# Macro news and views

## We provide a brief snapshot on the most important economies for the global markets

### US

**Latest GS proprietary datapoints/major changes in views**

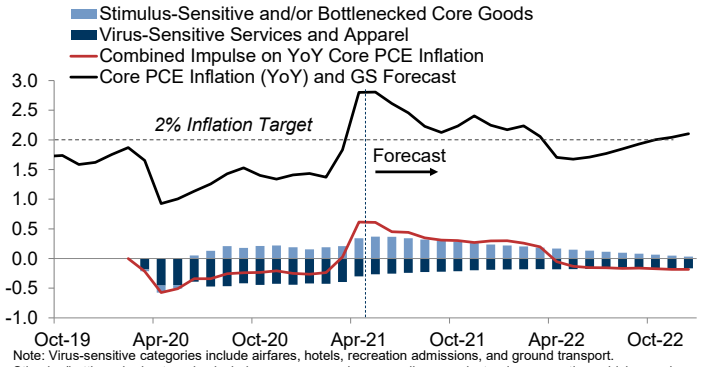
- We now expect core PCE inflation to peak at 2.8% in May and fall to 2.25% by year-end 2021 after the strong April CPI print.

**Datapoints/trends we're focused on**

- Taper timeline; we think the Fed will only start to hint at tapering in 2H21 and begin to taper in early 2022.
- Fed liftoff; if our taper timeline is right, then liftoff will probably not be on the table for about two years.
- Unemployment; we expect a somewhat less front-loaded jobs recovery, but still see unemployment at 4% by year-end 2021.

### Pandemic distortions to core inflation should peak soon

Core PCE and contributions to its 2020-22 deviation from trend




Note: Virus-sensitive categories include airfares, hotels, recreation admissions, and ground transport. Stimulus/bottlenecked categories include new cars, used cars, appliances, electronics, recreation vehicles, and miscellaneous core goods. Trend calculated as the 2015-2019 category average. April 2021 reflects GS nowcast based on available source data.

*Source: Department of Commerce, Haver Analytics, Goldman Sachs GIR.*

### Japan

**Latest GS proprietary datapoints/major changes in views**

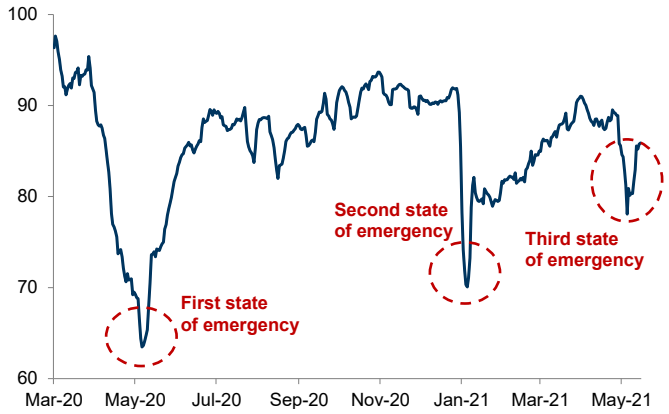
- We lowered our 2Q21 and CY21 real GDP growth forecasts to 1.8% qoq ann. and 2.6%, respectively, after the imposition of a third state of emergency, and see a more back-loaded recovery.

**Datapoints/trends we're focused on**

- Pent-up demand, which should boost spending by ¥3.1tn (1% of consumption) and ¥3.9tn (1.3%) in the first and second years after reopening, respectively.
- Fiscal policy; additional support is a possibility.
- BoJ policy; we expect the status quo in policy to remain for a long time with little impact from the inflation outlook.

### Third state of emergency delays recovery

Aggregate mobility index, index (1/3-2/6/2020 =100)




*Source: Google LLC "Google COVID-19 Community Mobility Reports"; https://www.google.com/covid19/mobility/. Accessed: 5/20/21. Goldman Sachs GIR.*

### Europe

**Latest GS proprietary datapoints/major changes in views**

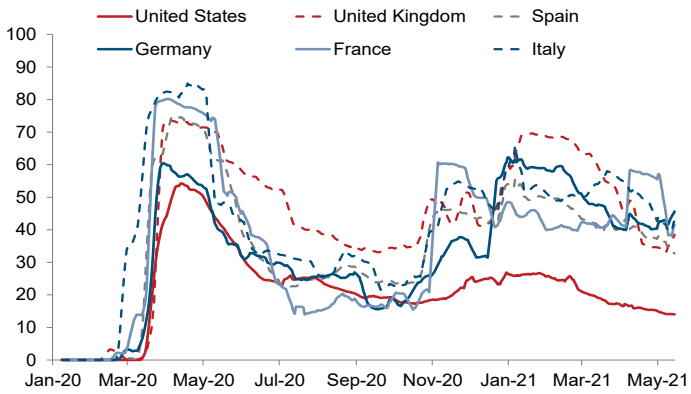
- We raised our 2021 UK GDP forecast to 8.1% based on upward revisions to GDP and stronger growth momentum.

**Datapoints/trends we're focused on**

- Euro area lockdowns, which should continue to loosen ahead of a summer reopening, supporting a growth surge.
- Tourism season; delaying int'l travel into early August would reduce av. growth in Southern Europe by 0.25 pp in Q2/Q3.
- Vaccine pace, which has more than doubled since March, putting the Euro area on track to vaccinate 50% of the pop. by mid-June.

### Europe still facing much tighter restrictions than US

GS Effective Lockdown Index, index




*Source: University of Oxford, "Google COVID-19 Community Mobility Reports"; https://www.google.com/covid19/mobility/. Accessed: 5/20/21, Goldman Sachs GIR.*

### Emerging Markets (EM)

**Latest GS proprietary datapoints/major changes in views**

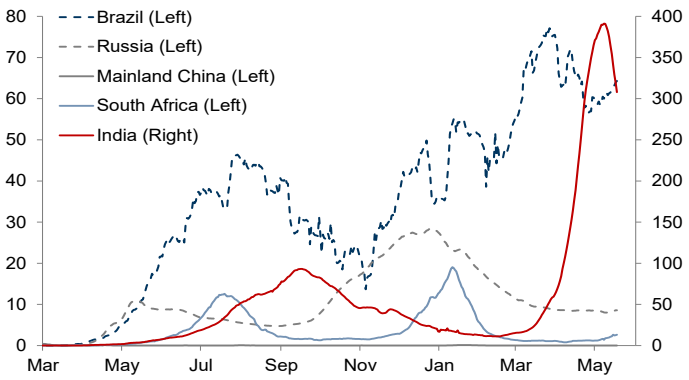
- We lowered our Q2 and full-year 2021 India real GDP growth forecasts to -20.5% qoq ann. and 9.7% yoy, respectively.

**Datapoints/trends we're focused on**

- Virus growth, which remains high in India and parts of LatAm.
- China turning point; with the V-shaped recovery complete, the policy focus is shifting to long-term stability and growth.
- Impact of rising US yields, particularly rising real rates, which remains a key risk for EMs.
- Rising oil prices; we see Brent crude prices rising to $75/bbl over 3m, which should support EM HY oil exporters.

