Currency Reserves Aren't Really Money, the World Is in for a Shock.*"[lxxx] A bi-partisan group of U.S. senators have even introduced a bill to target Russia's ability to sell gold reserves[lxxxi], which may raise a question in the minds of the 36 foreign central banks who use the New York Fed to custody their national gold reserves. **Confidence is a fickle thing, and can be lost without warning.**

At no time in American history has an adversary or group of adversaries totaled more than 60% of US GDP. China surpassed that mark in 2014, and is now up to 70% in 2021, with estimates of overtaking us as the world's largest economy by the end of the decade. China overtook[lxxxii] the United States to become the largest value-added manufacturer in the world in 2010, while the number of China millionaires soared from 236,000 in 2005 to 5.8 million in 2020. Despite the trade war launched by the Trump Administration and the COVID-19 pandemic, foreign investment into China hit a record[lxxxiii] US$144.4 billion in 2020, and China's global trade surplus hit a record $676.5 billion[lxxxiv] in 2021. They are attracting and deploying capital, while we import and consume perishable goods.

This is entirely a consequence of the current dollar system, which is increasingly working against our national interests. American power in the post-war era was built on a foundation of global dominance in industrial production and trade, which allowed us to then expand our military and financial dominance. We benefited greatly from the unique advantages this financial dominance afforded (as expressed through the eurodollar system) to delegate our production to China, which had the effect of recentering global trade in Asia and is now helping China expand their military power and financial influence. **While U.S. capitalism focuses on return on investment and profit margin, China's state-capitalism is focused on return on resources and closing the margin of power differential with the U.S.-led system they seek to overturn.**

Increasingly expensive oil with increasingly rising debt and rates already at zero, governments need bond holders willing to accept steeply negative real rates. We don't have the energy productivity growth needed to service the debt and grow our living standards, which will require increasing production of dollar currency units to stave off deflationary defaults. Macroeconomic analyst and investment manager Lyn Alden has noted[lxxxv] that the U.S. dollar system may not be large enough to remain the sole currency dominating global oil trade (see chart). No single chart better represents the structural headwinds facing the petrodollar system, which may come under acute stress in the current Russia-Ukraine crisis.

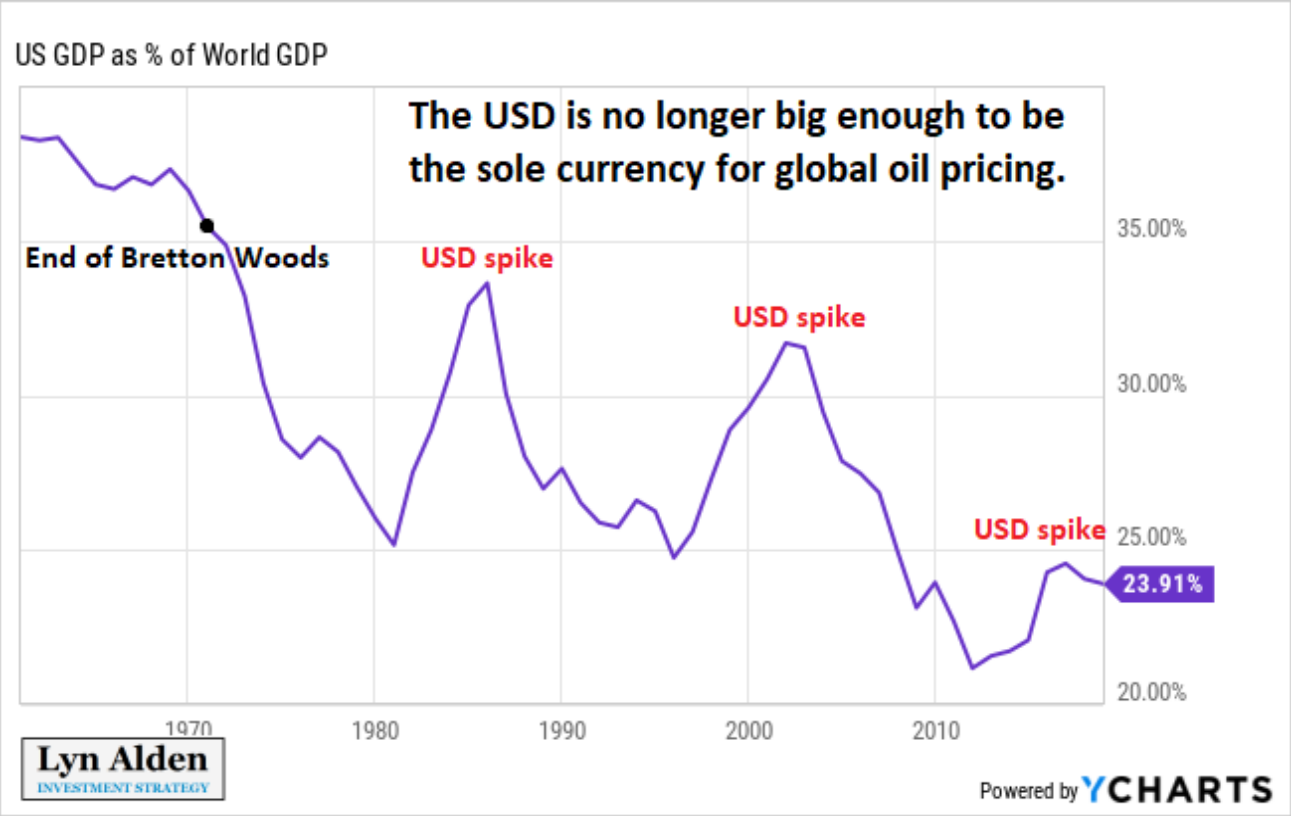


Figure 15: Presaging trends that may be coming to a head during the Russia-Ukraine war, this chart shows the structural down-trend of the U.S. as a share of the world economy, interspersed with periodic crisis-drive USD spikes.

While a simplification, one can view the structure of the geopolitical and economic system as aligned around the fact that China sets the marginal price of goods production and labor, OPEC+ (with Russia) sets the marginal price of oil, and the US sets the marginal price of the dollar/credit. This latter power is very significant but is increasingly weakened by the two other power blocs colluding to increasingly bypass the dollar system.

More perniciously, China can recycle their accumulated dollars from our trade deficits back into our equity markets and use that financial power to exert political influence over US corporations. One need look no further than the controversies the NBA[lxxxvi], Marriott[lxxxvii], and Hollywood[lxxxviii] have run into when their financial interests have crossed with the CCP's political interests.

Worryingly, the U.S. is entering a period where our ability to finance national defense to project global power, satisfy growing domestic social programs and entitlement obligations, and invest in crumbling and outdated infrastructure requires sustaining the bid for U.S. bonds (higher taxes will only contribute a fraction to our embedded fiscal requirements). However, aside from the Federal Reserve and regulated domestic institutions "forced" to buy bonds, the strength of this bid is frail[lxxxix].

At the moment, the Russia-Ukraine war is disrupting global energy and food markets to an unprecedented degree. The resulting commodity supply shock threatens to unleash a commodity crisis that may rip through the western financial system. One of the most well-respected Wall Street credit analysts, Zoltan Pozsar, sees strong echoes of the 2008 housing crisis, with sanctioned Russian exports playing the role of subprime mortgages.[xc] Except this time the Federal Reserve can't provide the needed backstop to "close the spread": the Fed can't print oil or ships, and it is western governments imposing the sanctions, as a "buyer's strike". But the People's Bank of China is well positioned. It has two options:

> "Sell Treasuries to fund the leasing and filling of vessels to clean up subprime Russian commodities. That would hurt long-term Treasury yields and stabilize the commodities basis and would give the PBoC control over inflation in China, while the West would suffer commodity shortages, a recession, and higher yields… [or] do its own version of QE – printing renminbi to buy Russian commodities. If so, that's the birth of the Eurorenminbi market and China's first real step to break the hegemony of the Eurodollar market. That is also inflationary for the West and means less demand for long-term Treasuries."

This would mark a fundamental shift in the global monetary order, leaving the U.S. dollar much weaker and "the renminbi much stronger, backed by a basket of commodities". Viewed from the vantage point of history, one can see this as a new "Bretton Woods III backed by outside money (gold bullion and other commodities" replacing the current system "backed by inside money (Treasuries with un-hedgeable confiscation risks)". As Zoltan says dramatically, "after this war is over, 'money' will never be the same again." **Maybe the U.S. should consider a novel form of "outside" money that doesn't help our adversaries win as the global monetary system shifts to a new regime.**

As we enter an era of strategic competition with rising and rogue states, the United States must not merely fight rear-guard actions to preserve its status in the legacy global order. We must do better than strategic retreat, managing our relative decline while acting from a defensive position. Rather, **the U.S. must seek non-traditional approaches that give us an asymmetric advantage**, applying strategies that our adversaries have not anticipated—that put them on the back-foot, forced to respond to our initiative.

Just as the United States has developed national strategies for Cybersecurity[xci], Defense,[xcii] Countering China[xciii], Climate change[xciv], Critical and Emerging Technologies[xcv], (and even a national strategy on honey bees[xcvi]), we need a **National Bitcoin Strategy**. Such a strategy would require a comprehensive and honest assessment of the changing geopolitical and international economic system. It should integrate "whole of government" perspectives to identify relevant risks, operational challenges, policy considerations, and recommendations to chart a national path to taking strategic advantage of this new, rapidly growing technology and global socioeconomic phenomena.

This essay takes inspiration from George Kennan's "Long Telegram[xcvii]" which famously diagnosed the strategic challenge and national security imperatives at issue in containing the Soviet Union. More recently, a similar "Longer Telegram[xcviii]" was anonymously authored by a former senior U.S. official calling for a renewed strategic approach to China. This essay correctly identifies the single most important challenge facing the United States in the twenty-first century as the rise of an increasingly authoritarian China under President and General Secretary Xi Jinping. As critical elements of addressing this strategic challenge, the author identifies "National Measures to Rebuild American Economic and Military Strength" including:

- Reversing declining investments in critical national economic infrastructure;
- Reversing declining public investment in STEM education, universities, and scientific research;
- Ensuring the United States remains the global leader in the major categories of technological innovation;
- Rectifying the long-term budgetary trajectory of the United States so that the national debt is ultimately kept within acceptable parameters, accommodating the new expansionary monetary policy without creating an inflation crisis and weakening the role of the US dollar;
- Resolving, or at least reducing, the severe divisions now endemic in the political system, institutions, and culture; and
- Addressing the critical question of future national political resolve to safeguard, build, and even expand the liberal international order.

No honest observer of our current state of affairs and future trends would assign a high probability to the U.S. achieving most or even any of these strategic imperatives. In fact, all signs point to continued degradation in just about every element listed.

Yet, there is cause for optimism. In particular, this essay argues that there are at least three key dimensions to how Bitcoin will help the U.S. achieve national strategic objectives. Together, they represent theses for viewing Bitcoin as an enabler of:

1) Sustaining national strength,
2) Countering strategic adversaries, and
3) Promoting our values.

While the challenge is great, Bitcoin offers clear and demonstrable solutions. If we capitalize on this unique opportunity, **Bitcoin could help reinvigorate our domestic economy, regain the strategic initiative, and buttress the global rules-based international order upon which the prosperity of our citizens is secured.**

Thesis 1: Bitcoin Will Help Sustain National Strength

Drive Technology Innovation and Expand U.S. Capital Markets

Bitcoin, first and foremost, is a technology. Synthesizing decades of research and development on cryptography, distributed systems, and peer-to-peer networking (the early work on which was heavily driven and funded by the U.S. government for defense and intelligence applications), the protocol should rightly be viewed a major breakthrough, on par with the invention of the internet.

As such, it has unleashed a wave of innovation and entrepreneurship, much of which is occurring in the United States. Over 600[xcix] crypto start-ups here have raised over $10 billion dollars in seed funding, building strong businesses that are attracting international talent, capital investment, and consumer demand. Some of the biggest brands in the industry are based in the U.S. and our deep and liquid capital markets provide the go-to venue for firms to list their equity on our public exchanges. As existing publicly traded firms increase their balance sheet exposure to Bitcoin and new Bitcoin-specific companies get listed, U.S. equity markets and our broad investor base stand to strongly benefit from the growth of this new asset class.

The next several years will also see an explosion in "Layer 3" applications that interoperate with the Lightning Network and bring the value transfer and store of value properties of Bitcoin to a broad swath of merchants, retailers, E-commerce, social media platforms, media firms, individual businesses, software developers, hardware manufacturers, and countless other businesses (some of which may not exist yet).

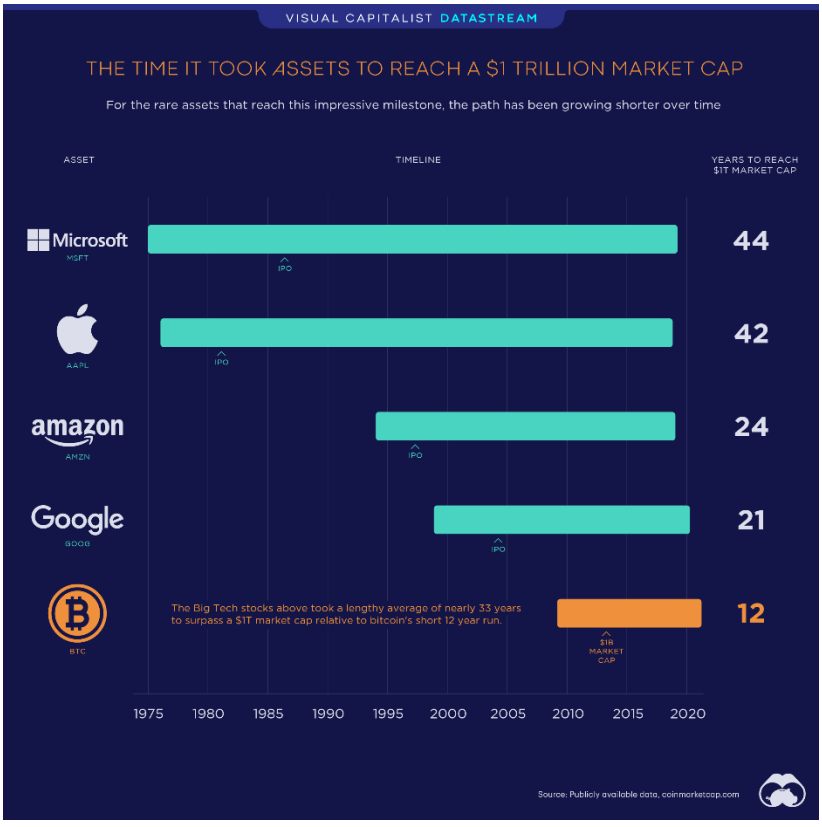


Figure 16: Bitcoin is the fastest asset to reach a $1 Trillion market capitalization, doing so in 12 years.

As history has shown, once an economy converges on a single protocol for value or communications transmission, network effects become exponential, unlocking entrepreneurship, creating new business models, driving down consumer costs, and improving overall quality of life for Americans. While not guaranteed, Bitcoin may serve as a Schelling Point for individuals, corporations, and nations seeking a neutral reserve asset and associated network protocol for digital value settlement. There are lock-in

effects for those protocols that achieve sufficient adoption which can be extremely durable (e.g., modern rail gauges don't differ much the width of Roman chariots). Those who build on this open standard and adapt their economic systems to its principles are positioned to disproportionately influence and benefit from its wider adoption.

