Science & Technology

Cryptocurrency and the Future of Your Money

Whether or not you understand blockchain and other new financial technologies, they have massive implications for us all.

By
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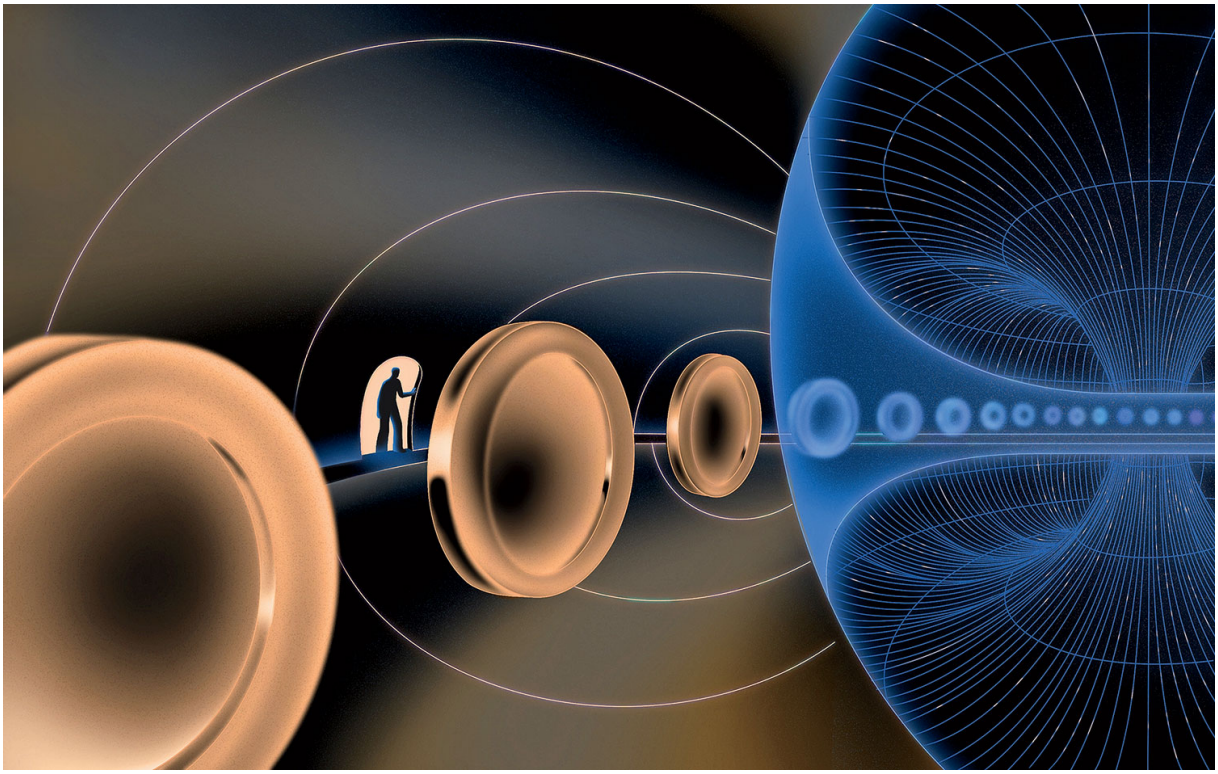

Jun Cen

An interview with R.A. Farrokhnia, the founding executive director of Advanced Projects and Applied Research in Fintech, a Columbia Business School initiative that undertakes leading-edge research and practice at the intersection of finance and

technology. Farrokhnia teaches at the schools of business, engineering, and journalism.

Your class on demystifying blockchain, cryptocurrencies, and digital tokens is extremely popular. Are you surprised?

Yes and no. Given the unprecedented pace of technological advancements in blockchain and beyond, it's important to untangle the interplay of disruptive forces shaping the financial-services industry and understand their strategic ramifications. Recognizing the esoteric nature of blockchain, I wanted to develop a comprehensive, interdisciplinary course with accessible content requiring no prior tech background. I also wanted this "crypto school" to not only cover the foundational principles but also constantly evolve to address the latest and most advanced topics. I am delighted my course is highly rated and quite popular with students. Its success has inspired my next project, which is a series of modular courses for non-students, from alumni to business executives to journalists. I'm planning to launch those in mid-2022.

Even though Bitcoin and blockchain have been around for more than a decade, many people still don't fully understand the technology. Could you give our readers a quick primer?