### A COVID-19 tidal wave for parts of EM

Daily change in confirmed cases (7dma), thousands




*Source: JHU, Goldman Sachs GIR.*

# Crypto: a new asset class?

With cryptocurrency prices remaining extremely volatile on news about regulatory crackdowns, environmental concerns and heightened tax scrutiny even as interest in crypto assets from credible investors has been rising and legacy financial institutions—including ourselves—have been launching new crypto offerings, crypto is undoubtedly Top of Mind. We first wrote about bitcoin in 2014 and cryptos more broadly in 2018, exploring the potential and risks of the crypto ecosystem. Amid the recent volatility, here we focus on whether crypto assets can be considered an institutional asset class.

We start by speaking with Michael Novogratz, Co-founder and CEO of Galaxy Digital Holdings, which is active in crypto investing and trading, asset management, and venture financing. He argues that the mere fact that a critical mass of credible investors and institutions is now engaging with crypto assets has cemented their position as an official asset class. And, despite the price volatility, he doesn't see the institutional interest in bitcoin, which he primarily views as a convenient store of value, waning as long as the current macro and political backdrop—in which the government has no imperative to stop spending on social issues that the Fed is largely financing—continues, and crypto remains in the adoption cycle.

Michael Sonnenshein, CEO of Grayscale Investments, the world's largest digital asset manager, agrees that institutional investors now generally appreciate that digital assets are here to stay, with investors increasingly attracted to the finite quality of assets like bitcoin—which is verifiably scarce—as a way to hedge against inflation and currency debasement, and to diversify their portfolios in the pursuit of higher risk-adjusted returns. Even though crypto assets have behaved as anything but a diversifier over the past year—selling off more than traditional assets as the COVID-19 pandemic set in—he says that their faster and stronger rebound in 2020 only reassured investors about their resiliency as an asset class.

But what makes a crypto like bitcoin—which has no income, no practical uses and high volatility—a good store of value? Novogratz's answer: because "the world has voted that they believe" it is. Zach Pandl, GS Co-Head of Global FX, Rates, and EM Strategy, largely agrees, arguing that bitcoin's potential for widespread social adoption given its strong brand on top of its other properties, such as its security, privacy, transferability and the fact that it's digital makes it a plausible store of value for future generations. And he believes that institutional investors today should treat bitcoin as a macro asset, akin to gold.

GS commodity analyst Mikhail Sprogis and Jeff Currie, Global Head of Commodities Research, for their part, argue that cryptos can act as stores of value, but only if they have other real world uses that create value and temper price volatility. This, they say, best positions cryptos whose blockchains offer the greatest potential for such uses, like ether, to become the dominant digital store of value. More broadly, Currie contends that cryptos are a new class of asset that derive their value from the information being verified and the size and growth of their networks, but that legal challenges to their future growth loom large due to their decentralized and anonymous nature.

And Nouriel Roubini, professor of economics at NYU's Stern School of Business, entirely disagrees with the idea that something with no income, utility or relationship with economic fundamentals can be considered a store of value, or an asset at all. Despite the recent crypto mania, he doubts the willingness of most institutions to expose themselves to cryptos' volatility and risks, which the volatile price action in recent days has served as a stark reminder of.

Christian Mueller-Glissmann, GS Senior Multi-Asset Strategist, then makes the case that for an asset to add value to a portfolio, it has to offer either an attractive risk/reward or low correlations with other macro assets, and preferably both. He finds that a small allocation to bitcoin in a standard US 60/40 portfolio since 2014 would've led to strong outperformance, owing both to higher risk-adjusted returns for bitcoin compared to the S&P 500 and US 10y bonds, as well as diversification benefits from relatively low correlations between bitcoin and other assets. But with this outperformance largely owing to only a handful of idiosyncratic bitcoin rallies, he concludes that bitcoin's short and volatile history makes it too soon to conclude how much value it adds to a balanced portfolio.

But beyond the debatable role of cryptos as a store of value and investible asset, does the broader crypto ecosystem provide promise for investors? Novogratz and Sonnenshein strongly believe that the answer is yes, given a myriad of potential use cases for crypto assets. In particular, Novogratz sees the three biggest developments in the crypto ecosystem—payments, Decentralized Finance (DeFi), and non-fungible tokens (NFTs)—mostly being built on the Ethereum network, which suggests substantial upside for it and various DeFi applications. But Roubini contends that few successful applications of blockchain technology exist today. And he sees many potential corporate uses of it as "BINO"—Blockchain In Name Only. In short, he's skeptical that blockchain technology will prove revolutionary because "the idea that technology can resolve the question of trust is delusional."

Mathew McDermott, GS Global Head of Digital Assets, then explains why GS has (re)engaged in the space—in two words: client demand—and how interest in cryptos differs between client types—from asset managers who are seeking portfolio diversification, to high-net-worth clients who are increasingly looking for exposure to broader crypto use cases, to hedge funds that are largely aiming to profit from the basis between going long the physical and short the future—an arbitrage that reflects the difficulties that still persist in accessing the market today.

Beyond this issue of market fragmentation, we conclude with a look at some of the other main obstacles to further institutional adoption of crypto assets. Alan Cohen, previous senior policy advisor to former SEC Chairman Jay Clayton and former GS Global Head of Compliance, explains how regulators are looking at crypto assets today. Michael Gronager, Co-founder and CEO of blockchain investigations firm Chainalysis, explains what is—and isn't—included in their analysis that finds that less than 1% of all cryptocurrency activity is illicit. And Dan Guido, Co-founder and CEO of software security firm Trail of Bits, discusses the black swan technological and security scenarios that all investors in the crypto ecosystem should be aware of.

**Allison Nathan, Editor**

*Email:* allison.nathan@gs.com
*Tel:* 212-357-7504
*Goldman Sachs and Co. LLC*

# Interview with Michael Novogratz

Michael Novogratz is CEO of Galaxy Digital Holdings Ltd. Below, he discusses the potential for crypto assets and their ability to transform the financial system and beyond.

*The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.*

**Allison Nathan: How does Galaxy invest in the crypto universe?**

**Michael Novogratz:** Galaxy Digital grew out of my family office, which operates like a merchant bank, and has become a nearly full-service business for the digital asset and blockchain technology communities. Being involved across the ecosystem is important to us, namely so that we can be positioned to help grow the industry that we believe will transform the way we live and work globally. We own and trade coins, have a large venture business, and invest in the virtual world that will be used not by finance, but by consumers—the metaverse, gaming studios, and non-fungible token (NFT) projects. We believe you learn by being at the frontier and that's why we started the company—to learn about the crypto space and share that knowledge with our institutional customers as we create the next generation of financial services companies.