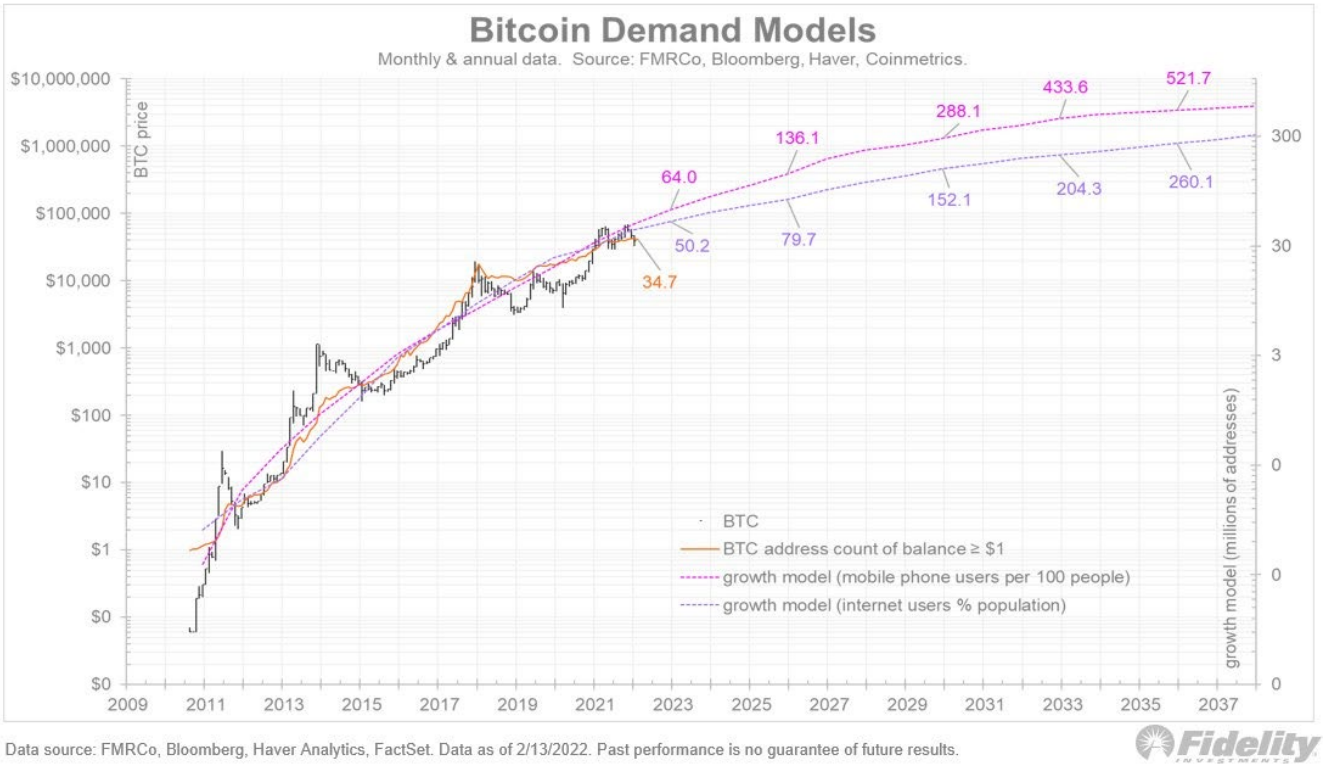


Figure 17: Investment giant Fidelity has developed demand models projecting growth of Bitcoin adoption following similar breakthrough technologies like mobile phones and the internet.[c]

To the extent that U.S. national security stands to gain from domestic technology innovation, appreciation in our equity markets, and as an attractive destination for global talent, **Bitcoin gives us a clear advantage over other economic blocs and adversary nations that reject or stifle its adoption**, as they pursue techno-authoritarian governance and analog commodity money systems.

Incentivize Renewable Energy Generation and Improve Energy System Resilience

One underappreciated recent development is the pace and scale of the impact Bitcoin mining is having on the U.S. energy sector. China's ban of Bitcoin mining in June of 2021 precipitated a shift in the global distribution of "hashrate", a measure of the computational effort dedicated to securing the network in reward for processing network transactions. Though specific estimates are hard to generate, **it is clear that the United States now has a plurality**[ci] **of global hashpower**[cii] (see Figure 18).

Several of the largest Bitcoin miners are now publicly listed in the United States and the intense competition in this industry is driving rapid innovation in hardware, business operations, financing models, scale of deployments, and improved economics[ciii] for renewables.

As the industry has matured, several distinct models have emerged, each with an important and distinct impact on the U.S. energy system. Firstly, small, modular mining operators are deploying containerized units onsite at oil wells throughout the Permian basin and Bakken fields to capture natural gas that would otherwise be flared, reducing the release of greenhouse gasses like methane that are released by the typically inefficiently burning stacks.

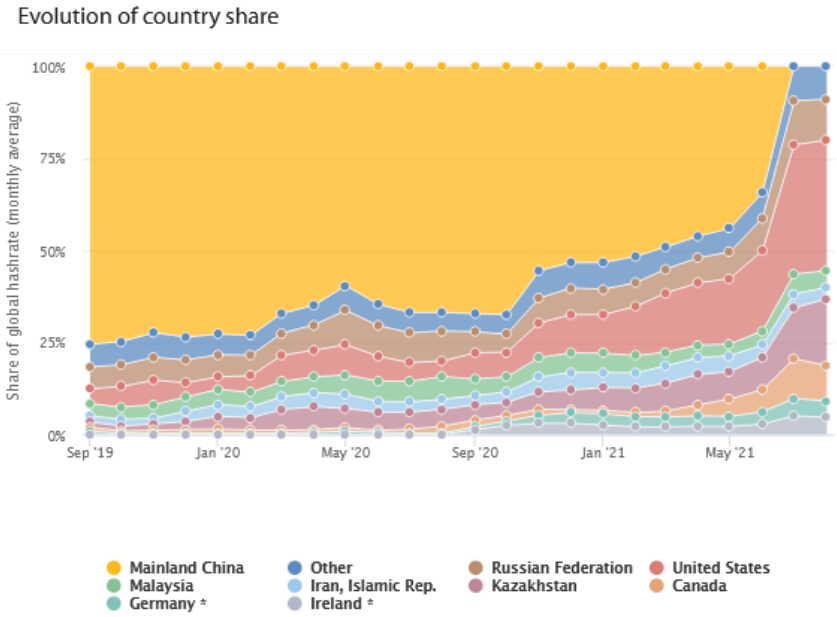


Figure 18: U.S. now hosts a plurality of mining hash share. (Note: While China's share has dropped substantially, it's still non-zero.)

While small, this practice is generating intense interest by the energy majors and could see systematic integration and deployment wide scale very shortly. There are enough flare sites worldwide to replicate the entire current hashrate on the Bitcoin network (though most are not geographically or jurisdictionally feasible). Others will capitalize on these energy sources and take advantage if we do not.

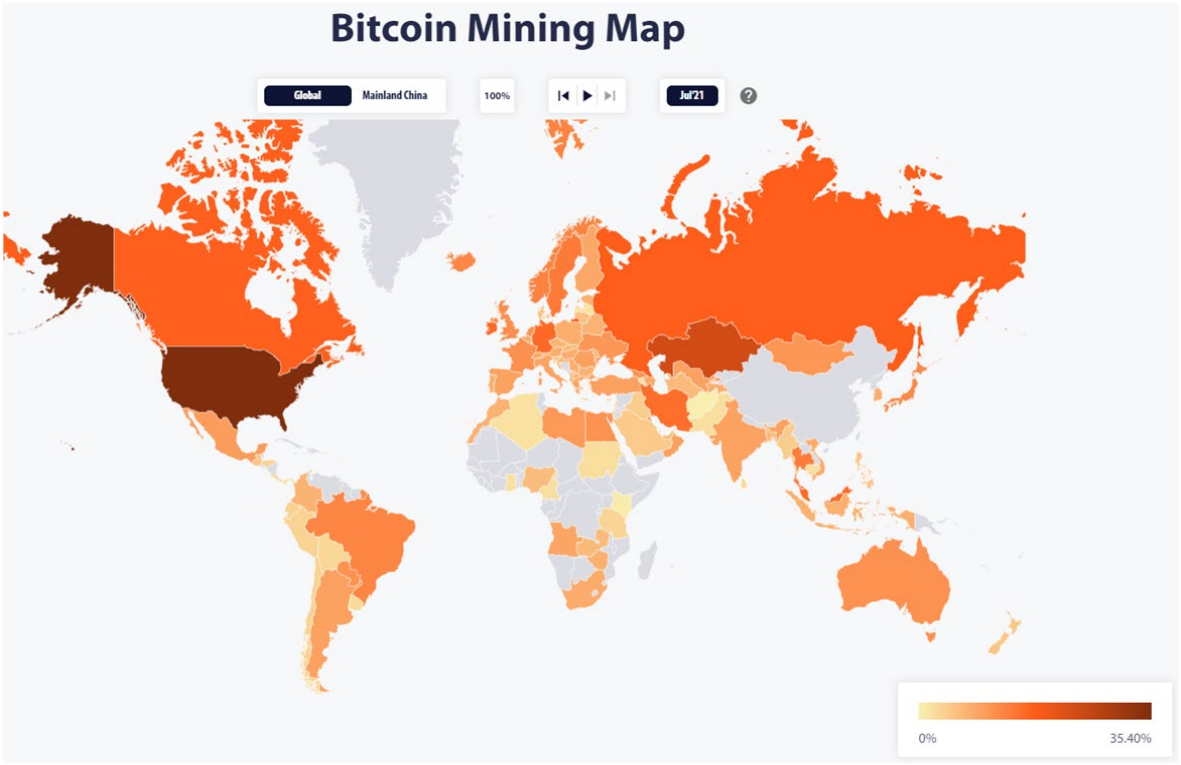


Figure 19: Bitcoin mining is globally distributed. (Note: Same China caveat as above)

Another mining model involves deploying older miners co-located with wind turbines and solar farms, a renewable power modality that suffers from the well-known “duck curve” mismatch between daily pattern of life grid demand and the supply generation profile. In particular, North and West Texas will see a massive expansion in wind power generation in the next several years, but the high voltage transmission lines to distribute this power to the major load centers in the south and east will lag substantially. Bitcoin miners offer these operations a co-located power consumer that can absorb the excess generation that would otherwise be wasted, or worse, may destabilize the grid.

Older generation miners are best suited for these deployments as their lower opportunity cost makes it economically feasible to run them in fits and starts. In turn, by providing a second customer for renewable generation with predictable demand, these Bitcoin miners improve the economics of these power projects, a development which is already changing the Return-on-Investment calculations by major energy investors. Bitcoin mining will be naturally attracted to those areas of the U.S. that see negative pricing events due to excess energy generation, acting as a sponge and a stabilizer at the same time (see Figure 20).

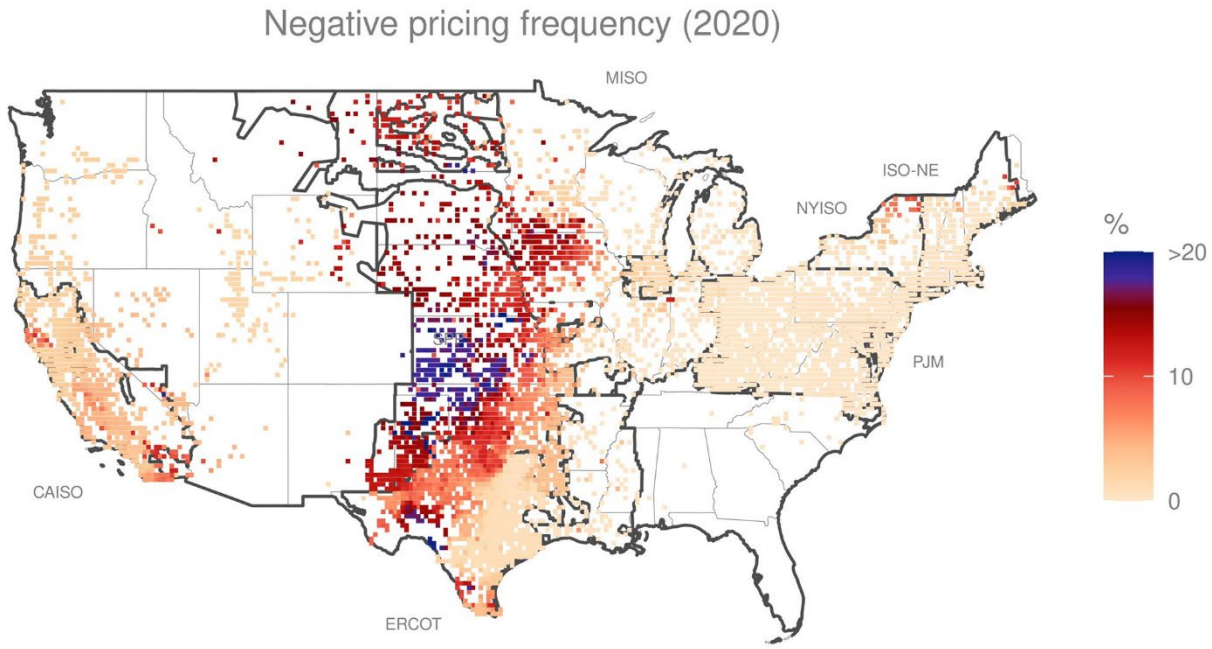


Figure 20: Bitcoin miners are drawn to the U.S. Wind Belt to soak up excess and unpredictable renewable generation that often results in negative electricity pricing.

Some of the most sophisticated miners have negotiated detailed arrangements with utilities to install large-scale operations “behind-the-meter,” providing “ancillary services” as part of “demand response programs”. These sorts of programs are established by energy utilities to incentivize grid customers (both industrial and retail users) to agree to reduce power consumption on demand.

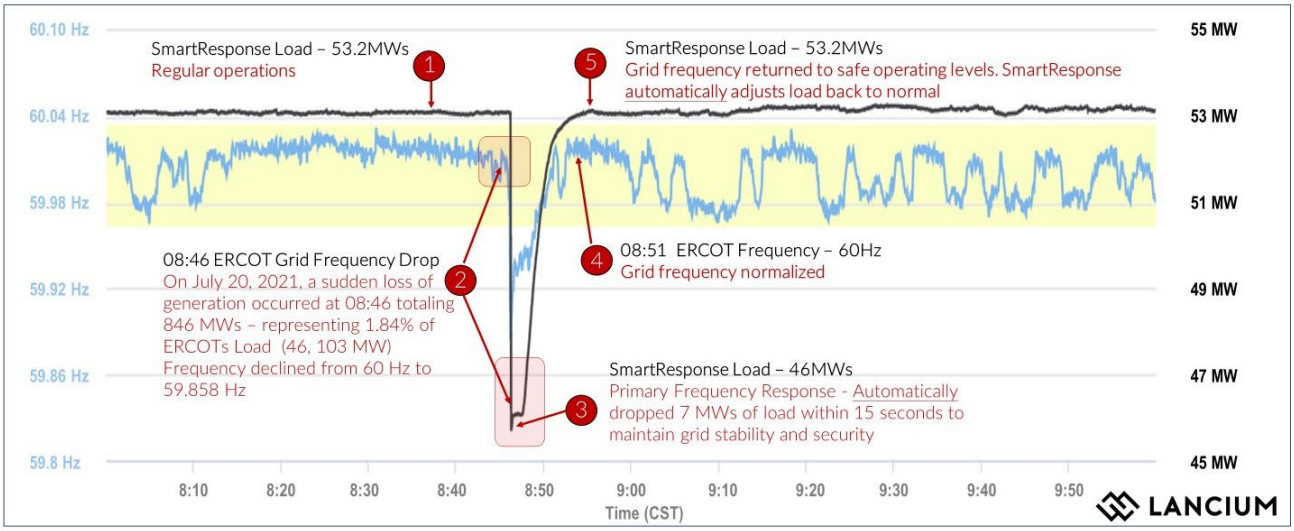


Figure 21: Bitcoin miners are helping to stabilize the Texas ERCOT grid.