It's impossible to do it justice in a short paragraph, but let's try. Blockchain and Bitcoin are intertwined but not the same. Simply put, Bitcoin is a digital currency that is built on a technology called blockchain. Bitcoin and blockchain use math and computer science, particularly cryptography, to facilitate transactions of digital assets, and they do it through algorithms that establish indisputable trust. Because Bitcoin is maintained by a peer-to-peer network and does not rely on a central authority like a bank or a government, it is known as a decentralized currency.

In the Bitcoin network, transactions are processed in bundles called blocks, which are validated about every ten minutes. These blocks, which have recorded every Bitcoin transaction and every new Bitcoin created since the currency's genesis, are chained together in an immutable, sequential, and irreversible fashion to collectively form a public ledger. Many thousands of computing devices, or nodes, work cohesively to verify and process those transactions and update the ledger. Embedded in this protocol is a math puzzle used to verify the integrity of transactions and blocks. Some node operators may decide to commit electricity and

computational resources to try to solve this puzzle. If they are the first to succeed, then they will win rewards in the form of new Bitcoin. This is called “mining.”

But how can you have a currency that is based on computer code? It seems so intangible.

I know! But learning such intricacies is not out of reach of non-techies. Note that the inner workings of central banking and fiat currency — think dollars and euros — are also complex and intangible, but we trust and use them without fully understanding them.

What do you say to the argument that cryptocurrencies help money launderers and tax dodgers?

A tool is just a tool. The way it is used, intentionally or unintentionally, is what gives it moral and ethical meaning. Cryptocurrencies can be used for nefarious purposes, but hundred-dollar bills are also misused by criminals and others with malicious intent. Overall, the hope is that we will eventually create a balanced and well-defined regulatory framework to reduce unscrupulous activities without stifling responsible innovation. We have yet to see whether blockchain will live up to its potential or if it will degenerate into a system where the benefits will disproportionally favor only certain groups.



R.A. Farrokhnia (Jonathan Sury)

Today, major financial-services companies like Goldman Sachs trade Bitcoin, and you may soon be able to use Bitcoin at Taco Bell. This seems to suggest that Bitcoin is gaining legitimacy. Should investors consider it?

Well, that depends on a person's appetite not only for tacos but also for volatility. Most of us would like our money to be stable. Bitcoin continues to experience big swings in value on a daily or weekly basis, so that may deter its short-term adoption as a direct medium of payment. As for its value as an investment, that's a very difficult question to answer. Obviously, you have to understand the risk–reward profile of each qualified investor as well as other pertinent tax, financial, and personal considerations. There are certainly more institutional investors dabbling in Bitcoin, perhaps because they believe it will continue to appreciate in value or be a hedge against inflation.

But in discussing the legitimacy or value of Bitcoin, it's important not to see the world through our narrow lens. Some of us are privileged to live in a democracy with a highly developed economy and a stable legal system. There are millions of others who live in countries with weak or failed governments where the economy has suffered severe setbacks and high inflation. Ordinary citizens have seen their

savings wiped out. Large swaths of the middle class have been dragged into poverty. If they had access to Bitcoin, it might have been an alternative way to exert a small amount of control over their savings and circumvent artificially restrictive capital controls that limit access to foreign currency.

A lot of articles have been published recently that suggest the Bitcoin network is a real drain on the environment and from that point of view is unsustainable.

Bitcoin mining and its verification systems are based on a mechanism that requires a lot of computational firepower and, thus, a lot of electricity. In fairness, its energy consumption as a network, while large and growing, is a fraction of that of other industries. Nonetheless, it is a real issue, and there is certainly more acknowledgement of this criticism in the crypto community. There are a number of ongoing developments designed to address it head-on, including using renewables and more energy-efficient consensus mechanisms for the newer-generation crypto ventures.

Some countries want to issue their own sovereign digital currencies. Didn't China just issue its own central-bank digital currency (CBDC) with the goal of replacing paper money?

China and a host of other nations, including the US, are indeed moving in the direction of CBDC. We don't know if or when we will live in a truly cashless society, as cash has utility, but we are already living in a less-cash era. There will also be many other ramifications of moving toward CBDC, from privacy issues to the effects on international commerce to geopolitical shifts in power and influence. It's impossible to predict every outcome, given all the moving parts. The unintended consequences are particularly worrisome.