**Allison Nathan: You've been involved in and excited about the crypto space for a while now, but it's had fits and starts, including the dramatic price rise and collapse in 2017/18. What makes this time different?**

**Michael Novogratz:** 2017/2018 was the first-ever truly global and retail-driven speculative mania. It was blind excitement. It's not that there are no excesses, knuckleheaded Twitter comments, cheerleading, or tribalism today, but that's all there was back then. And crypto's market cap cratered 98.5%. But out of that mania grew a much smarter investor base that took the lessons learned and is more willing to differentiate between the different use cases for crypto—from stores of value to decentralized finance (DeFi) to stablecoins and payment systems. And in turn, the community has built up a more logical investment process.

Importantly, that price downturn didn't result in a downturn in investments being made in the underlying crypto infrastructure, so the custody and security infrastructure necessary to attract institutions has been built. As a result, we've now hit a critical mass of institutional engagement. Everyone from the major banks to PayPal and Square is getting more involved, which is a loud and clear signal that crypto is now an official asset class. There's still a lot of volatility, so people will wash in and out. But crypto is not going away. And a core group of crypto people see this as—and I quote the Blues Brothers here —"a mission from god". They want to rebuild the infrastructure of the financial markets in a way that's more transparent and egalitarian and doesn't rely on governments who make bad decisions with our finances. They will never sell. And because of that, bitcoin and ether can't go to zero.

**Allison Nathan: But can the crypto ecosystem survive if it isn't intertwined with the traditional financial system?**

**Michael Novogratz:** No. Institutions need to participate because they have most of the money in the world and there's actually a symbiotic relationship between the two. The advisor model that Galaxy possesses is important because many people don't have time to learn to become investors. And as traditional financial advisors and asset managers understand the space and become crypto preachers, they bring more people into the tent, which is key for the future of crypto.

That said, payments will be an interesting battleground. The money transfer business is a very high margin one for legacy financial institutions and it's under threat from new payment systems that are faster, more transparent, and cheaper. Facebook is coming out with their Dollar-based payment system, the Chinese government is coming out with theirs, and stablecoins are gaining traction. At some point, I believe our phones will have crypto wallets that will replace bank accounts. The competition to see who dominates payments is just starting along with the competition between exchanges and derivative markets. So the question is, how fast will banks iterate and compete?

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**Allison Nathan: But will it be bitcoin that's transformative in payments?**

**Michael Novogratz:** No. Bitcoin isn't set up to process thousands of transactions per second. Paying for a diet coke with bitcoin would be like paying for it with gold. That won't happen. But payment rails will be built on other blockchains. Right now, if I want to send money to my sister in Holland, it would be painful, costly, and slow. But soon, I'll be able to send her a Dollar stablecoin and transferring money will become free. Most of this will be built on the Ethereum network, which is why ethereum prices have been rising. The three biggest moves in the crypto ecosystem—payments, DeFi, and NFTs—are mostly being built on Ethereum, so it's going to get priced like a network. The more people that use it and the more stuff that gets built on it, the higher the price will ultimately go.

**Allison Nathan: What's the value proposition of bitcoin, then?**

**Michael Novogratz:** Bitcoin is a really convenient way to store value. One of the main reasons people have gotten excited about bitcoin recently is that they're worried that we currently have an unsustainable balance of monetary and fiscal policy

that will eventually set off an inflationary spiral. And that worry isn't going away anytime soon. More and more Americans are in favor of paying for college for people whose families earn less than $100k annually. President Biden just gave half of the $1.9tn fiscal package directly to people who needed it, which was very well-received. Some version of universal basic income (UBI) is coming; it may not be called UBI, but capital will be taxed and given to labor. None of that is fiscally prudent, but there's no political imperative to say stop spending money. Even before COVID-19, deficits were bad, but now they're insane. And monetary policymakers are financing everything the government wants to spend, not just in the US but all over the world. So the main reason everyone got into bitcoin is the same reason they got into gold—the current macro backdrop is tailor-made for it. And, as long as that macro and political backdrop persists and crypto remains in the adoption cycle, it's crazy to get out.

> "The three biggest moves in the crypto ecosystem—payments, DeFi, and NFTs—are mostly being built on Ethereum, so it's going to get priced like a network. The more people that use it, the more stuff that gets built on it, and the higher the price will ultimately go."

**Allison Nathan: But why is bitcoin, which has no income and no other uses, a good store of value?**

**Michael Novogratz:** Bitcoin is one of the few uniform stores of value in the world. It's the most widely distributed asset in history outside of the Dollar and Euro; 140 million people own some bitcoin. And it's easily stored and transported, unlike gold. Stores of value are social constructs—they have value because we believe they do. There has never been a more successful brand created in such a short period of time. It's like they floated the baby in the river and the community raised the baby, and now it's worth around $1tn. Today, it's recognized and believed in by exceptionally credible people. So the world has voted that they believe bitcoin is a store of value. People still make stubborn arguments against it, but every single bank we know of is building a wealth channel for crypto, 14 entities have bitcoin ETFs in line at the SEC, and most tech companies are building bitcoin into their wallet and interface. To think we're going to have less people believing in bitcoin isn't logical.

**Allison Nathan: Haven't people been buying bitcoin and other cryptos just because their prices were rising?**

**Michael Novogratz:** Of course that's part of the equation. People in general are momentum investors. All great fortunes on this planet have been made by trends—I learned that from Paul Tudor Jones thirty years ago and Jeff Bezos and Bill Gates are proof points to this as well. Bitcoin adoption and the macro factors behind it are a mega bull trend.

**Allison Nathan: So what are the remaining roadblocks to further institutional adoption?**

**Michael Novogratz:** Institutions need a little more regulatory clarity, which they'll likely get soon. Former SEC Chair Jay Clayton didn't want crypto to be his legacy, and so he punted. But Gary Gensler is very knowledgeable about and interested in the crypto space. Within his first nine months, a clear regulatory framework will likely emerge that will make it easier for institutions to get involved. For example, institutions have a hard time using DeFi products right now due to uncertainty around how Know Your Customer (KYC) requirements are applied to smart contracts and DeFi companies that are comprised of code. With a little more innovation and regulator understanding over the next few years, DeFi protocols and projects will probably explode. Uniswap could become a bigger exchange than the CME or the NYSE which will pull people in. More clarity on the tax side would also be helpful. But policymakers today are rational and have high intellectual integrity, so I don't see them singling out cryptocurrencies and do expect they will be taxed like any other asset. I'm much more confident than I've ever been that this is inevitable.

**Allison Nathan: What do you make about the rise of Dogecoin and other meme coins?**

**Michael Novogratz:** Dogecoin is a very speculative asset, much more so than bitcoin. It likely doesn't have long-term legs because no institution is buying it and at some point, retail will lose interest. Dogecoin started as a joke and grew for two reasons. First and foremost is tribalism in the investing community. It's the same thing we saw with the rise in GameStop, which was driven by a young community of investors who have been empowered as financial players through trading apps and social media platforms. Second, value is showing up in new places because the government is printing a lot of money. It's important to keep that in mind when thinking about some crypto assets and equities like GameStop that have short-term potential but no long-term viability.