The most advanced of these programs involve "controllable load resource[civ]", which provide the utility a highly responsive capability to finely tune both the demand profile as well as regulate the grid frequency (acting as an automatic stabilizer via load shedding targeting 60 Hz).

Bitcoin miners have emerged as the "holy grail" form of controllable load and frequency control, able to dynamically respond within seconds to adjust their demand. This gives utilities a new, powerful tool to help keep the grid stable, improving the resilience of the overall system, and reducing the impacts of exogenous shocks like the Winter Storm that caused widespread blackouts in Texas in Feb 2021.

Power System Flexibility – Characteristics

Generation, Load and Batteries

Resource Designation	Resource Type	Flexibility				Economy	Quantity
		Start-up Time	Avg. Ramp Rate (% of nominal power/min)	Minimum Uptime	Minimum Downtime	Start-up Cost (USD/MW)	Minimum Load (% of nominal power)
Hard Coal	Generation	2–10 h	1.5–4%	48 h	48 h	> 100	25–40%
Lignite	Generation	4–10 h	1–2%	48 h	48 h	> 100	50–60%
Combined-Cycle Gas Turbine	Generation	1–4 h	2–4%	4 h	2 h	55	40–50%
Internal Combustion Engine	Generation	5 min	> 100%	< 1 min	5 min	< 1	20% per unit
Load - Traditional Demand Response	Load	Minutes	> 100%	2-3 h	4 h	0	5–40%
Load – Controllable	**Load**	**Seconds**	**> 100%**	**Seconds**	**Seconds**	**0**	**0%**
Batteries	Storage	Seconds	> 100%	4 h	Charge time	0	0%

h = hour; min = minute; MW = megawatt; VOLL = Value of Lost Load;

Generation Flexibility Source: IRENA

Figure 22: Bitcoin mining, as a form of controllable load, is an ideal resource for power systems that need more flexibility and resilience as the share of renewable generation increases.

Moreover, the U.S. will need to build out dramatically more flexible load in the grid to achieve the electrification required to meet our 2050 Net Zero emissions goals. **Bitcoin mining, as a unique form of this type of load, can play a critical enabling role in achieving this strategic national objective.**

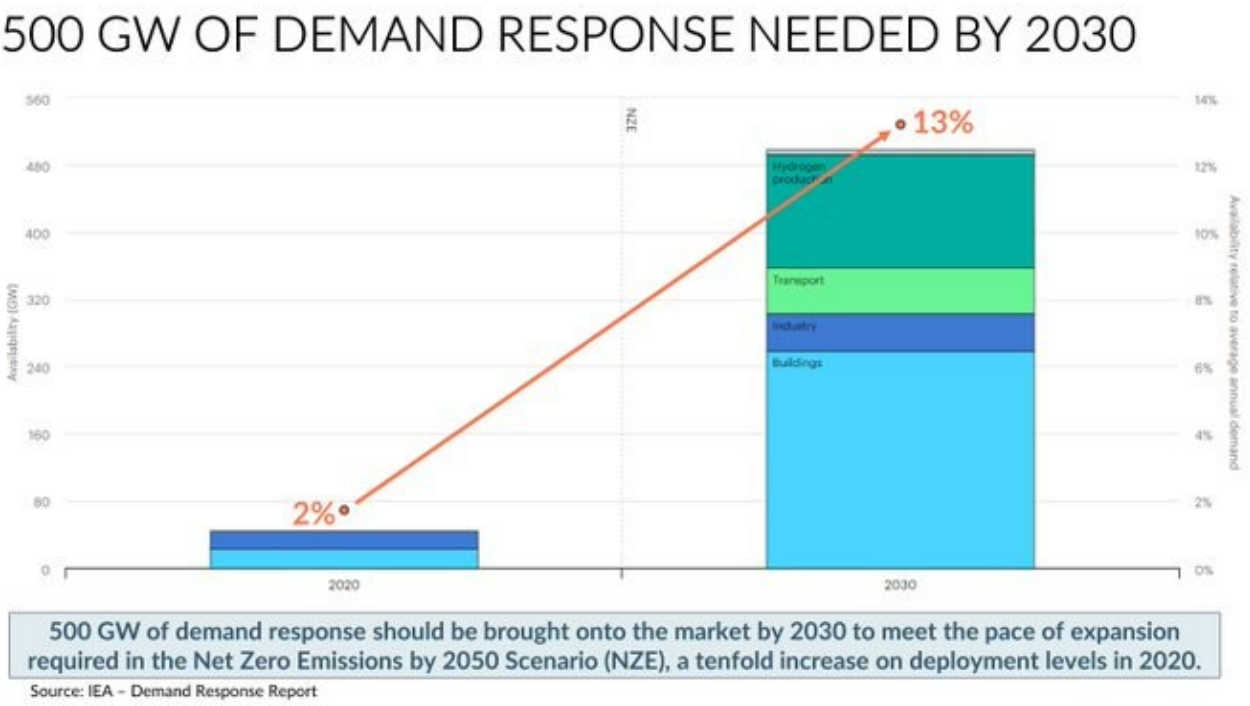


Figure 23: the U.S. will need dramatically more flexible load, like Bitcoin mining, in the grid to achieve the electrification required to meet the 2050 Net Zero emissions goals.

These are just the developments that have come to the fore in the past year or so. The pace of innovation, investment, and deployment in this area is just starting to accelerate. Looking further ahead, Bitcoin mining promises to also transform the domestic nuclear energy industry, a sector that has seen stagnation and underinvestment for decades. A key challenge for nuclear power in the U.S. -- aside from negative public perceptions due to high profile disasters like Chernobyl, Three Mile Island and Fukushima -- has been the immense regulatory hurdles involved in new construction. The burden of these regulations has all but eliminated the ability of smaller scale operations to be cost-effective. However, a few U.S. nuclear energy start-ups (e.g., Oklo) have resurrected and reengineered proven designs for advanced small, modular reactors[cv], and navigated the Nuclear Regulatory Commission approvals process to bring pilot systems to market. In July of this 2021, Oklo announced a 20-year[cvi] commercial partnership with retail-oriented U.S. Bitcoin mining company Compass Mining.

More exploratory approaches involve thermal decomposition from waste tires[cvii], coal refuse[cviii], biomass[cix]. Just about anywhere there is stranded or wasted or low-cost energy, Bitcoin miners are incentivized to capture and monetize it, generating positive externalities, innovation, and economic growth in the process. To the extent that Bitcoin miners continue to use non-renewable energy sources, the zero sum nature of the mining market means that directed investments in renewable mining[cx] (whether by individuals or governments[cxi]) increase the difficulty level for all

other miners and shift the equilibrium breakeven profitability in favor of "greener" miners. Individuals or governments can also invest in green Bitcoin mining incentive offsets[cxii] in proportion to the size and duration of their holdings to provide no net incentive for carbon-intensive mining.

Thus Bitcoin mining augurs a renaissance in the American energy industry: improving our ability to be energy independent[cxiii], capturing and reducing environmentally harmful emissions and waste[cxiv], improving the economics and demand profile for renewable generation[cxv], bolstering the resilience and stability[cxvi] our increasingly burdened electrical grids, and driving investment and innovation in nuclear power[cxvii] for the first time in decades.

This will have increasingly serious national security implications as domestic mining operations become tightly integrated into energy production and distribution systems. While mining firms within each nation will likely evolve into co-opetitive arrangements that dissuade disorderly sabotage, no such constraints will exist between states. In the zero-sum battle for the next block reward, the incentive to undercut (by any means necessary) one's global competition will be large.

This will manifest first in sophisticated corporate espionage and sabotage operations, likely involving the same sorts of firms which now hire ex-intelligence and military professionals to conduct all sorts of deniable and unsavory activities around the world. As is the case with strategically important industries today, these types of activities tend to fuse with state intelligence services. Bitcoin mining may become a strategically important industry, if not *the* most important such industry, in the most geopolitically powerful and relevant nations.

Thus, it should not be surprising if we come to see state intelligence agencies brought into service to protect domestic mining operations and develop offensive capabilities to threaten their global competitors. Given the interconnection of these mining operations with regional energy production and grid networks, this will compound the existing risks states face in protecting against cyberattacks and disruption to critical infrastructure.

States (and/or their deniable proxies) will find and exploit vulnerabilities in each other's mining and national Bitcoin operations, which may range from executing sophisticated supply chain attacks that compromise competitor ASICs to outright physical or cyber-enabled sabotage. This will set off an increasingly expensive game to protect one's domestic mining infrastructure. As Bitcoin emerges as an increasingly important nexus between energy and finance, the U.S. should be proactive and incorporate Bitcoin mining into existing national risk management frameworks[cxviii] for the protection of critical infrastructure.

Foster Economic Inclusion

Bitcoin is an opt-in system, open to all, with no barriers to entry (beyond KYC/AML on regulated exchanges). It provides Americans at every level of society a savings vehicle that isn't gated by discriminatory credit checks, "accredited investor" criteria, or other social qualifications.

Individuals can purchase as little as $.50 worth (with close to zero fees) at a time on platforms like Strike, with many Americans (including NFL stars[cxix] and the mayors of New York City and Miami[cxx]) choosing to take automatic portions of their paycheck in Bitcoin or "dollar-cost averaging" small, regular purchases using U.S. companies like Swan, CashApp, and River Financial.

No one can be "red-lined[cxxi]" out of opening a Bitcoin savings account, as Bitcoin knows no race, color, religion, gender, gender expression, age, national origin, disability, marital status, sexual orientation. Minority-owned businesses are structurally disadvantaged by the current banking system, receiving proportionally lower loan amounts[cxxii] and often forced to rely on cash. Women in the US couldn't get a line of credit without a male co-signer until the 1970s. Black families' median and mean wealth is less than 15 percent that of White families, at $24,100 and $142,500, respectively.[cxxiii] And yet, a recent survey found that 30% of African Americans and 27% of Hispanic investors own crypto, compared with just 17% of Whites.[cxxiv]

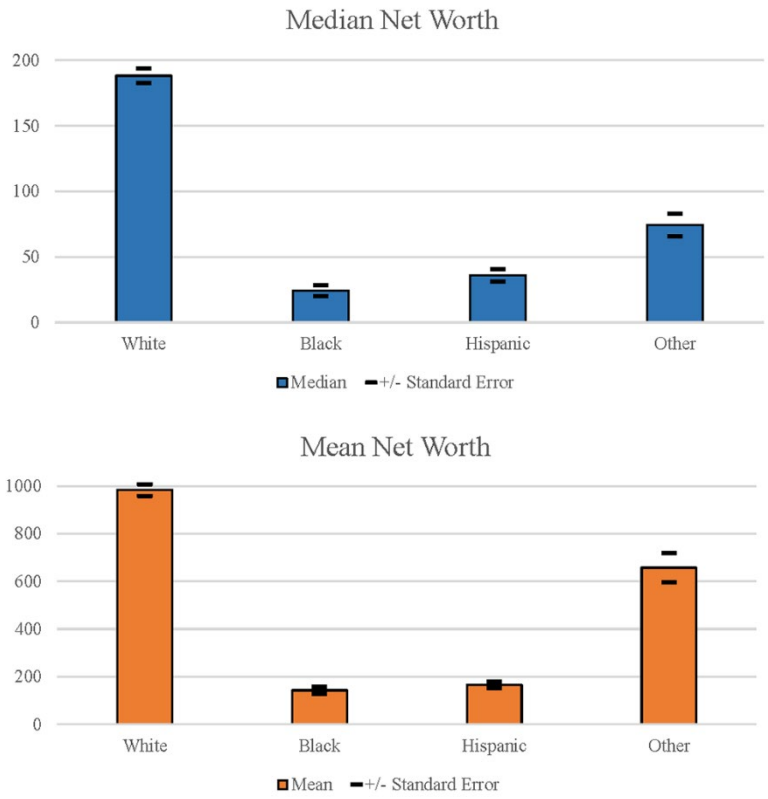


Figure 24: Minority groups in the U.S. that are financially excluded in the current system are disproportionately adopting Bitcoin as a tool of economic empowerment.

As the popularity of groups like "Black Bitcoin Billionaires" (with over 100,000 members[cxxv]) on social chat apps like Clubhouse and books like "From Bars to Bitcoin[cxxvi]" and "Bitcoin and Black America[cxxvii]" attest, Bitcoin is increasingly being viewed by minority groups as a tool for economic empowerment. These communities are signaling that they view Bitcoin as a potentially constructive vehicle for building and preserving minority wealth.

More broadly, the post-pandemic "K-shaped" recovery has seen asset prices skyrocket while wages lag. This has compounded existing wealth inequality to the such an extent that just 39% of Americans have enough savings to cover a $1,000 emergency expense.[cxxviii] While net productivity has risen 61.8% since 1979, the hourly pay of a typical worker has increased only 17.5% in real terms over the same period. With real wages not keeping pace with the cost of living, the average American has been forced to take on increasing debt, with minorities and socioeconomic disadvantaged groups exploited by pay-day and other predatory lenders.

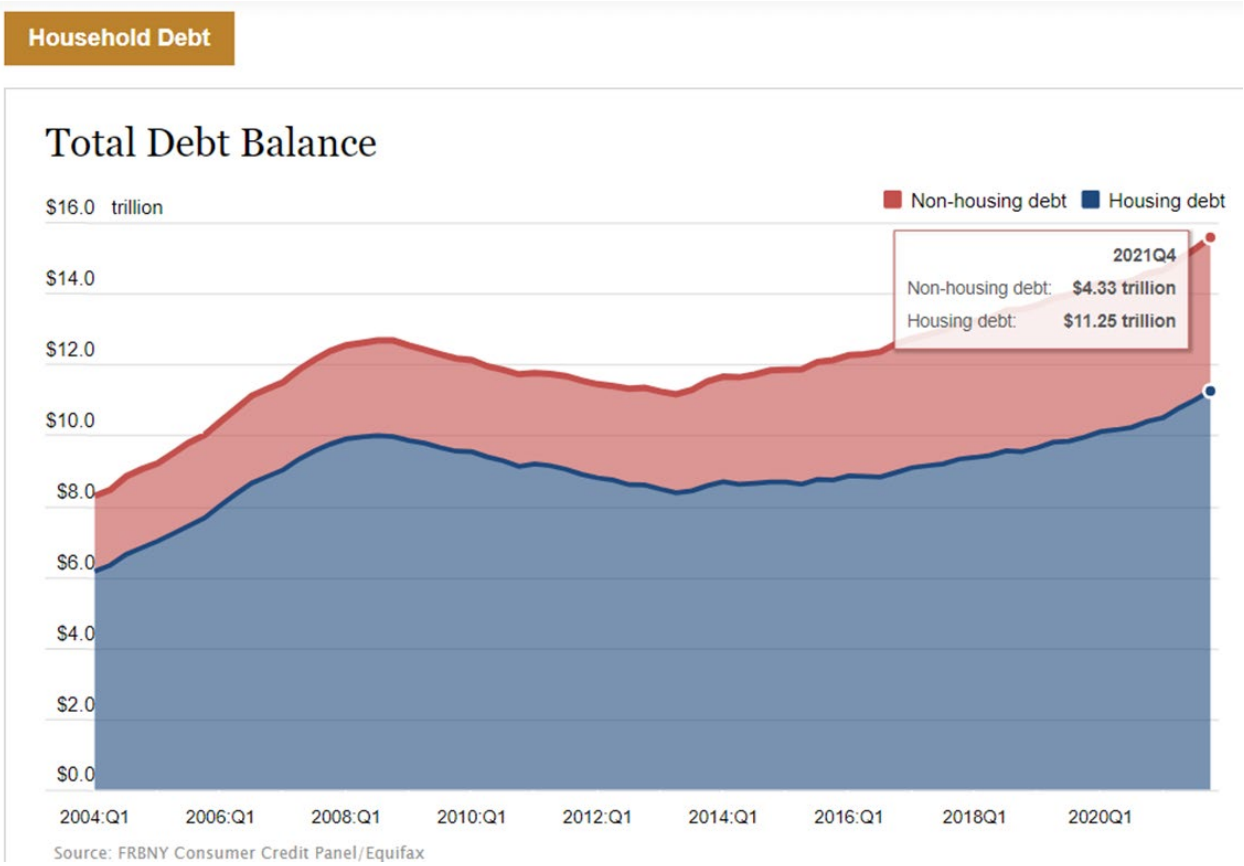


Figure 25: Total household debt in the U.S. is at all-time highs, leaving many families vulnerability to economic shocks and reliant on social support fiscal transfers to keep afloat.