You have said that we are at a seminal moment in the financial-services industry — that it could evolve in a completely new direction.

We are indeed rethinking many of our first principles. The financial-services industry needs more innovation, as many of our systems are costly, inefficient, or unjust. Advances in fintech and blockchain, more sophisticated and ethical data analytics, and new developments in machine learning and AI could streamline financial processes, making them run more efficiently, intelligently, and inclusively. Our financial systems could be made more resilient when it comes to unpredictable

events like the pandemic. In many ways, I hope COVID-19 ends up being a wake-up call.

In what way?

By showcasing our need to sensibly and purposefully tackle financial inclusion, access, and education. In studying the impact of the pandemic, in particular on low-income households, my lab team at the Fintech Initiative had a front-row seat. Along with several coauthors, we were among the first to publish a series of papers, starting in April 2020, on the consumer response to the pandemic and the CARES Act stimulus payments. We could see firsthand the challenges of getting stimulus payments to those who needed them most. If our financial system was built to better facilitate sharing of data among banks and various governmental agencies with proper privacy protections, we would have lessened the pain for the most vulnerable. A good number of my collaborative research efforts at the Fintech Initiative strive to develop solutions that would result in a more equitable and fairer financial industry. With holistic use of AI, data management, and cryptoeconomics, our money could work harder and smarter. We could even be moving toward autonomous, self-driving money, which could potentially be a net benefit to the society.

How might smart money affect the reader of this magazine?

Assuming most alumni belong to a certain socioeconomic stratum, it could take a lot of the stress out of their personal finances. For instance, with smart money, or “self-driving” money, our retirement accounts would be automatically and intelligently rebalanced based on parameters and market conditions with minimal input by us. Our credit cards would look out for our needs and not be geared toward maximizing fees and profits for their issuers. Our banking relationships could become decentralized, working more cohesively across various accounts and products to optimize outcomes aligned with our personal goals. Of course, there is a cost, financial and otherwise, to letting data and algorithms take an ever-larger role in our daily lives. We would need to have privacy and civil-liberty protections in place, and when it comes to AI we would need to address issues such as data bias. Finding the right balance between convenience and privacy, among many other considerations, would require computer scientists to work hand in hand with their colleagues in the humanities and social sciences. I am grateful that I’m doing my research at a “full-stack” university like Columbia where one is surrounded by smart faculty, students,

and industry participants across all disciplines and where collaboration comes naturally. I should add that as fintech and crypto evolve, what I am really excited about is their potential to democratize access for unbanked, underbanked, and underserved communities.

How would it do that?

Generally speaking, it is expensive to be poor. For lower-income households, access to a good number of banking services is limited or not cost-efficient. This perpetuates a whole series of downstream effects such as the inability to save for retirement, secure a mortgage, or even cash a check without hefty fees. Technologies like blockchain could help address some of these issues, at the most basic level by removing some of the middle players who are collecting economic rent. Consider how remittance fees have been a big burden on low-income immigrants, especially for small transfers. A blockchain-based solution could theoretically provide cheaper alternatives by allowing direct transfers.

You have described blockchain as a very elegant technology. You seem to be more excited about its broader uses than about Bitcoin.

In some ways, yes. Bitcoin has historically dominated the conversation when it comes to blockchain-based applications. I believe blockchain is a true paradigm shift, and the use cases are vast. Blockchain could be a force for good, helping us to design alternative models that could redress some of the shortcomings and structural challenges of our finance or banking industries. It enables digitization and monetization of many types of assets that, when coupled with decentralized finance (DeFi), could unleash a new class of distributed consumer finance. We are already seeing an ever-growing collection of inventive ideas and solutions coming online. Blockchain is being used to support fair-trade cooperatives and microfinance initiatives. It could completely transform the real-estate industry by streamlining costs and creating new, more liquid ownership models. The use cases and industry applications are endless. I'm excited to see crypto and blockchain domains beginning to overlap with innovations in machine learning and AI. But we need to make sure that our foundational infrastructure continues to evolve and scale in user-friendly ways that benefit everyone. Certainly, achieving these "global maxima" would be quite complex, and there is still a chasm between theory and praxis when it comes to blockchain's promise. Still, I am hopeful that the entire ecosystem and its major players, from academics to innovators to technologists to investors to policymakers to regulators, will continue to view constructive collaboration as

foundational. It is on that promising intersection that I have banked — pun intended — my academic and professional careers.

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