> "People in general are momentum investors. All great fortunes on this planet have been made by trends… Bitcoin adoption and the macro factors behind it are a mega bull trend."

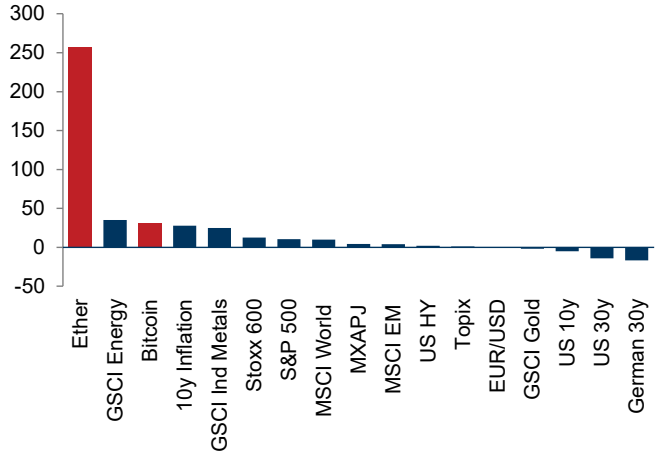
**Allison Nathan: What would make enthusiasm for the asset class diminish?**

**Michael Novogratz:** I am not sure what could dent enthusiasm for the broader ecosystem at this point. But, at least for bitcoin, the biggest risk in this cycle is, in the words of Ray Dalio, a beautiful de-leveraging. If the Fed successfully taps the brakes, pulls back liquidity, and slows the economy down just enough to ensure inflation doesn't run away and deficits come down, then the impetus for having a store of value will fall. But this is the hardest macro environment policymakers have ever dealt with, and only a tiny window exists to get it right. And even if they do, bitcoin won't just collapse into oblivion. Why has gold been a mediocre asset to own this year and bitcoin's generally been a great one? Because gold isn't in the adoption cycle. Bitcoin is.

# Cryptos: sizing the surge

## Bitcoin and ether have performed strongly YTD

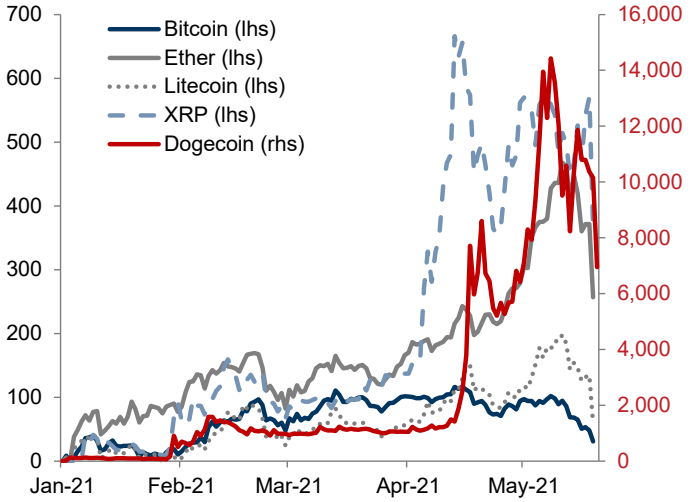
Total returns YTD, %




*Note: Total returns in USD; all market prices as of May 19, 2021.*
*Source: Bloomberg, Goldman Sachs GIR.*

## And other cryptocurrencies have seen even larger rallies

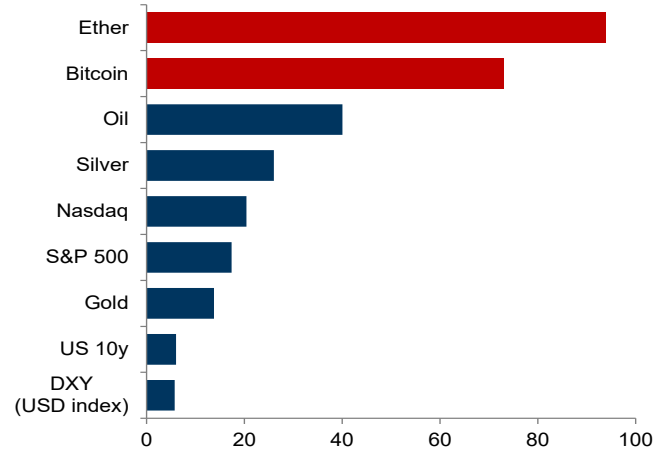
Total returns YTD, %




*Note: Total returns in USD.*
*Source: Bloomberg, Goldman Sachs GIR.*

## But crypto returns remain very volatile

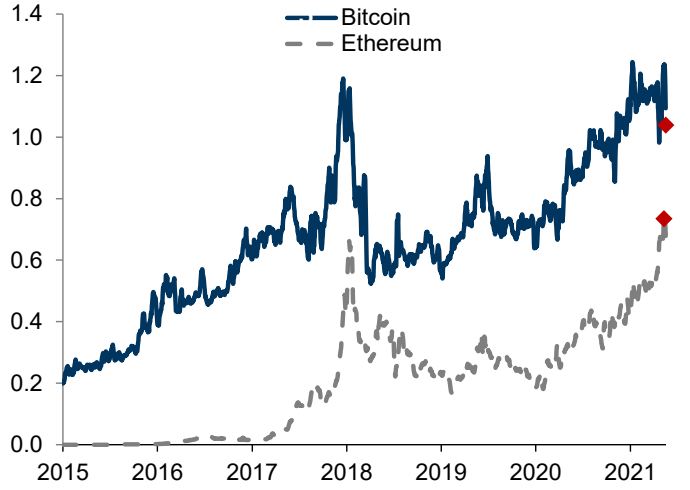
Average daily volatility in ann. terms, %




*Note: Based on returns since 2014 and since 2015 for ether.*
*Source: Bloomberg, Goldman Sachs GIR.*

## Activity on Bitcoin and Ethereum networks is around 2018 highs

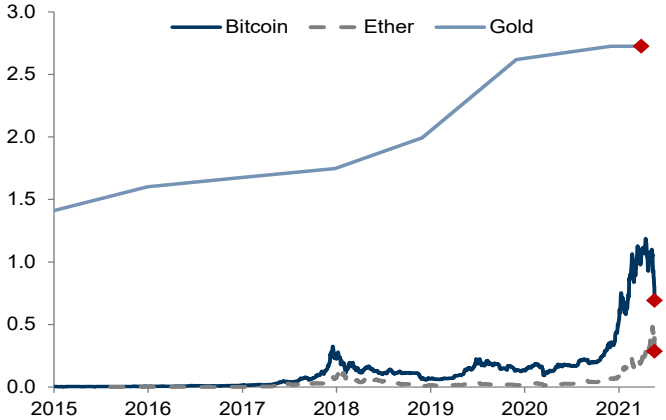
Total active addresses, million




*Note: Includes unique addresses active in the network as a sender or receiver.*
*Source: Glassnode, Goldman Sachs GIR.*