At the same time, accelerating college tuition burdens new entrants to the workforce with non-dischargeable debt and the increasing cost of heath issuance has become the largest driver of bankruptcy, reduces labor mobility and acts as a drag on small business formation and entrepreneurship.[cxxix] It should greatly trouble national policy-makers hoping to challenge China that 20% of Americans read below the level needed to earn a living wage[cxxx] and that 45 million adults are functionally illiterate[cxxxi], struggling to read a simple story for their children.

While not all of these problems will be unilaterally solved by Bitcoin, it can help steer our economic trajectory in a different direction. Our current system drives the population into debt[cxxxii], fosters inflation[cxxxiii] that erodes meager savings, incentivizes neo-feudal labor arrangements[cxxxiv], and concentrates real wealth[cxxxv] and hard assets among a shrinking and extractive elite class. Scarce assets are mostly held by the already wealthy, who gain disproportionately from asset appreciation (partly the result of monetary policy). An IMF study[cxxxvi] found that "an individual in the 75th percentile of wealth distribution who invested $1 in 2004 would have yielded $1.50 by the end of 2015—a return of 50 percent. A person in the top 0.1 percent would have yielded $2.40 on the same invested dollar—a return of 140 percent."

Moreover, once at the top of the wealth ladder, these dynamics reinforce their position: "Controlling for age, parental background and earnings, moving from the 10th percentile to 90th

percentile of wealth distribution increases the probability of making it to the top 1 percent by 1.2 percentage points compared to an average probability of 0.89 percent."

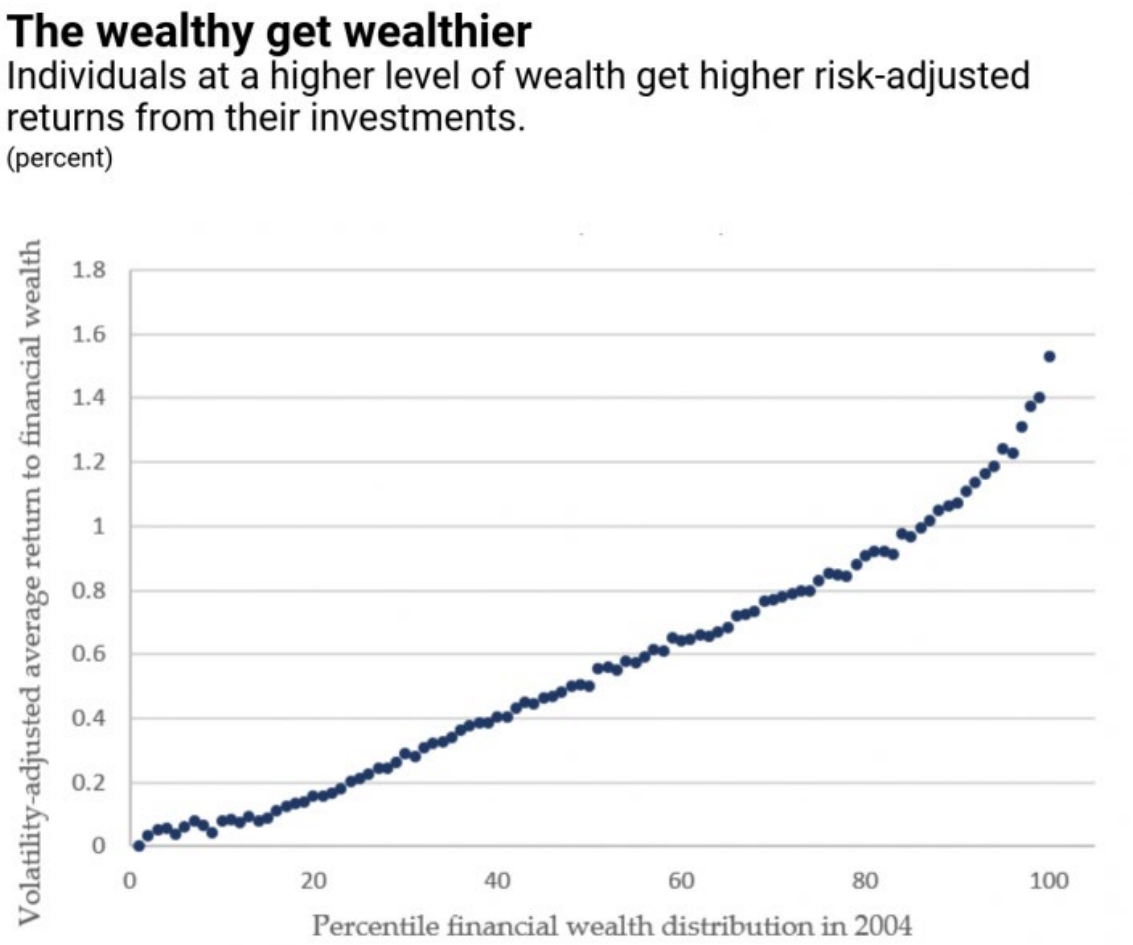


Figure 26: Existing asset holders benefit the most from monetary inflation, exacerbating social inequality and inter-generational tensions.

Bitcoin is the first truly accessible hard asset that can be acquired by anyone with a phone and internet, in increments as small as fractions of a penny at a time. There are no "accredited investor" barriers, usurious loan terms, large down-payments, or other structural barriers that keep the lower and middle class from climbing the economic ladder. Victims of domestic or spousal abuse can also use Bitcoin to acquire and protect their wealth from seizure or monitoring by their significant other. As an absolutely scarce and obtainable asset, Bitcoin can thus serve as a universal long-term savings vehicle that allows all segments of the population to preserve and protect the hard-earned fruits of their labor.

The effects of Bitcoin, over the long-term, can help mitigate the exclusionary effects of our current monetary system and offer renewed prospects to historically discriminated and disempowered groups. In addition to obvious benefits to our society and our people, this will also mitigate the effectiveness of attempts by our adversaries to exploit the political and racial divisions that our economic system has generated over decades.

Thesis 2: Bitcoin Will Help U.S. Counter Strategic Adversaries

China is Using the Current Dollar System Against the U.S.

The U.S. dollar system, as currently arranged, has ceased to serve as a net benefit to the interests of the Nation. While it served its purpose well (at least from our strategic perspective) during the Cold War and in the "hyperpower" era of the 1990s, the post-GFC period has revealed the inherent flaws and latent instability in the system.

While our dominance of the international payments system (e.g., SWIFT) has enabled us to apply targeted economic sanctions, these tools have become increasingly ineffective[cxxxvii] because of their overuse[cxxxviii], especially as mechanisms of coercion against near-peer[cxxxix] and rogue[cxl] states. Sanctions are still important instruments of foreign policy, but have served mostly to symbolically punish rather than strategically deter. Even our European allies have openly flouted[cxli] our sanction policies. They are not a substitute for endogenous U.S. national power, which relative power is in clear decline in the context of a rising China and increasingly multipolar political order.

Most recently, Western governments have unleashed punishing sanctions on Russia in response to their invasion of Ukraine, cutting off Russia's financial system (including its Central Bank), imposing severe export controls across a range of key industries, and targeting Putin and his inner circle personally. Some onlookers have speculated that Bitcoin and cryptocurrency could enable Russia to bypass these restrictions. But it is unlikely[cxlii] that any cryptocurrency will provide a meaningful way for the Russian institutions, officials, oligarchs subject to these specific sanctions to accomplish widespread asset flight. Instead, Bitcoin is both helping Ukrainians directly raise funds and enhancing Western pressure on the Russian government by enabling its citizens to escape the collapsing ruble.

Moreover, major exchanges maintain strict compliance with U.S. and other jurisdictions' sanctions regimes. They are highly responsive to blacklist designated addresses and non-compliant exchanges. Thus, sanctioned entities and individuals will struggle to find fiat off-ramps to cash out. Sanctions violators will also have a hard time hiding their transactions with Bitcoin or other cryptocurrencies, given that cryptocurrency monitoring companies cooperate closely with law enforcement, using advanced tools and the inherent transparency of blockchains to flag violations in real time.

U.S. Treasury officials themselves "are not overly worried about crypto undermining the effort to choke off the Kremlin's access to capital. Laundering large amounts of money through a dizzying array of digital wallets and exchanges is expensive, time-consuming and would likely be visible in the broader crypto market, given the massive investment portfolios of individuals and institutions named in the sanctions."[cxliii]

As a globally distributed digital settlement system, Bitcoin allows anyone to transfer value peer-to-peer without centralized intermediaries. Amidst the crisis, Ukrainian citizens, NGOs, and the

Ukrainian government itself have turned to Bitcoin and cryptocurrency to raise more than $50 million in aid.[cxliv]

Everyday Russians are using Bitcoin and dollar-pegged stablecoins to escape the collapsing ruble.[cxlv] This will aggravate Russia's currency distress and enable capital to flow out to the West. Broad, indiscriminate sanctions that limit Russian citizens' access to cryptocurrency would violate a core principle of U.S. policy articulated by Deputy National Security Advisor Daleep Singh to only impose sanctions that are "targeted to avoid the appearance of punishing the Russian civilian population."[cxlvi]

Moreover, the global offshore dollar market has been cleverly exploited by our principal strategic adversary, China, to finance their neo-imperial ambitions. As we've run ever deeper twin (current and capital account) deficits (including over $300 billion in trade deficit with China), we've handed China massive dollar reserves which, instead of recycling into refinancing our bonds, they've used to go on a spending spree around the world, buying up hard assets and taking large-scale positions in western equity and real-estate markets. China and a handful of other nations now own over $12 trillion in U.S. equities, up from $2 trillion in 2010. In 2015, almost 85% of China-Russia trade was settled in dollars. This fell to less than 50% in 2020. The number of U.S. manufacturing jobs fell from over 17 million to less than 12 million after China was awarded "most-favored-nation" trade status.

As a result, the current dollar system is becoming a threat to national economic security. Note that this runs counter to the typical refrain: we can print the world's reserve currency and receive real goods and services in exchange. Seems like a good deal. Not quite. China turns around and buys up our real estate and stocks and farmland with those dollars. We have thus traded ownership of our hard, productive assets to China in exchange for consumable, perishable goods. This doesn't exactly put the US in a great position from which to project strength in a period of great power competition. Reversing this in the current system requires capital controls which would greatly damage, if not kill, the reserve currency status of the dollar.

As part of their exceptionally ambitious BRI project, China has made dollar-denominated loans to other emerging markets, usually with local infrastructure (ports, land, dams) as collateral. Just as one example of the scale of China's ambitions, their state-owned enterprises (SOEs) have built over 100 commercial ports and other facilities around Africa in the past 20 years. Essentially, China has used this system to construct an elaborate, global series of leveraged hedges against the dollar system, knowing that the Fed will be forced to intervene in any systemic crisis, opening up foreign swap lines and pushing whatever dollar liquidity is needed to prevent large-scale dollar defaults that could cascade across the interconnected global banking system. And, in the unlikely event the debtor nation does default, well China has a claim to the hard asset collateral it really wants in the first place. Heads they win, tails we lose.

This shouldn't come as a surprise. In the early 1960s, American economist Robert Triffin noted that in order to maintain the U.S. dollar as the global reserve currency, we would be forced to run structural trade deficits to keep a growing world economy sufficiently supplied with dollars. The effects of this "Triffin Dilemma" manifested slowly, over the course of decades, with the gradual erosion and elimination of wide swaths of our industrial base. **It isn't too much of a stretch to draw a direct line between the systemic effect of the U.S. being the global reserve currency to the increase in income inequality, the rise of political populism in recent years, and the estrangement of working classes from our legacy governing institutions.**

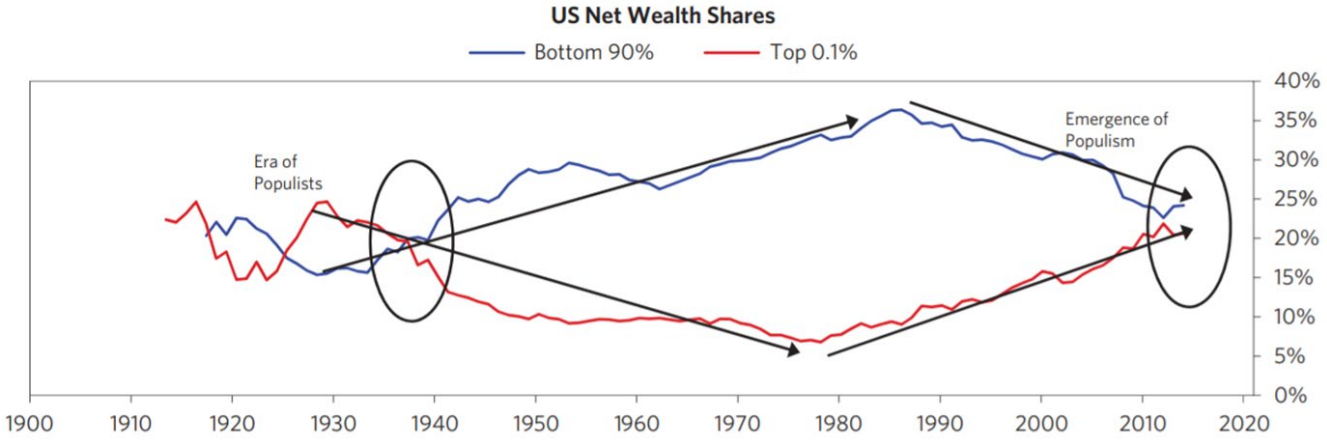


Figure 27: Coincident with the arc of the long-term debt cycle, the U.S. is witnessing the political consequences of extreme wealth inequality, which historically presage periods of social instability.