## The market cap of bitcoin had surged above $1tn

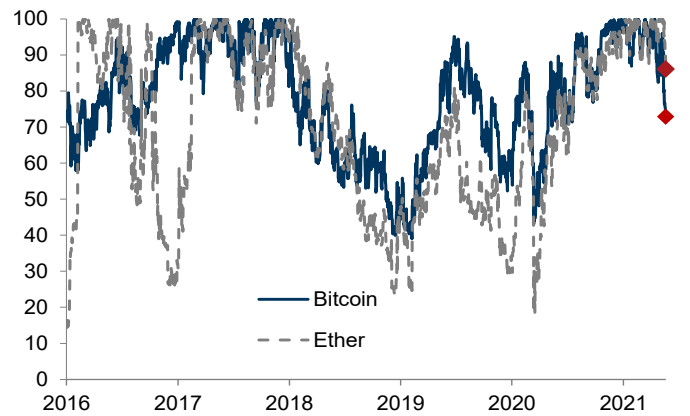
Crypto market cap. vs private investment gold stock, $tn




*Note: Private investment gold stock based on ETFs and bars/coins held privately.*
*Source: World Gold Council, CoinMarketCap, Goldman Sachs GIR.*

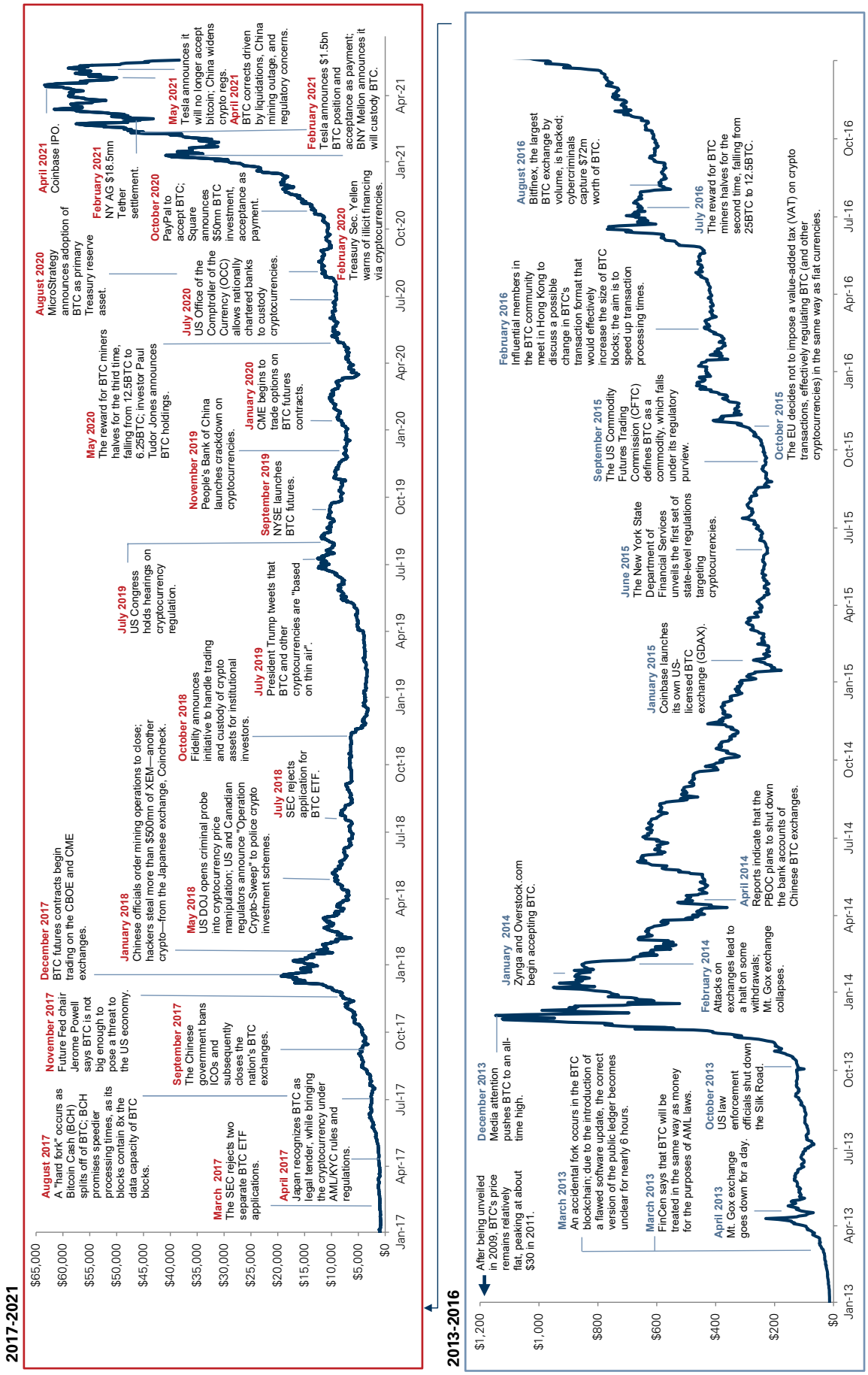
## Around 70% of bitcoin and 85% of ether is held in profit today

Percent of total supply in the network with positive balance, %




*Note: The percentage of circulating supply bought below the current market price. See more detail here; as of May 19. 2021.*
*Source: Glassnode, Goldman Sachs GIR.*

# Tracking bitcoin's volatile ride




*Note: Market pricing as of May 19, 2021.*
*Source: CoinDesk, 99bitcoins, Bloomberg, various news sources, Goldman Sachs GIR.*

# Interview with Nouriel Roubini

Nouriel Roubini is a professor of economics at New York University's Stern School of Business. He is CEO of Roubini Macro Associates, LLC, a global macroeconomic consultancy firm. Below, he discusses his skepticism about the value of cryptocurrencies and their ability to radically transform the financial system.

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**Allison Nathan: Why do you think bitcoin and other cryptocurrencies are in a bubble?**

**Nouriel Roubini:** To start, calling them currencies is a misnomer. Currencies must have four qualities: they must be a unit of account, a means of payment, a stable store of value, and act as a single numeraire. Bitcoin and most other cryptocurrencies have none of these features. It's not a unit of account; nothing is priced in bitcoin. It's not a scalable means of payment; the Bitcoin network can only complete seven transactions per second, versus the Visa network that can conduct 65,000. It's not a stable store of value for goods and services; even the crypto conferences I've attended don't accept bitcoin for payment because the price volatility could wipe out their profit margin overnight. And the crypto universe doesn't offer a single numeraire in which the prices of different items can be denominated because there are thousands of tokens and thus limited price transparency. Even the Flintstones had a more sophisticated system by using shells as a single numeraire to compare the price of different goods.