The well-known hollowing out of our national industrial capacity accelerated with the entry of China in the WTO, with the US losing five million manufacturing jobs in less than ten years.[cxlvii] This same period saw a dramatic rise in opioid addiction, a crisis that now kills over 100,000 Americans every year.[cxlviii] Despite the hope of converting China towards the western rules-based liberal order, it's clear that Beijing is intent on expanding its "state-led, non-market approach to the economy and trade" that "cause serious harm to workers and businesses around the world, particularly in industries targeted by China's industrial plans", according to the US Trade Representative in a 2022 report.[cxlix]

While the polarization and domestic instability that these effects portend is worrying enough, the tangible national security impact on our defense industrial base capacity is more acute. Our warfighting ability doesn't just require bulk manufacturing of armaments (as was our signature strength during World War II), but relies on critical, high-technology components. The production and supply chains for these components (e.g., semiconductors) and upstream commodities (e.g., rare earth metals) are dominated by China. While efforts are underway to secure and stockpile critical national needs in these areas, it is not clear those efforts will be sufficient in a time of crisis. The likelihood[cl] of such a crisis grows every year, with no guarantee of U.S. victory[cli] and potentially catastrophic consequences[clii] for the world economy. Our reliance on Chinese imports of personal protective equipment (PPE)[cliii] in the early months of the pandemic should raise the alarm on the pernicious effect the dollar system has had on national security.

Further, as the COVID-19 pandemic has shown, consumer goods and a broad range of commercial supply chains are exceptionally fragile. The stimulus checks that were effective at averting an economic collapse contributed to a shift from services spending to consumption of imported goods, which, when combined with labor and chassis and storage space shortages, have caused severe disruptions to a just-in-time logistics and supply chain that largely originates at a handful of Chinese mega-ports.

The only way to reverse these deeply embedded structural flows that sap our national strength and security is to shift the global monetary system towards a neutral reserve asset like Bitcoin and give up the "exorbitant burden" of the U.S. Treasury-based dollar system. Note that moving away from a system where the U.S. Treasury is the reserve asset for the world is not the same as abandoning the dollar as the world reserve currency. Dollars, as a medium of exchange and unit of account, will continue to be in high demand. However, we must gradually replace the Treasury as the reserve store-of-value asset, for which function they are increasingly ill-suited at negative real rates. This will not happen overnight and any transition must be orderly, but we must recognize the unsustainability of the present system and explore alternatives that preserve our position in the world economic order.

While Bitcoin isn't a silver bullet solution for these embedded structural vulnerabilities and complex interdependencies, it offers the U.S. a backstop reserve asset to use as a bridge away from the dollar-debt system in case of an acute geopolitical crisis. In such a crisis, approaching war, the Fed would be forced to overtly and directly monetize massive debt issuance to finance the war. Even in the absence of an overt conflict, the cost of a new arms race (involving hypersonics, cyber, space, and nuclear weapons) will force expansion of deficit spending. Unlike a similar period in the 1980s, we don't have the monetary or fiscal capacity to "outspend" our strategic opponent.

While Bitcoin could be viewed as an escape valve for dollars fleeing anticipated financial repressions and even capital controls, **the U.S. possesses a distinct advantage: given that such a large amount of Bitcoin is held by U.S. residents, we stand to disproportionately benefit from its monetization.** That is, the value of our domestically taxable Bitcoin grows as the rest of the world increasingly pours value into the network, serving as a form of de facto seigniorage for us.

As long as we don't turn towards punitive taxation and drive Bitcoin holders out of the country, this capital appreciation can be used as a backstop in times of acute national crisis to mitigate effects of what could otherwise be a sovereign debt crisis. A dramatic re-valuation of gold is another viable alternative, but this would have the effect of also benefiting our adversaries, as Russia and China have been aggressively adding to their sovereign gold holdings over the past several years.

In this sense, it is as if someone invented a new form of gold (digitally) and now the U.S. finds itself holding a disproportionate share of this new asset. Such a move would be a strategic surprise to our adversaries, who have been quietly repositioning for years for the end of the dollar system. It would allow us to reset the global monetary order once again on relatively favorable

terms. Such a “great reset” seems inevitable -- the only question is who will set the rules of the new arrangement. **Bitcoin, as a neutral reserve asset possessed disproportionately by United States residents and companies, offers us a strategic national advantage as the world’s monetary system shifts to a new regime.**

To be clear, this is a “break-glass” scenario, only offered to assuage concerns that Bitcoin would tie the hands of the government in cases of geopolitical conflict. The sorry state of the government’s finances are not the fault of Bitcoin, and whatever crisis, if it arrives, will not be the fault of Bitcoin. But given the path we are on, the existence of Bitcoin and its adoption by our citizens gives us a relative advantage in navigating such periods without resorting to even more extreme, likely authoritarian, measures of economic control and coercion.

Either way, it’s clear that China is using the dollar system against us. And while certain segments of our population have benefited very much from this system, the cumulative erosion of our industrial capacity and political stability has put us in a highly vulnerable state. Bitcoin, in the medium term, can help shore up our national balance sheet, serve as a bridge to a new monetary system in which the U.S. can retain some (but not all) of its seigniorage benefits, and provide a domestic reserve asset backstop in an acute sovereign debt crisis.

Bitcoin is a Counter to the Digital Yuan and Authoritarian Use of CBDCs

A key element of China's strategic initiative to dethrone the U.S. (or at least achieve peer status with their own equivalent geopolitical sphere of influence) involves their implementation of a Central Bank Digital Currency. A complement to their BRI, the roll-out of the digital yuan has been made a national priority by the CCP and the PBoC.

China’s digital payments ecosystem (including AliPay and WeChat Pay) is already much more advanced than western economies, and the Digital Currency Electronic Payment (DCEP) e-renminbi (e-RMB) is adding a degree of state centralization and social control one should expect from a one-party communist state. The e-RMB is expected to become an instrument of China’s expansive surveillance and social credit system, enforcing targeted penalties on political deviancy to snuff out any threat to the “harmonious society” over which the CCP desires continued, unchallenged rule.

Beyond its application as part of the apparatus of domestic control, China also has broad ambitions for the internationalization of the e-RMB by DCEP technology. Deployed along the geographic contours of the BRI, the DCEP aims to facilitate bi-lateral trade and cross-border payments in yuan-terms, bypassing the dollar system entirely and pulling more of Asia and Africa into China’s economic sphere of influence.

Further, in January 2021 the PBOC announced a joint venture[cliv] with the Society for Worldwide Interbank Financial Telecommunications (SWIFT), an entity over which the U.S. has expressed singular dominance. The JV plans to create a data center and localized network in China that

connects to the main SWIFT network and allows the Chinese government to monitor and control cross-border payments, greasing the rails for their DCEP efforts.

While the yuan is not nearly as large as the other current reserve currencies in absolute terms, it has been growing rapidly[clv] on a relative basis in the past two years (see chart). The share of RMB in global FX reserves more than doubled from 2016 to 2020.[clvi]

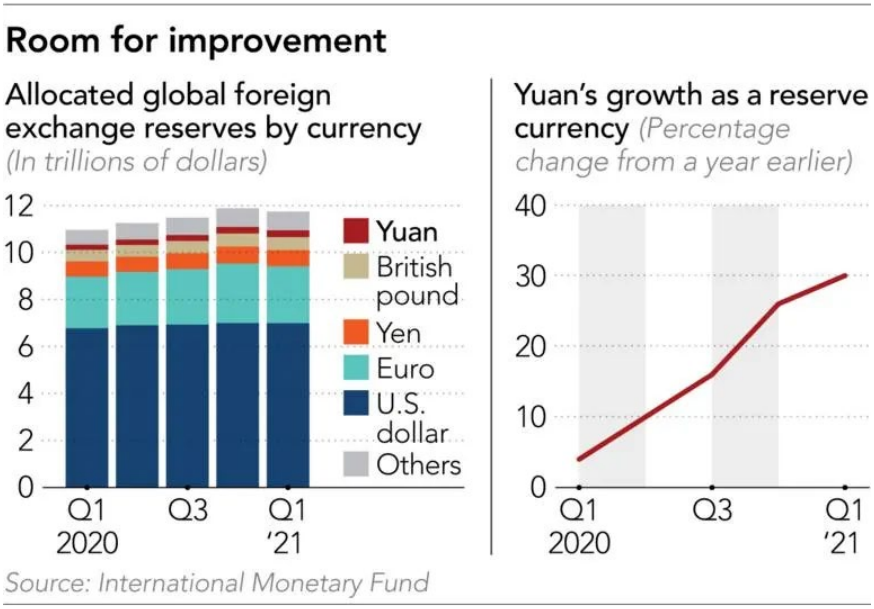


Figure 28: The yuan is a small share of global FX reserves, but is growing fast, especially since 2020.

Rather than promoting the RMB as a global alternative to the dollar, China has prioritized exchange rate stability with non-dollar currencies tolerating "higher volatility in the USD/CNY pair, in exchange for lower volatility of the RMB against other currencies."[clvii] As a result, China is able to anchor the RMB against a reference basket of its Asian neighbor's currencies without an official Asian currency bloc similar in function to the euro area. The implementation of the e-RMB is likely to evolve in tandem with other countries' CBDC efforts to prompt a multi-CBDC arrangement among central banks that facilitates further internationalization of yuan, especially for cross-border payments along BRI and Asian economies.

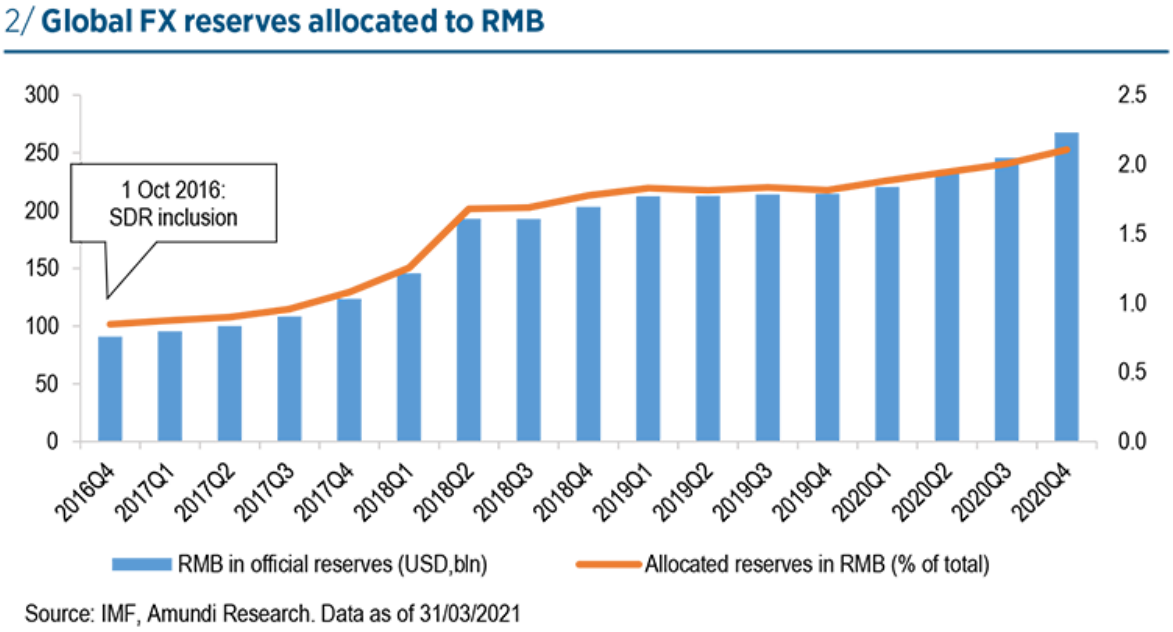


Figure 29: China is making slow, but steady, progress in internationalizing use of the renminbi.

Our closest allies across the pond have raised the red flag. GCHQ chief Sir Jeremy Fleming warned that China's digital currency efforts will give them the ability to "exercise control", "surveil transactions" and that China is "investing very heavily, overtly and covertly" to exercise influence on "the rules of the road" for the emerging digital global infrastructure.[clviii] MI6 head Richard Moore recently opined that China's "technologies of control and surveillance are increasingly being exported to other governments…expanding the web of authoritarian control around the planet."[clix] Over 140 million individuals and businesses are supposedly already using the e-RMB, and China used their hosting of the Winter Olympics to further internationalize its adoption.[clx]

There is a reason China has been among the most Bitcoin-hostile governments in the world, banning Bitcoin mining and making all cryptocurrency transactions illegal. **Bitcoin is a clear and present threat to China's strategic ambitions for the e-RMB as well as its efforts to enforce capital controls.** The latter in particular has been a worry for the PBoC, with stablecoins like Tether being a popular vehicle for mainland Chinese to bypass annual limits on overseas capital transfer. These moves on Bitcoin coincided with a crackdown on other mechanisms for capital flight like gambling in Macau and the Hong Kong banking sector.[clxi]

Even if the U.S. didn't stand to itself directly benefit from Bitcoin's technological innovation, energy incentives, and value growth (as argued in Thesis #1), we indirectly gain from the constraints it places on China. The existence of Bitcoin is a severe complication for China's CBDC ambitions, presenting an attractive store of wealth and effective cross-border payment system to those BRI nations that China seeks to entangle with the e-RMB. The e-RMB will be an attractive tool for certain states that trade directly with China. We should encourage Bitcoin's adoption in these nations as an open-source and freedom-promoting alternative that comes with on-ramps and transaction rails that facilitate dollar-exchange and associated dollar-demand as well.

China has banned Bitcoin in its own country, but cannot do the same across the rest of Eurasia, the Middle East, and Africa, many nations of which have relatively permissive cryptocurrency regimes.[clxii] In fact, China's banning of Bitcoin mining led to the U.S. almost immediately taking the hashpower lead.[clxiii] At the heart of the "new Silk Road" Kazakhstan and Russia now round out the top three nations for Bitcoin mining, with Russia's soviet-era overcapacity in hydro production and cold Siberian climate rapidly emerging as a prime destination for exiled Chinese miners.[clxiv] Bitcoin could thus serve as a potential "wedge" issue that divides China from its extended sphere of influence, putting China's Bitcoin hostility at odds with the domestic interests of its erstwhile allies and "friends".

The vast majority (86%[clxv]) of central banks are exploring the benefits and drawbacks of CBDCs[clxvi], with the Federal Reserve recently releasing its own, somewhat spare, discussion paper.[clxvii] The adoption of Bitcoin and other cryptocurrencies (including stablecoins pegged to the dollar) is growing rapidly, presenting challenges and opportunities to governments and financial authorities.

Russian leaders recently announced a draft law to treat Bitcoin as an "analogue of currencies" and integrate cryptocurrency into their legacy financial system, although the status of this law is

uncertain in the context of the ongoing war and associated sanctions.[clxviii] As tensions grew prior to the Ukraine invasion, Russia had shifted away from the dollar system and attempted to prepare its economy to withstand further western sanctions by stockpiling diverse foreign currency reserves and gold[clxix], declaring a "no-limits" partnership with China[clxx], and reinforcing its position in the global energy market.[clxxi]

To address these challenges, the United States can take special advantage of the dollar-based stablecoin ecosystem that has emerged to facilitate cryptocurrency trading, especially offshore. The top two largest dollar-pegged stablecoins hold a market cap exceeding $130 billion[clxxii], and are growing quickly.[clxxiii] One can argue that these private stablecoins are winning the fight the U.S. should be fighting against the e-RMB, with market-driven transaction volume in just these two dollar-stablecoins vastly outpacing that of the PBoC's DCEP efforts to-date.[clxxiv] The world wants dollars, not renminbi. But when it comes to serving the demand for digital currency, China has a determined strategy. Thus far, the U.S. has been able to free-ride on private innovation, but continued success in this regard is not guaranteed.