Bitcoin and other cryptocurrencies also aren't assets. Assets have some cash flow or utility that can be used to determine their fundamental value. A stock provides dividends that can be discounted to arrive at a valuation. Bonds provide a coupon, loans provide interest, and real estate provides rent or housing services. Commodities like oil and copper can be used directly in different ways. And gold is used in industry, jewelry, and has historically been a stable store of value against a variety of tail risks, including inflation, currency debasement, financial crisis, and political and geopolitical risk. Bitcoin and other cryptocurrencies have no income or utility, so there's just no way to arrive at a fundamental value. A bubble occurs when the price of something is way above its fundamental value. But we can't even determine the fundamental value of these cryptocurrencies, and yet their prices have run up dramatically. In that sense, this looks like a bubble to me.

**Allison Nathan: Why are more institutions interested in getting involved in cryptocurrencies if they are in a bubble, and will this help stabilize and credentialize the market?**

**Nouriel Roubini:** Given the large trading volumes, it pays to facilitate trading activity, custodial services, etc. But do institutional investors really want to get more involved? Maybe some do, but I don't see it becoming mainstream. There's an argument that because only a fraction of institutional money is currently invested in bitcoin relative to gold, the price of bitcoin could go to the moon as a result of asset re-allocation from gold. But I'm doubtful institutions want exposure to an asset that can drop by 15% overnight. There's also always the risk that something else backed by real assets might end up completely replacing bitcoin as an alternative store of value. Bitcoin could disappear one day, but gold won't. And the idea of corporate treasurers allocating to crypto assets is totally crazy. No serious company would do that because treasury accounts must be invested in stable assets with minimal risk, even if they provide a very low return. Any treasurer who invests in something that falls 15% in value overnight will be fired. Sure, Elon Musk can do it because he's the boss, although he's since backtracked somewhat on bitcoin due to environmental concerns. But few other people are in that position.

**Allison Nathan: But didn't gold also have highly volatile periods before it matured as an institutional asset?**

**Nouriel Roubini:** While gold has experienced periods of volatility, a set of economic fundamentals generally drove those price swings. Gold rises with inflation and inflation expectations because it's an inflation hedge, and it falls when the Fed tightens monetary policy and rates rise, not just in nominal but also in real terms, for the same reason. Gold is inversely related to the value of the Dollar, because a falling Dollar leads to higher commodity production costs and prices, including for gold. When there's serious political or geopolitical risk or a financial crisis, the value of gold rises because it serves as a safe haven asset, as does the Swiss Franc, the Japanese Yen and US Treasuries. A whole set of variables can be used to determine the demand for gold relative to its supply, which makes it possible to establish a fundamental price. In contrast, the prices of bitcoin and other cryptos don't have a consistent relationship with economic fundamentals that explains their volatility or suggests it will eventually subside.

**Allison Nathan: But couldn't bitcoin serve as an inflation hedge similar to gold given that it doesn't have exposure to currency debasement?**

**Nouriel Roubini:** It's true that inflation and inflation expectations have moved higher, the Dollar has started to weaken, and US breakevens are now well above 2%. But while the price of gold and other inflation hedges has reflected these shifts to a limited extent, at their peak, bitcoin's price had increased by more than tenfold from a low of $5K to more than $60K in a year. That can't be explained by a fear of currency debasement, because if there was really such a strong worry, gold and other assets like TIPS would likely have rallied more. So, something else must account for the rise in bitcoin and other crypto prices.

Does bitcoin offer protection against debasement? At least among the cryptos, it can't be debased because a cryptographic rule determines the increase in supply and caps total supply at 21mn. But just because something is scarce doesn't mean it has fundamental value. It's not difficult to create something with limited supply, and there's no reason artificial scarcity is

valuable in and of itself. Beyond bitcoin, the supply of most cryptocurrencies is determined by a bunch of whales and insiders based on random rules that can be used to increase supply ad-hoc. And their supply has actually increased at a much faster rate than the balance sheet of any central bank given the proliferation of the number of coins. Scarcity also doesn't make something a reliable store of value. It took a hundred years for the value of the Dollar to fall by 90% in real terms. In 2018, it only took 12 months for thousands of cryptocurrencies to lose the same amount of value, and even bitcoin fell by more than 80%. That's currency debasement.

Bitcoin isn't even a reliable hedge for risk-off events, let alone inflation shocks. It's actually highly pro-cyclical. During the peak of the COVID-19 shock in early 2020, US equities fell by about 35%, but bitcoin collapsed by around 50%. Other top 10 crypto currencies fell by even more. In difficult times, crypto assets don't go up; they go down. If investors want inflation hedges, a wide variety of assets have proven to be good inflation hedges for decades, including commodities and their stocks, gold, TIPS, inflation-adjusted and other forms of inflation-indexed bonds. I do worry that monetized deficits might eventually lead to fiscal dominance and higher inflation. But I wouldn't recommend bitcoin or other cryptocurrencies to protect against this risk.

**Allison Nathan: Nascent technologies are often volatile in their adoption phase. What makes this moment for crypto any different than the early days of the internet?**

**Nouriel Roubini:** More than a decade on from the advent of Bitcoin, it's nowhere near as transformative as the internet was at a similar stage. The World Wide Web already had around a billion users ten years in. While it's difficult to know the total number of crypto users today, active users for the most traded coins probably amount to a maximum of a hundred million. Transaction growth for cryptocurrencies has been slower than in the case of the internet, and transaction costs remain very high, with mining revenues as a share of the total volume of transactions still very high. After ten years of the internet, there was email, millions of useful websites and apps, and technologies like the TCP and HTML protocols with broader applications. In the case of cryptocurrencies, there are so-called "dApps", or decentralized apps, but 75% of dApps are games like CryptoKitties or literally pyramid or Ponzi schemes of one sort or another. And the other 25% are "DEXs", or decentralized exchanges, that for now have few transactions and little liquidity. So the comparison with the internet just doesn't ring true.

**Allison Nathan: Doesn't the concept of decentralized ledgers and networks have value, though?**

**Nouriel Roubini:** I am not sure it does, but the reality is that the crypto ecosystem is not decentralized. An oligopoly of miners essentially controls about 70-80% of bitcoin and ether mining. These miners are located in places like China, Russia, and Belarus, which are strategic rivals of the US and have a different rule of law. That's why the US National Security Council is starting to worry about the risks that could pose for the United States. And 99% of all crypto transactions occur on centralized exchanges. Many crypto currencies also have a concentrated group of core developers who are police, judge, and jury whenever updates to or conflicts over the blockchain arise. Rules assumed to be fixed have been changed in these situations. So the blockchain isn't even immutable.

There's some evidence that the ownership of crypto wealth is also highly concentrated. Less than 0.5% of addresses own around 85% of all bitcoin, based on CoinMarketCap data. There's also evidence that whales holding a large amount of the total supply of bitcoin and other cryptocurrencies actively manipulate their prices. Tons of news articles have detailed active manipulation in chat rooms in the form of pump-and-dump schemes, spoofing, wash trading, front-running, etc. This behavior is much worse than even penny stocks, which suggests a high likelihood of an eventual regulatory crackdown.