No less an authority than the Vice Chair for Supervision at the Federal Reserve Randal K. Quarles noted in a recent speech, that "a global U.S. dollar stablecoin network could encourage use of the dollar by making cross-border payments faster and cheaper, and it potentially could be deployed much faster and with fewer downsides than a CBDC."[clxxv] Given that the global economy suffers from a somewhat chronic "eurodollar" shortage, stablecoins provide another rail to satisfy demand for dollar liquidity.[clxxvi] While these "crypto-eurodollar" issuers must come under some form of regulatory framework and risk management supervision[clxxvii], the strategic benefits the U.S. accrues from increased global dollarization are highly significant.

Moreover, it is likely that domestically-domiciled stablecoin issuers will eventually be regulated into holding a large portion of their reserves in highly liquid, cash-equivalent instruments, just as do money market funds. As a result, **increased demand for these stablecoin issuance (mostly driven by increased demand for Bitcoin, and its rising dollar price) will drive increased (regulatory-required) demand for U.S. bonds** (and other U.S. corporate and municipal debt blessed as "money-good" High Quality Liquid Asset collateral). At a time where foreign demand for our debt is drying up, Bitcoin-driven stablecoin growth can serve as another source of government financing. Again, given the global dynamics involved in stablecoins, this is essentially an international tax levied on dollar-Bitcoin inflows that goes directly into floating U.S. debt markets.

The Federal Reserve has been incrementally forced to take ever larger responsibility for the stable functioning of the global dollar system built on an orderly and smooth Treasury market. While most casual observers may only remember the 2008/9 Lehman Crisis, the Fed has been forced to respond to a number of crises since, cementing its role as the lender-of-last resort to the off-shore banking system. In particular, the spike in the repo market in September 2019 and the Treasury market freeze in March 2020 triggered a series of abstruse but highly significant changes to the monetary plumbing through which dollars (and their associated debt collateral) flow throughout the world financial system. In particular, during the COVID-19 crisis the Fed

invoked its emergency authorities[clxxviii] under Section 13(3) of the Federal Reserve Act to deploy an unprecedented series of lending and credit facilities in coordination with the Treasury Department.[clxxix]

The net effect of these changes have been to substantially broaden the number of counterparties (financial institutions) with access to the Fed's balance sheet. These monetary facilities—specifically the Overnight Reverse Repo Facility (ON RRP) and the Standing Repo Facility (SRF)[clxxx]—serve to provide a floor and ceiling, respectively, to money market and dollar funding markets, with an effectively unlimited ceiling (the Chair has discretion to raise caps as needed). The Fed has also expanded its dollar liquidity and foreign-currency liquidity swap lines with foreign central banks to prevent obstruction in the key arteries in the global dollar system.[clxxxi] While typically limited to countries with a close relationship to the U.S. (e.g., UK, Canada, the E.U., Japan, and Switzerland), a crisis like Covid-19 saw these broadly expanded[clxxxii] to many others.

However, not all major foreign central banks have access to these facilities, most notably China. To cover this gap in its ability to manage global dollar funding markets, the New York Fed executes repo and reverse repo transactions through its foreign and international monetary authorities facility (FIMA[clxxxiii]). While not publicly acknowledged, it's understood that the dominant FIMA customer is China[clxxxiv]. This facility allows China to borrow dollars directly from the Fed without selling Treasury holdings. In a time of Treasury market stress driven by foreign selling of USTs like that seen in March 2020, the Fed will print new dollars and give those to China in exchange for UST collateral. One can see how this arrangement may become increasingly awkward as strategic tensions rise between the U.S. and China, especially as the latter attempts to de-dollarize[clxxxv] it's trade and selectively impair[clxxxvi] overseas dollar-debt holders (as seen in the Evergrande crisis). It may become especially problematic if China helps a sanctioned Russia access dollar-liquidity by acting as a middle-man to the UST market via FIMA.

As the G30 Working Group on Treasury Market Liquidity[clxxxvii] has noted, the smooth functioning of the U.S. debt market is absolutely imperative for the stability of the global financial system. As a result, the Fed has had to develop (and somewhat improvise) expansive facilities that increase the "moneyness" of USTs (e.g., it's fungibility as a "cash equivalent") and shore up this foundational layer of the world's monetary pyramid. These efforts have come in halting response to periodic disruptions to the Treasury in the post-GFC period: the first signs of disturbance appeared with the Flash Rally[clxxxviii] in 2014, then the Repo Spike[clxxxix] in 2019, and the particularly concerning sell-off[cxc] in March 2020, when the Fed purchased as much as $75 billion of Treasury securities, an amount comparable[cxci] to the highest monthly pace purchases following the Global Financial Crisis. In addition, while written-off as an "operational error", the technical failure of the FedWire system on February 25th, 2021 left a lasting imprint in the debt market.[cxcii]

One can view the Fed's actions as gradual attempts of managing the UST market, as any disorder in that market threatens U.S. national security. Active discussions of further controlling this market through Central Clearing[cxciii] of U.S. Treasury securities are underway as a mechanism to fix the spread on the core collateral used for leverage operations throughout the global monetary

system. This would allow the Fed to effectively cap credit rates without open market operations or explicit yield curve control, but at the cost of increasing centralization and creating a potential single-point of failure in the world's most critical asset.

However, these developments have not been driven to achieve a strategic objective or resulted from a considered plan linked to U.S. national security interests. Rather, they have emerged as mostly stop-gap emergency measures in response to crises in the increasingly unstable and interconnected global dollar system. While they have centered more responsibility and power in the hands of the Federal Reserve, they have also generated an enormous moral hazard across the financial system and allowed our adversaries to free-ride. Alternatives should be explored.

If one forgets for a moment the novel and unique aspects of Bitcoin, one can see the outlines of an arrangement that closely approximates the current "petrodollar" system. Just as that system is implicitly backed by energy (via the oil trade and the threat of U.S. military kinetic action), Bitcoin is a monetary asset directly linked to energy production (via the integration of mining with domestic grids and energy sources, giving us a plurality of global hashrate). Crypto-eurodollars, aka stablecoins, provide the bridge between the existing implicitly energy-linked dollar system and this new explicitly energy-anchored proof-of-work hybrid Bitcoin-dollar system.

In this system, as Bitcoin continues its volatile monetization and remains a low velocity asset principally used as a long-term store of value, USD fiat units would continue to serve as a global medium of exchange as well as domestic legal tender. During this period of transition, as the U.S. onshores more of global hashpower, accrues a disproportionate share of Bitcoin among its citizens, and uses crypto-eurodollar stablecoins to counter the e-RMB, the USD stands to at least holds its relative position as the reserve currency.

In a sense, we would be inserting a new commodity reserve asset (which in earlier systems was gold, and then oil) at the base of the monetary pyramid that currently rests on U.S. Treasuries. However, instead of replacing those bonds, it could rebuild confidence in those debts (and associated embedded social welfare and defense obligations) by placing the monetary sovereign from whom they issue on a more solid foundation.

Beyond these financial stability risks, one underappreciated vulnerability of our current system is cybersecurity risk. A recent New York Fed report[cxciv] found that a cyber-attack on U.S. banks can ripple through the wholesale payments network and that "impairment of any of the five most active U.S. banks will result in significant spillovers to other banks, with 38 percent of the network affected on average." After high profile breaches of Solarwinds[cxcv] (attributed to Russian actors) and Microsoft Exchange (attributed to Chinese APT Hafnium), Chairman Powell, in July 2021, said[cxcvi] that "I'd have to say that the thing that worries me the most is really cyber risk."

Advanced Persistent Threats (APTs) associated with Chinese military and intelligence agencies are among the most capable and aggressive actors that network defenders like the 100+ strong threat hunting force[cxcvii] at the Federal Reserve worry about. Meanwhile, the Cybersecurity and

Infrastructure Security Agency (CISA)—responsible for defending Federal networks and closely coordinating with private entities like the Financial Services Information Sharing and Analysis Center[cxcviii]— is "underfunded, outmatched and 'exhausted'[cxcix]." While attributed to "operational error", it isn't comforting that FedWire (a system that moves over $3 trillion each day) as well as a number of other critical services[cc] completely failed[cci] for a time earlier this year.

The Bitcoin network is exceptionally reliable and resilient. It continued to seamlessly process billions of dollars each day even as over half of the mining capacity[ccii] was suddenly stripped away by the China ban this summer. Further, the decentralized, heterogeneous nature of Bitcoin (mimicking the early internet designed as it was to survive a nuclear war) is the most secure, reliable, and resilient open computer network in existence. What the U.S. government and private companies have to spend billions each year on mostly ineffective cybersecurity defenses, the Bitcoin network has built endogenously, with its security improving as the network and mining expands.

Finally, **the U.S. economy is simply not large enough (as a percentage of the world economy) to indefinitely sustain its role as the global reserve currency**. Further, as noted above, playing this role for as long as we have has caused systemic damage to our domestic manufacturing and industrial capacity, made us vulnerable to fragile supply chains and reliant on our principal strategic adversary for most of our consumer imports as well as critical components for defense articles. It is apparent that the current petrodollar reserve currency system is fraying[cciii]. This system worked for a time, but no longer serves our interests.

Therefore, it is in our strategic national interest to seriously consider how Bitcoin can play a key role in an alternative model that helps preserve our global position and counter the malign plans of our adversaries.

Thesis 3: Bitcoin Promotes Our Values

America stands on its wealth, but stands *for* freedom. At the heart of our way of life, our national ethos, is a professed commitment to essential human rights like individual liberty, freedom of speech, personal privacy, and democratic choice. These values, under threat by illiberal and authoritarian states around the world, sit at the center of our strategic interest in promoting liberal democracy and protecting civil societies around the world. Anything that helps advance the cause of freedom thus helps advance this core national interest.

As the Human Rights Foundation[cciv] calls it, Bitcoin is freedom money. In particular, Bitcoin is a highly effective and practical tool being used now by refugees fleeing war, by democracy activists dodging state oppression, by impoverished populations protecting their wealth from hyperinflation and state collapse, and by the unbanked billions around the world accessing for the first time a savings vehicle that gives them a step up onto the economic ladder. Bitcoin mining is also inherently egalitarian.

There are few industries on earth with such low barriers to entry. Anyone with access to stranded, wasted, or otherwise favorable power sources and ASIC machines can mine. One is not required to own Bitcoin first to participate in the network in this way, so new issuance is not tied to stake. This is a new form of monetary equality (notably absent in other "Proof-of-Stake" cryptocurrencies) where global distribution of new issuance is entirely fair and open. There is no special advantage to early miners over new incumbents, and no unique governance power accrues to those with disproportionate endowment.

In addition to fostering the domestic mining industry, the U.S. government should encourage Bitcoin mining as part of its international development efforts[ccv]. The efforts are a key part of our global efforts to expand liberal values and counter Chinese influence. Local development projects involving Bitcoin mining can help bypass corrupt national governments, fund productivity-enhancing and clean energy projects, stimulate local economic growth and enable direct acquisition of dollars by underserved populations that lack effective access to domestic banking systems and capital markets.

As noted earlier in this essay, the adoption of Bitcoin by U.S. minority groups promises to help reduce the racial wealth gap and this should be encouraged prior to Wall Street derivative products geared toward the existing investor class. With wide and increasing adoption by these elements of our society, Bitcoin can help empower deeper participation in the economy. While Bitcoin, by itself, won't reverse the dramatic income equality we see today, it will help encourage the fruits of productivity gains to be more broadly shared by wage-earners, a class in our country which have seen their incomes stagnate even as CEO incentive-compensation has skyrocketed.

Looking further ahead, the tall stack of Layer 2 and 3 technologies that are rapidly emerging on top of the core Bitcoin protocol promise a radical expansion of tools and applications that enhance privacy, generate innovative financial products, and open new markets for creative expression and entrepreneurship. While somewhat speculative given their nascent stage, there is hope for these open-source software and self-hosting data tools to offer Americans a plausible path out of the walled, monopolistic gardens of our current tech oligopolies.

By embedding value transfer at the base layer of the network, Bitcoin enables communications applications that don't have to rely on advertising as the revenue model. Decentralized identity and self-hosting data platforms may, at scale, help disincentivize and eventually steer our society away from the malignant form of surveillance capitalism in which we find ourselves apparently trapped. If successful, such a transition of our social media and advertising industry could greatly mitigate the Mal-, Dis-, Mis-information[ccvi] vulnerabilities that are cleverly exploited by malign actors to sow discord in our society.

Net Assessment: Benefits and Risks

The post-1971 U.S. dollar system is showing signs of strain. The current Russia-Ukraine crisis has brought geopolitical tensions to the fore and threatens to rupture the delicate balance of financial flows and economic relationships upon which the U.S. has leveraged its global power and hegemonic status. Faith in fiat currency built on a foundation of ever expanding (and unsustainable) sovereign debt, while strong at the moment, is not invulnerable. U.S. adversaries may be posturing for a new monetary order that is recentered on a hard asset (i.e., gold) linked to energy (e.g., oil) and marginal control over the price of consumer goods and global supply chains. Russia and China stand to benefit from such a new (or really old) monetary system.

Bitcoin presents the U.S. with an opportunity to shape an alternative system that is also built on a hard asset (i.e., BTC) linked to energy (i.e., proof-of-work Bitcoin mining), and allow the U.S. to reverse the structural trade flows that have off-shored domestic manufacturing and made us acutely vulnerable to Chinese-dominated production and supply chains. Those benefits aside, there are several potential risks that such a system may present. In particular:

- Inflexible monetary policy: with a declining role for the UST market, Bitcoin's rise as an alternative neutral reserve asset will constrain monetary policy authorities and challenge their ability to control interest rates through open market operations or other Federal Reserve administrative facilities. Responsibility for economic intervention by the government will fall mostly to fiscal authorities, whose decisions on taxation and expenditure are subject to democratic mandate. This may impose limits on the scale of intervention in crisis situations and force more market adjustment for misallocation of capital. In a sense, this would involve trading off the long-term tail risk instability of the current system for more persistent, but hopefully manageable economic volatility.
- Protocol changes: The Bitcoin protocol is open source. Updates are made by rough consensus via a power balance between economic nodes and miners (within and across different geographic jurisdictions). As such, U.S. authorities will have no decisive power or control over how the protocol may evolve, in particular in ways that might limit future chain-analysis surveillance and financial monitoring. U.S. authorities will have to participate in these debates as a peer with other nations and their citizens, and use soft power influence to help shape the future direction of the protocol. There is no guarantee that future changes will not constrain current instruments of national power like sanctions designations, even if the current design of the protocol makes tracking and designating public addresses relatively easy for law enforcement.
- Domestic and international shifts in economic power: Any dramatic increase in the value of Bitcoin will result in new power centers concentrated in those states and nations early to adopt. Domestically, this will manifest as an increase in the economic power of states that have abundant energy resources (especially excess renewables or stranded assets) and/or have attracted Bitcoin holders and companies to their locales. Internationally, the story will be similar, with currently marginal states (like El Salvador, Singapore, and Gulf States) that are early to Bitcoin seeing a relatively dramatic rise in their national wealth, and associated

influence. This could have unanticipated effects on U.S. foreign policy and how we engage with changing power blocs built around an alignment with Bitcoin and Bitcoin mining.