**Allison Nathan: Does any innovation in the crypto ecosystem look promising to you?**

**Nouriel Roubini:** Not really. The next decade will see radical financial innovation across many dimensions, disrupting the traditional financial system. But it will have nothing to do with cryptocurrencies. Driving this innovation will be a revolution in fintech owing to some combination of AI, machine learning, and the use of the Internet of Things (IoT) to collect big data. Fintech is already transforming payment systems, borrowing and lending, credit allocation, insurance, asset management, and parts of the capital markets. In the context of payment systems, billions of transactions are made every day using AliPay and WeChat Pay in China, M-Pesa in Kenya and most of Sub-Saharan Africa, and Venmo, PayPal, and Square in the United States. These are all great companies that are scalable, secure, and are disrupting financial services. They're not based on decentralized finance (DeFi), and have nothing to do with crypto or blockchain.

I've honestly spent a lot of time looking at this because more and more people are saying that while maybe these aren't currencies, blockchain technology could be revolutionary. There are now all these buzzwords like "enterprise distributed ledger technology (DLT)" or "corporate blockchain." But I call most of these projects BINO—"Blockchain In Name Only". Something truly based on blockchain technology should be public, decentralized, permissionless, and trustless. But looking at DLT and corporate blockchain experiments, almost all of them are private, centralized and permissioned—because a small group of people has the ability to validate transactions—and most are authenticated by a trusted institution.

And even among these projects, few have actually worked. One study looking at 43 applications of blockchain technologies in the non-profit sphere for reasons such as banking the unbanked, giving IDs to refugees, and transferring remittances found that zero actually worked. The fundamental problem with this whole space is that it assumes the idea that technology can create trust. But that's mission impossible. Resolving the challenge of authenticating ownership or quality requires due diligence and testing. Why should I trust a DLT that says my tomatoes are organic? I trust Whole Foods that actually tests the tomatoes for chemicals. The idea that technology can resolve the question of trust is delusional. So, I'm deeply skeptical that blockchain, DLT, and cryptocurrencies for that matter will be the revolutionary technologies that their proponents suggest.

# Bitcoin as a macro asset

Zach Pandl argues that institutional investors should treat bitcoin as a macro asset, akin to gold, going through a social adoption phase

Although bitcoin is now seeing wider institutional adoption, many sophisticated investors still struggle to understand why a digital asset should have any value—much less a market capitalization of more than $500bn. And because of the parabolic price increases and high retail participation, many treat the cryptocurrency phenomenon as a classic speculative mania or "bubble". Regardless of whether bitcoin will prove to be a good investment over time, this perspective is too narrow. Bitcoin is a medium which is beginning to serve the functions of money—primarily as a "store of value". Virtually anything can serve this purpose as long as it gains widespread social adoption, and bitcoin has made meaningful progress down that path.

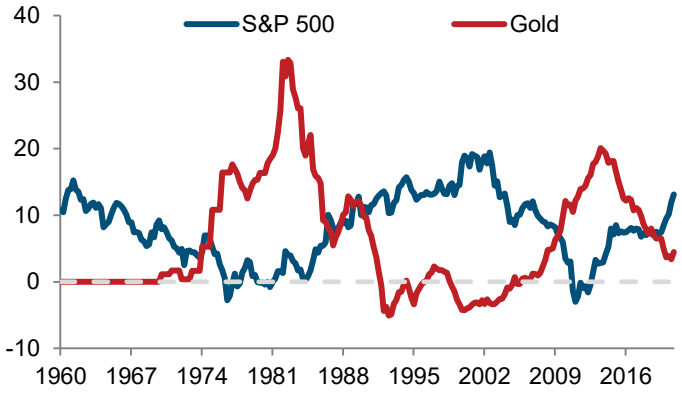
### The need for stores of value

To understand bitcoin, it is best to begin with gold. Gold serves a unique function in the global financial system. It is both a useful commodity and a money-like, "store of value" asset. However, unlike conventional money mediums, it is not issued by a government and does not denominate any transactions in goods or assets. In effect, gold serves as an alternative fallback money instrument for adverse states of the world—when investors are unsure about the safety of conventional assets or fiat money in general (e.g. due to the risk of inflation or confiscation). In foreign exchange markets, gold behaves like an "inverse currency": its price tends to fall when the fundamentals of major currencies improve, and tends to rise when the fundamentals of major currencies worsen. Over time, the most important driver of nominal exchange rates is the relative rate of inflation between two economies. Because gold has a quasi-fixed supply, its nominal value tends to rise at the rate of inflation in major markets. These correlation and store of value properties allow gold to play a very useful diversification role in portfolios.

Originally, gold was likely adopted as a money medium due to its elemental properties. Gold and copper are the only metals which are not greyish in color in their natural state[1], and they have captivated humans since ancient times. Gold is also relatively dense, malleable, and ductile (stretchable), and unlike many other metals it does not tarnish, rust, or corrode. These features have underpinned gold's use as a money instrument throughout human history.

But the use of gold today has as much to do with inertia as it does with the metal's physical properties. After all, US Dollar notes are also a store of value, and they are made of paper[2]. Money, like language, is a social device—it is closer to a *concept* than a *thing*. Money is a social device that facilitates commerce, in much the same way that language is a social device that facilitates other aspects of our lives. It is useful for society to have a type of money that is not issued by a sovereign government. But the specific medium used for that purpose is partly arbitrary. Throughout history, a diverse array of objects has functioned as money, dictated by the demands of place and time—as Bitcoiners and monetary historians are fond of pointing out. Classic examples include the tobacco-based money standards of the early American colonies, and the regular use of mobile phone minutes as money throughout Africa. Gold serves a money function today primarily as an artifact of history, not because it is literally the best possible medium for society's store of value needs.

**Gold plays an important diversification role in portfolios**
10-year annualized returns




*Source: Bloomberg, MeasuringWorth, Goldman Sachs GIR.*

When inflation accelerated in the mid-20th century and investors sought out options to protect the real value of their assets, gold was the natural choice. At the time, major currencies were pegged to gold via the US Dollar through the Bretton Woods gold exchange standard, and, before the Great Depression, most currencies, as well as most US Treasury notes, were directly backed by gold. The US government provided an official price of gold in Dollars, which changed only twice in the nearly two centuries between the 1790s and 1970s. During the 1960s, under the gold exchange standard, gold trading above its official stated price was the clearest way to observe depreciation pressure on the US Dollar. In short, over much of the post-WWII period, there was a close association between the price of gold, currency stability, and the real value of money—making it the obvious inflation hedge for portfolios.

But the official link between the Dollar and the price of gold was severed 50 years ago when President Nixon ended the convertibility of Dollars into gold in August 1971. As a result, a generation of asset holders have grown up in a world without a tight connection between gold and money. So when the need for a store of value asset arises, could it be that they reach for something else?