- **Increasing reliance on overseas chip fabrication:** Almost all Bitcoin mining hardware is manufactured overseas and relies on microchips from a limited number of advanced semiconductor foundries in Asia. If Bitcoin (and Bitcoin mining) becomes systemically important to the U.S. economy, this reliance may present a strategic vulnerability. While there are ongoing efforts to re-shore this production, the geographic concentration of mining hardware supply chains will remain an area of strategic national interest (similar to how the DoD views semiconductors inputs for the Defense Industrial Base.)
- **Unanticipated effects on domestic and international energy production:** As a geographically independent and interruptible source of demand for low-cost energy, Bitcoin mining may have a dramatic effect on energy markets and power systems. While the net effect of these changes is likely to be very positive (as noted above with respect to the incentives for renewables and grid stabilization), the resulting shifts could be disruptive if not well managed. Domestically, grids that offer ancillary services may attract Bitcoin miners at the expense of other grid systems, which could have second-order consequences setting up a new form of competition among regional energy grids that are currently economically independent. Internationally, nations with large, stranded energy resources may become new loci attracting Bitcoin mining, which given the global nature of the market will open up intense competition. If Bitcoin mining becomes tightly integrated into the domestic grid, and are suddenly attracted to a new, more competitive jurisdiction or region, this may cause local disruption that authorities may seek to manage and mitigate.
- **Adversary attack:** As a proof of work system, the rules of the protocol require all nodes to only accept as valid those blockchain histories that have the most demonstrated energy expenditure (i.e., the longest chain). Thus, the only way to double-spend a transaction or mine empty blocks or otherwise disrupt the normal functioning of the network is for an entity to acquire and deploy at least 51% mining "hashpower". While such an attack will require immense resources and planning (and may end up being self-defeating), it cannot be entirely ruled out as impossible. Therefore, the game theory of such an attack requires careful analysis, and analytical red teaming, to identify scenarios in which the network would be vulnerable, assess the resources necessary to execute them, and determine the risk-weighted relative likelihood of their success, given potential future conditions of the network. This is an area that needs continued research and study, especially as the network adoption grows, hashpower concentration changes, and mining hardware supply chains evolve.
- **Other, unanticipated risks:** Bitcoin is a novel monetary asset, with only 13 years of market behavior and technical functioning under its belt. While it has been extraordinarily reliable as a network, and its decentralization makes it very difficult to manipulate, it is hard to rule out "unknown unknowns" that could emerge in the future and threaten the stability or functioning of the network. The Bitcoin community as a distributed collective is always on the look-out for potential threats and risks, but completely unknown, unanticipated issues are possible.

Conclusion

It is difficult for legacy institutions to acknowledge that the structures that underpin their power need reform. It is natural for incumbents to view the systems they spent their careers building as necessary and good; to view any challenge as a threat, and innovation as a concern. This is understandable at a human level. At the level of national security and geopolitical strategy, however, it is counterproductive. Preconception bias and cognitive inertia are limiting in an era of rapid change. **Those who fail to adapt, fail.**

Our adversaries are positioning themselves for, and trying to bring about, a radically different international order. Individuals around the world (including tens of millions of our own citizens) are opting into an emerging monetary order, with Bitcoin as its new foundation. This order is one in which America can maintain and extend its inherent sources of national power, while holding resurgent and destructive illiberal forces at bay**. Bitcoin, if it succeeds at home and abroad, can help the U.S. and it's liberal allies achieve our enduring objective to "keep the world safe for democracy."**

As President Biden himself has proclaimed, "This moment is an inflection point. We are in the midst of a fundamental debate about the future direction of our world. To prevail, we must demonstrate that democracies can still deliver for our people." If we expect to deliver on these promises – to present and future generations – we must think differently.

In this moment of crisis, the time for such thinking is now.

About the Author

Matthew Pines is a National Security Fellow at the Bitcoin Policy Institute. He is also a management consultant with over ten years of experience advising the U.S. government and the private sector on critical security and resilience challenges. He has conducted dozens of assessments of national preparedness, emerging technology, and strategic national programs for several government agencies.

He is an expert at executing wargames, exercises, technology experiments, and other analytical activities to help solve complex security challenges and inform strategic planning. His analysis has been used to drive decision-making by senior officials across the government to mitigate risk, adapt policy, and foster innovation.

At the Bitcoin Policy Institute, Mr. Pines applies strategic foresight, risk assessment, and policy analysis methodologies to evaluate how Bitcoin intersects with national security issues. His objective is to help policymakers understand the implications of emerging technologies like Bitcoin to minimize identifiable risks and maximize potential benefits to the Nation.

Mr. Pines holds a master's degree in Philosophy and Public Policy (with Distinction) from the London School of Economics and Political Science and a bachelor's degree in Physics and Philosophy (with Honors) from Johns Hopkins University.

The views expressed in this report and elsewhere on this topic are his own and do not express the views or opinions of his employer.

About the Bitcoin Policy Institute

Who We Are

The Bitcoin Policy Institute is an interdisciplinary cohort of economists, coders, lawyers, climate scientists, philosophers, and policy analysts providing research, fact-checking, and commentary on Bitcoin.

Bitcoin may well change society's relationship with money as profoundly as the internet did with information. Future policy debates on issues ranging from national security to central bank digital currencies will require a robust understanding of the Bitcoin network.

Currently, few institutions are focused on the topic and mainstream writing is still playing catch up to the realities of the technology, with technical facts frequently misstated and new developments often ignored. BPI was formed to change that.

What We Do

We are in a period of rapid growth for Bitcoin, comparable to mass-adoption of the Internet in the 90's. Like any new technology, mass-adoption of Bitcoin presents serious policy and ethical questions. To unlock the full potential of this network while properly managing risks, policymakers need high quality information.

BPI's experts study Bitcoin's implications for the U.S., technology-driven globalization, and the future of finance to provide insights that help policymakers continue to position America as the global leader in technology and innovation.

As a 501(c)3 public charity, the Bitcoin Policy Institute:

- Produces articles, videos, and infographics with key facts on Bitcoin;
- Connects journalists with Bitcoin experts;
- Conducts rigorous research on relevant topics to Bitcoin such as its environmental impact and national security implications;
- Analyzes and assesses media coverage on Bitcoin to find errors and correct mistakes;
- Fosters discourse, with diverse perspectives, across the ideological spectrum

For more information, please contact David Zell, david.zell@b.tc

List of Figures

Endnotes

[i]https://www.whitehouse.gov/wp-content/uploads/2021/03/NSC-1v2.pdf
[ii]https://www.whitehouse.gov/wp-content/uploads/2021/03/NSC-1v2.pdf
[iii]https://www.whitehouse.gov/wp-content/uploads/2021/03/NSC-1v2.pdf
[iv]https://www.defense.gov/About/Office-of-the-Secretary-of-Defense/Office-of-Net-Assessment/
[v]https://hassmccook.medium.com/the-economic-environmental-cost-of-Bitcoin-part-iv-perfect-competition-Bitcoin-9f31156034ae
[vi]https://stats.buyBitcoinworldwide.com/fees-percent-of-reward/
[vii]https://Bitcoin.org/Bitcoin.pdf
[viii]https://philpapers.org/rec/WARWIB
[ix]https://river.com/learn/what-is-a-Bitcoin-improvement-proposal-bip/
[x]https://www.coindesk.com/markets/2020/06/05/coinbase-offers-us-feds-new-crypto-surveillance-tools/
[xi]https://www.cnn.com/2021/11/30/politics/cryptocurrency-seized-fbi-ransomeware-attacks/index.html
[xii]https://www.theblockcrypto.com/post/67551/coinbase-irs-dea-analytics-neutrino
[xiii]https://blog.chainalysis.com/reports/2022-crypto-crime-report-introduction/
[xiv]https://www.jdsupra.com/legalnews/revised-fincen-advisory-warns-financial-9373219/
[xv]https://strike.me/en/
[xvi]https://medium.com/breez-technology/podcasts-on-breez-streaming-sats-for-streaming-ideas-d9361ae8a627
[xvii]https://blog.twitter.com/en_us/topics/product/2021/bringing-tips-to-everyone
[xviii]https://usa.visa.com/solutions/crypto.html
[xix]https://www.mastercard.com/news/press/2021/october/mastercard-and-bakkt-partner-to-offer-innovative-crypto-and-loyalty-solutions/
[xx]https://www.coindesk.com/tech/2021/08/23/substack-rolls-out-Bitcoin-payments-via-opennode-and-lightning-network/
[xxi]https://Bitcoinmagazine.com/technical/dids-built-on-Bitcoin-fix-the-web
[xxii]https://www.cnbc.com/2021/10/05/Bitcoin-custody-us-bank-launches-service-as-institutions-race-to-cater-to-crypto-demand.html
[xxiii]https://www.amazon.com/Blocksize-War-controls-Bitcoins-protocol/dp/B08YQMC2WM
[xxiv]https://btctools.io/stats/dominance
[xxv]https://www.wsj.com/articles/cryptos-defi-projects-arent-immune-to-regulation-secs-gensler-says-11629365401#:~:text=The%20term%20DeFi%20is%20%E2%80%9Ca,highly%20centralized%20in%20other%20aspects.%E2%80%9D
[xxvi]https://insuredfinance.medium.com/over-1-billion-in-defi-hacks-in-2021-ee8e5811b19
[xxvii]https://en.Bitcoin.it/wiki/Common_Vulnerabilities_and_Exposures
[xxviii]https://www.newsweek.com/46-million-americans-now-own-Bitcoin-crypto-goes-mainstream-1590639#:~:text=About%2046%20million%20Americans%20now,plans%E2%80%94including%20their%20life%20insurance.
[xxix]https://theharrispoll.com/speculative-investing-april-2021/
[xxx]https://theharrispoll.com/wp-content/uploads/2021/04/Harris-Poll_Speculative-Investing_Data-Tables_March-2021.pdf
[xxxi]https://assets-global.website-files.com/614e11536f66309636c98688/616db2743df0d03cf3824093_NYDIG-Survey-Bitcoin-Banking.pdf
[xxxii]https://twitter.com/woonomic/status/1356310219215699968?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1356310219215699968%7Ctwgr%5E%7Ctwcon%5Es1_&ref_url=https%3A%2F%2Fd-2433403441316075648 9.ampproject.net%2F2110152252002%2Fframe.html
[xxxiii]https://www.forbes.com/sites/theapothecary/2021/10/07/in-el-salvador-more-people-have-Bitcoin-wallets-than-traditional-bank-accounts/?sh=264c471320b5
[xxxiv]https://www.bloomberg.com/news/articles/2021-07-29/state-street-to-offer-crypto-services-to-private-fund-clients
[xxxv]https://Bitcoin.org/en/faq#what-is-Bitcoin
[xxxvi]https://www.lopp.net/Bitcoin-information.html
[xxxvii]https://fermatslibrary.com/s/Bitcoin
[xxxviii]https://www.youtube.com/playlist?list=PLPQwGV1aLnTuN6kdNWlElfr2tzigB9Nnj
[xxxix]https://endthefud.org/
[xl]https://www.federalreservehistory.org/essays/bretton-woods-created
[xli]https://history.state.gov/milestones/1969-1976/nixon-shock
[xlii]https://www.federalreservehistory.org/essays/great-inflation
[xliii]https://www.nytimes.com/1974/06/09/archives/milestone-pact-is-signed-by-us-and-saudi-arabia-acclaimed-by.html
[xliv] https://www.federalreservehistory.org/essays/anti-inflation-measures
[xlv]https://www.oecd.org/economy/decoupling-of-wages-from-productivity/
[xlvi]https://history.state.gov/milestones/1989-1992/collapse-soviet-union
[xlvii]https://www.frbsf.org/economic-research/files/wp11-22bk.pdf
[xlviii]https://www.wsj.com/articles/how-china-swallowed-the-wto-1509551308
[xlix]https://fred.stlouisfed.org/series/FEDFUNDS
[l]https://www.pgpf.org/blog/2020/10/what-are-overseas-contingency-operations
[li]https://en.Bitcoin.it/wiki/Genesis_block
[lii]https://www.cepal.org/sites/default/files/news/files/s1900341_en.pdf
[liii]https://twitter.com/LukeGromen/status/1487160846782455810

[liv]https://hbr.org/2020/02/how-much-money-does-the-world-owe-china
[lv]https://interactives.lowyinstitute.org/charts/china-us-trade-dominance/us-china-competition/
[lvi]https://greenfdc.org/countries-of-the-belt-and-road-initiative-bri/
[lvii]https://www.scmp.com/economy/global-economy/article/3161707/what-rcep-worlds-largest-free-trade-deal-under-way
[lviii]https://www.jpost.com/international/article-695713
[lix]https://www.jpost.com/international/china-iran-expected-to-sign-25-year-accord-iranian-state-media-says-663324
[lx]https://www.globaltimes.cn/page/202202/1251555.shtml
[lxi]https://www.wsj.com/articles/as-oil-nears-100-saudis-snub-u-s-stick-to-russian-pact-amid-ukraine-crisis-11645015415
[lxii]https://www.timesofisrael.com/israel-torpedoed-sale-of-iron-dome-to-ukraine-fearing-russian-reaction-report/
[lxiii]https://www.russia-briefing.com/news/russia-to-provide-brazil-with-nuclear-power-plants-fertilizer.html/
[lxiv]https://www.bloomberg.com/news/articles/2022-01-25/germany-has-sought-energy-exemption-in-russia-finance-sanctions
[lxv]https://www.osw.waw.pl/en/publikacje/osw-commentary/2022-02-04/germany-and-trade-conflict-between-lithuania-china
[lxvi]https://fred.stlouisfed.org/series/FYFSD
[lxvii]https://fred.stlouisfed.org/series/GFDEBTN
[lxviii]https://6a29c7c5-4d35-4429-8c98-d306824aff19.filesusr.com/ugd/dc7287_15b99549af024013a0a0d377065bf39f.pdf
[lxix]https://www.ceicdata.com/en/indicator/japan/net-international-investment-position#:~:text=Japan%20Net%20International%20Investment%20Position%20reached%203%2C740.718%20USD%20bn%20in.bn%20in%20the%20previous%20quarter
[lxx]https://www.bloomberg.com/news/articles/2020-12-06/boj-becomes-biggest-japan-stock-owner-with-434-billion-hoard
[lxxi]https://www.brookings.edu/wp-content/uploads/2021/06/Social-and-economic-impact-COVID.pdf
[lxxii]https://www.brookings.edu/wp-content/uploads/2021/06/Social-and-economic-impact-COVID.pdf
[lxxiii]https://www.brookings.edu/research/social-and-economic-impact-of-covid-19/
[lxxiv]https://www.nber.org/system/files/working_papers/w15815/w15815.pdf
[lxxv]https://www.bridgewater.com/big-debt-crises/principles-for-navigating-big-debt-crises-by-ray-dalio.pdf
[lxxvi]https://www.barrons.com/articles/fed-economic-policy-powell-inflation-51631120497
[lxxvii] https://eml.berkeley.edu/~eichengr/managing_multiple_res_curr_world.pdf
[lxxviii] https://www.federalreserve.gov/econres/notes/feds-notes/the-international-role-of-the-u-s-dollar-20211006.htm
[lxxix] https://eml.berkeley.edu/~eichengr/managing_multiple_res_curr_world.pdf
[lxxx] https://www.wsj.com/articles/if-currency-reserves-arent-really-money-the-world-is-in-for-a-shock-11646311306
[lxxxi] https://www.axios.com/scoop-senators-look-to-lock-down-russias-gold-reserves-04c6c7bb-cc32-4e72-981e-fa972c31a1a4.html
[lxxxii]https://hbr.org/2021/05/the-strategic-challenges-of-decoupling
[lxxxiii]https://www.scmp.com/news/china/diplomacy/article/3149792/us-china-trade-war-did-not-bring-american-firms-home-research
[lxxxiv]https://www.usnews.com/news/business/articles/2022-01-13/chinas-trade-surplus-surges-to-record-676-4b-in-2021
[lxxxv]https://www.lynalden.com/fraying-petrodollar-system/
[lxxxvi]https://www.forbes.com/sites/masonbissada/2021/10/21/new-nba-china-controversy-tencent-drops-celtics-games-after-kanter-calls-jinping-brutal-dictator/?sh=38a8e2312ad0
[lxxxvii]https://www.axios.com/marriott-uyghur-conference-d6deb429-9b5e-4759-ba10-98d59e81be12.html
[lxxxviii]https://thehill.com/opinion/international/560559-from-the-big-screen-to-boardrooms-china-is-tightening-grips-on-us
[lxxxix]https://wolfstreet.com/2020/02/19/who-bought-the-1-3-trillion-in-debt-the-us-government-added-to-its-23-tn-pile-in-12-months/
[xc] https://plus2.credit-suisse.com/shorturlpdf.html?v=4ZR9-WTBd-V
[xci]https://trumpwhitehouse.archives.gov/wp-content/uploads/2018/09/National-Cyber-Strategy.pdf
[xcii]https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf
[xciii] https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf
[xciv]https://www.dhs.gov/sites/default/files/publications/dhs_strategic_framework_10.20.21_final_508.pdf
[xcv]https://nps.edu/documents/115559645/121916825/2020+Dist+A+EOPOTUS+National+Strategy+for+Critical+%26+Emerging+Tech+Oct+2020.pdf/1543be15-a2ae-3629-7a45-aabdecaedb84?t=1602805142602
[xcvi]https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/Pollinator%20Health%20Strategy%202015.pdf
[xcvii]https://digitalarchive.wilsoncenter.org/document/116178.pdf
[xcviii]https://www.atlanticcouncil.org/wp-content/uploads/2021/01/The-Longer-Telegram-Toward-A-New-American-China-Strategy.pdf
[xcix]https://www.crunchbase.com/hub/united-states-Bitcoin-companies
[c] https://cointelegraph.com/news/fidelity-analyst-Bitcoin-price-up-down-debate-mostly-noise-watch-network-s-apple-esque-growth
[ci]https://cointelegraph.com/news/us-dominates-global-Bitcoin-hash-rate-distribution-after-china-crackdown
[cii]https://www.washingtonpost.com/world/2021/10/14/us-leads-china-Bitcoin-mining-largest/
[ciii]https://assets.ctfassets.net/2d5q1td6cyxq/5mRjc9X5LTXFFihIITt7QK/e7bcba47217b60423a01a357e036105e/BCEI_White_Paper.pdf
[civ]https://www.prnewswire.com/news-releases/lancium-and-mp2-energy-offer-unique-energy-demand-response-solution-for-high-throughput-computing-and-cryptocurrency-miners-301080410.html
[cv]https://www.energy.gov/ne/advanced-small-modular-reactors-smrs
[cvi]https://www.world-nuclear-news.org/Articles/Oklo-to-power-Bitcoin-mining-machines
[cvii] https://www.datacenterdynamics.com/en/news/prti-makes-cryptocurrency-from-old-car-tires-in-northern-carolina/
[cviii] https://www.powermag.com/group-buys-pennsylvania-coal-plants-to-power-Bitcoin-mining/