### Gold for the digital generation

This is where bitcoin comes in. Any alternative medium would need to be secure, privately held, have a fixed or quasi-fixed supply, and be transferable, ideally outside the traditional payments system. In our modern globalized society, where a substantial portion of social interaction and commerce occurs online (especially among younger people), it may also need to be digital. But, most importantly, it would need to have the potential for widespread social adoption—*anything* can be money, as long as it has that. Bitcoin is therefore a plausible

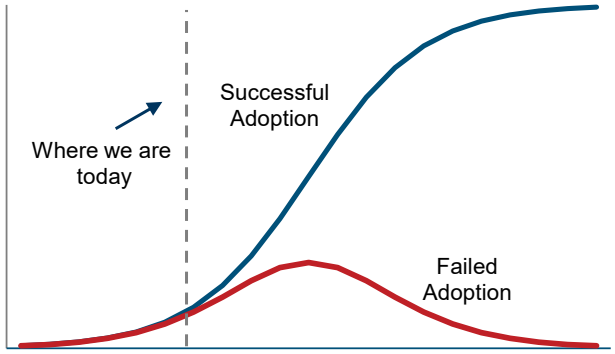
[1] Gold's periodic symbol AU comes from the Latin word *aurum*, meaning "shining dawn."
[2] Technically a 75% cotton-based and 25% linen-based material.

alternative store of value medium to gold and, at the moment, the best candidate among cryptocurrencies with a similar structure because of its broader social adoption (i.e. its "name brand").

In equilibrium, a store of value as volatile as bitcoin would not be very useful. But cryptocurrencies are in their infancy; it is better to think of today's prices as reflecting some probability that bitcoin or another coin/token could achieve greater adoption in the future, at which time its price could be extremely high. Therefore, small changes in those probabilities can result in high price volatility today. Bitcoin investors are speculating that it will eventually achieve near-universal acceptance as a non-sovereign money, with high returns (and high volatility) along the way.

**Today's bitcoin prices reflect some probability that cryptos could achieve greater adoption in the future**

Time (x-axis) vs. price (y-axis)




*Source: Goldman Sachs GIR.*

The critical ingredient to bitcoin's success—widespread social adoption—has now crossed many notable thresholds: Tesla, the sixth largest company in the S&P 500, is carrying bitcoin on its balance sheet; storied macro hedge fund Brevan Howard has begun investing in cryptocurrencies; and Coinbase is now listed on the Nasdaq. Other blockchain networks, especially Ethereum, are developing decentralized banking platforms, Facebook is expected to introduce its stablecoin Diem later this year, and many central banks are exploring distributed ledger technology for their own digital currencies. Whether bitcoin will succeed as a store of value in the long run remains an open question—and its consumption of real resources may be a headwind over time—but for now social adoption of cryptocurrencies appears to be moving forward.

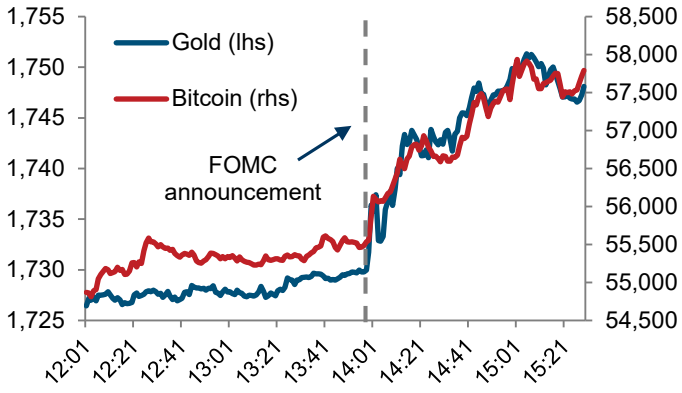
### Bitcoin as a macro asset

Bitcoin has also matured enough that its price behavior resembles that of other macro assets. For example, at its March 17th meeting, the Federal Reserve said that most policymakers did not expect to raise interest rates until after 2023—later than financial markets had expected. Macro assets reacted in the conventional way to a "dovish policy shock": shorter-maturity Treasury yields declined, the yield curve steepened, the Dollar fell, and stock prices increased. Bitcoin rose, just like gold, but with about four times the volatility.

Investors should treat bitcoin in this way. Gold is a *commodity* that serves a *money* function and behaves like a *currency*. Bitcoin is exactly the same, even though it is a digital commodity created through cryptography, rather than a physical commodity found in the Earth's crust. From a markets standpoint, the main difference between the two assets is that bitcoin is going through a one-time social adoption phase—which may succeed or fail. When social adoption is rising, bitcoin should offer superior returns compared to gold. When social adoption is declining (e.g. due to adverse regulatory changes), bitcoin will likely offer inferior returns compared to gold. Because of the speculative nature of the asset class and high uncertainty around valuation, investors should be prepared for prices to overshoot fundamentals in both directions. While bitcoin has generally appreciated in value over time, there have already been several waves of speculative excess followed by large drawdowns.

**Bitcoin behaved like gold following the March FOMC announcement**

Prices on March 17, 2021, $

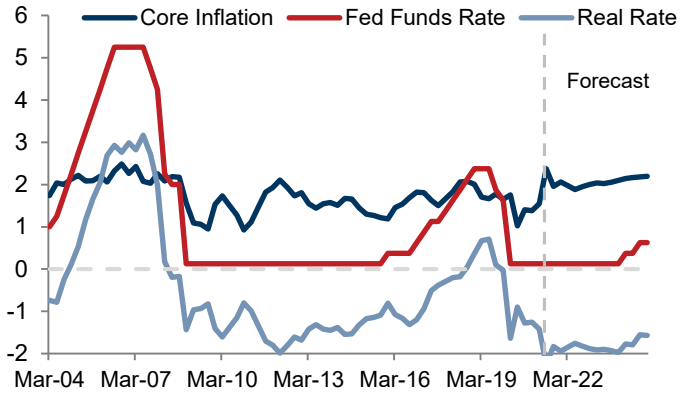



*Source: Bloomberg, Goldman Sachs GIR.*

Technological issues aside, the current macroeconomic outlook appears favorable for store of value assets, whether physical or digital. The Federal Reserve has adopted a more ambitious labor market goal of "broad and inclusive" full employment, and seems more tolerant of above-target inflation than in the recent past. Our economists expect real cash yields to remain negative across developed market economies for a number of years to come. Equity market multiples are at historic highs. Many developing countries will struggle with the fiscal hangover from the COVID-19 crisis for years to come. In this environment, unless investors can find other sources of real returns, demand for assets that protect purchasing power should remain high.

**Low real interest rates should support high demand for "store of value" assets over the next several years**

%




*Source: Goldman Sachs GIR.*

**Zach Pandl, Co-Head of Global FX, Rates, EM Strategy**

*Email:* zach.pandl@gs.com *Goldman Sachs and Co. LLC*
*Tel:* 212-902-5699