[cix] https://www.yahoo.com/now/vgrid-energy-systems-finds-solution-201400729.html
[cx] https://www.resistance.money/green/
[cxi] https://www.coindesk.com/policy/2021/10/05/want-cleaner-Bitcoin-mining-subsidize-it/
[cxii] https://docs.google.com/document/d/1N2N-5jY00cmteoY_puWI9oosM1foa4EQqs01FFfIFR4/edit
[cxiii] https://www.eia.gov/energyexplained/us-energy-facts/imports-and-exports.php
[cxiv] https://www.cnbc.com/2021/09/04/bitcoin-miners-oil-and-gas-execs-talk-about-natural-gas-mining.html
[cxv] https://assets.ctfassets.net/2d5q1td6cyxq/5mRjc9X5LTXFFihIlTt7QK/e7bcba47217b60423a01a357e036105e/BCEI_White_Paper.pdf
[cxvi] https://Bitcoinmagazine.com/business/Bitcoin-mining-fits-texas-energy-grid
[cxvii] https://www.wsj.com/articles/Bitcoin-miners-eye-nuclear-power-as-environmental-criticism-mounts-11632654002#:~:text=New%20nuclear%20projects%20are%20eyeing,and%20hosting%20firm%20Compass%20Mining.&text=Mining%20Bitcoin%20is%20an%20energy%2Dintensive%20process
[cxviii] https://www.cisa.gov/national-critical-functions
[cxix] https://www.bnnbloomberg.ca/panthers-russell-okung-becomes-first-nfl-player-to-be-paid-in-Bitcoin-1.1542008#:~:text=The%20tackle%20will%20be%20receiving,a%20proponent%20of%20the%20cryptocurrency
[cxx] https://www.cnn.com/videos/business/2021/11/07/eric-adams-new-york-city-mayor-elect-on-why-he-wants-to-be-paid-in-Bitcoin-bash-intv-sotu-vpx.cnn
[cxxi] https://www.newamerica.org/family-centered-social-policy/reports/racialized-costs-banking/the-racialized-costs-of-banking/
[cxxii] https://www.theguardian.com/business/2019/feb/17/african-american-small-business-growth-investment
[cxxiii] https://www.federalreserve.gov/econres/notes/feds-notes/disparities-in-wealth-by-race-and-ethnicity-in-the-2019-survey-of-consumer-finances-20200928.htm
[cxxiv] https://theharrispoll.com/wp-content/uploads/2021/04/Harris-Poll_Speculative-Investing_Data-Tables_March-2021.pdf
[cxxv] https://www.blackBitcoinbillionaire.com/
[cxxvi] https://www.amazon.com/Bars-Bitcoin-Justin-Rhedrick-ebook/dp/B09F71LN3Q
[cxxvii] https://Bitcoinandblackamerica.com/
[cxxviii] https://www.cnbc.com/2021/01/11/just-39percent-of-americans-could-pay-for-a-1000-emergency-expense.html
[cxxix] https://www.abi.org/feed-item/health-care-costs-number-one-cause-of-bankruptcy-for-american-families
[cxxx] https://literacygulfcoast.org/2017/10/illiteracy-impacts-us-all/#:~:text=44%20million%20adults%20are%20unable,simple%20story%20to%20their%20children%3B&text=45%20million%20are%20functionally%20illiterate,single%20book%20in%20a%20year
[cxxxi] https://literacygulfcoast.org/2017/10/illiteracy-impacts-us-all/#:~:text=44%20million%20adults%20are%20unable,simple%20story%20to%20their%20children%3B&text=45%20million%20are%20functionally%20illiterate,single%20book%20in%20a%20year
[cxxxii] https://www.newyorkfed.org/microeconomics/hhdc
[cxxxiii] https://www.bls.gov/cpi/
[cxxxiv] https://quillette.com/2020/06/11/the-coming-of-neo-feudalism-a-review/
[cxxxv] https://blogs.imf.org/2020/11/30/how-the-rich-get-richer/
[cxxxvi] https://blogs.imf.org/2020/11/30/how-the-rich-get-richer/
[cxxxvii] https://www.bloomberg.com/opinion/articles/2020-04-02/trump-s-overuse-of-sanctions-is-weakening-their-effectiveness
[cxxxviii] https://www.ft.com/content/69421aa4-f86d-4c64-bd83-0f8402a65db5
[cxxxix] https://www.bloomberg.com/news/articles/2021-04-15/u-s-poised-to-impose-russia-sanctions-over-election-solarwinds
[cxl] https://www.reuters.com/article/usa-northkorea-china/u-s-accuses-china-of-flagrant-n-korea-violations-offers-5-million-reward-idUSKBN28B540
[cxli] https://www.middleeasteye.net/news/europes-trade-mechanism-iran-evading-us-sanctions-now-effect
[cxlii] https://www.btcpolicy.org/blog/no-Bitcoin-wont-save-russia-from-western-sanctions
[cxliii] https://www.politico.com/news/2022/02/25/russia-crypto-sanctions-00011886
[cxliv] https://www.elliptic.co/blog/live-updates-millions-in-crypto-crowdfunded-for-the-ukrainian-military
[cxlv] https://www.reuters.com/markets/europe/rouble-crypto-trading-soars-sanctions-hit-russian-currency-2022-02-28/
[cxlvi] https://www.banking.senate.gov/imo/media/doc/Singh%20Testimony%209-12-18.pdf
[cxlvii] https://www.marketwatch.com/story/china-really-is-to-blame-for-millions-of-lost-us-manufacturing-jobs-new-study-finds-2018-05-14
[cxlviii] https://www.cdc.gov/nchs/pressroom/nchs_press_releases/2021/20211117.htm
[cxlix] https://ustr.gov/about-us/policy-offices/press-office/press-releases/2022/february/ustr-releases-annual-report-chinas-wto-compliance
[cl] https://news.usni.org/2021/06/23/milley-china-wants-capability-to-take-taiwan-by-2027-sees-no-near-term-intent-to-invade
[cli] https://www.washingtonpost.com/national-security/2021/10/26/us-taiwan-china/
[clii] https://www.rand.org/content/dam/rand/pubs/research_reports/RR1100/RR1140/RAND_RR1140.pdf
[cliii] https://www.nytimes.com/2020/07/05/business/china-medical-supplies.html
[cliv] https://www.reuters.com/article/china-swift-pboc/update-1-swift-sets-up-jv-with-chinas-central-bank-idUSL1N2KA0MS
[clv] https://asia.nikkei.com/Spotlight/The-Big-Story/Will-China-s-digital-yuan-vanquish-the-dollar
[clvi] https://research-center.amundi.com/article/rmb-internationalisation-new-commanding-heights
[clvii] https://research-center.amundi.com/article/rmb-internationalisation-new-commanding-heights
[clviii] https://www.ft.com/content/128d7139-15d6-4f4d-a247-fc9228a53ebd
[clix] https://www.cnbc.com/2021/11/30/mi6-risk-of-chinese-miscalculation-through-overconfidence-is-real.html

[clx] https://www.bloomberg.com/news/articles/2021-11-03/china-s-pboc-says-digital-yuan-users-have-surged-to-140-million
[clxi] https://www.bloomberg.com/news/articles/2021-09-23/china-s-casino-crackdown-part-of-bigger-quest-to-transform-macau
[clxii] https://en.wikipedia.org/wiki/Legality_of_Bitcoin_by_country_or_territory#/media/File:Legal_status_of_Bitcoin.svg
[clxiii] https://www.washingtonpost.com/world/2021/10/14/us-leads-china-bitcoin-mining-largest/
[clxiv] https://Bitcoinmagazine.com/business/russia-is-benefiting-from-the-great-chinese-Bitcoin-miner-migration
[clxv] https://www.bis.org/publ/bppdf/bispap114.pdf
[clxvi] https://www.atlanticcouncil.org/cbdctracker/
[clxvii] https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf
[clxviii] https://www.euronews.com/next/2022/02/09/russia-s-government-and-central-bank-agree-to-treat-cryptos-as-currency
[clxix] https://www.nytimes.com/2022/02/03/world/europe/putin-sanctions-proofing.html
[clxx] https://www.reuters.com/world/europe/russia-china-tell-nato-stop-expansion-moscow-backs-beijing-taiwan-2022-02-04/
[clxxi] https://www.brookings.edu/articles/russia-the-21st-centurys-energy-superpower/
[clxxii] https://coinmarketcap.com/view/stablecoin/
[clxxiii] https://jumpcap.com/insights/stablecoins-the-impending-rise-of-a-multi-trillion-dollar-market
[clxxiv] https://www.bloomberg.com/news/articles/2021-11-03/china-s-pboc-says-digital-yuan-users-have-surged-to-140-million
[clxxv] https://www.federalreserve.gov/newsevents/speech/quarles20210628a.htm
[clxxvi] https://www.thelykeion.com/the-long-term-dollar-shortage/
[clxxvii] https://apnews.com/article/cryptocurrency-technology-business-financial-markets-government-regulations-17af882047b89238410bed7a653d73e6
[clxxviii] https://www.brookings.edu/research/fed-response-to-covid19/
[clxxix] https://www.federalreserve.gov/aboutthefed/section13.htm
[clxxx] https://www.newyorkfed.org/markets/domestic-market-operations/monetary-policy-implementation/repo-reverse-repo-agreements
[clxxxi] https://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm
[clxxxii] https://www.federalreserve.gov/newsevents/pressreleases/monetary20200319b.htm
[clxxxiii] https://www.federalreserve.gov/monetarypolicy/fima-repo-facility.htm
[clxxxiv] https://fedguy.com/china-repo-facility/
[clxxxv] https://www.everycrsreport.com/files/2021-07-23_IF11885_09a6986fb2de221b83de761f118062ca2def8737.pdf
[clxxxvi] https://asia.nikkei.com/Business/Markets/China-debt-crunch/Evergrande-favors-domestic-investors-as-default-looms
[clxxxvii] https://group30.org/publications/detail/4950
[clxxxviii] https://libertystreeteconomics.newyorkfed.org/2019/10/from-the-vault-a-look-back-at-the-october-15-2014-flash-rally/
[clxxxix] https://www.federalreserve.gov/econres/notes/feds-notes/what-happened-in-money-markets-in-september-2019-20200227.htm
[cxc] https://www.brookings.edu/blog/up-front/2020/05/01/how-did-covid-19-disrupt-the-market-for-u-s-Treasury-debt/
[cxci] https://docs.google.com/document/d/1TtqD-cwxkj0Ues5jbfaagXmDFjX3AeBjoYN_n45if1Q/edit
[cxcii] https://www.reuters.com/article/us-usa-fed-fedwire/fedwire-resumes-operations-after-hourslong-disruption-idUSKBN2A02I1
[cxciii] https://www.dtcc.com/news/2021/may/25/dtcc-highlights-need-for-increased-adoption-of-central-clearing-in-us-Treasury-market
[cxciv] https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr909.pdf
[cxcv] https://www.npr.org/2021/04/16/985439655/a-worst-nightmare-cyberattack-the-untold-story-of-the-solarwinds-hack
[cxcvi] https://www.forbes.com/sites/mayrarodriguezvalladares/2021/07/15/what-is-federal-reserve-chair-jerome-powells-biggest-worry/?sh=55419efa4a86
[cxcvii] https://foreignpolicy.com/2014/04/29/exclusive-meet-the-feds-first-line-of-defense-against-cyber-attacks/
[cxcviii] https://www.fsisac.com/
[cxcix] https://www.politico.com/news/2021/03/30/cisa-cybersecurity-problems-478413
[cc] https://www.frbservices.org/app/status/serviceStatus.do
[cci] https://arstechnica.com/tech-policy/2021/02/fed-outage-shuts-down-us-payment-systems-for-more-than-an-hour/
[ccii] https://Bitcoinvisuals.com/chain-hash-rate
[cciii] https://www.lynalden.com/fraying-petrodollar-system/
[cciv] https://hrf.org/why-Bitcoin-matters-for-freedom/
[ccv] https://Bitcoinmagazine.com/culture/Bitcoin-is-humanitarian-and-environmental
[ccvi] https://www.cisa.gov/mdm