FREAKONOMICS
THE HIDDEN SIDE OF EVERYTHING

FOLLOW THIS SHOW

EPISODE 508

Does the Crypto Crash Mean the Blockchain Is Over?

No. But now is a good time to sort out the potential from the hype. Whether you're bullish, bearish, or just confused, we're here to explain what the blockchain can do for you. (Part 1 of a series.)

00:00 49:29

Jun 22, 2022

By Stephen J. Dubner
Produced by Ryan Kelley

Comments

SHARE THIS EPISODE

EPISODE TRANSCRIPT

> *Tom SACHS: My name is Tom Sachs. I'm a sculptor. I'm 55 years old.*

You may remember **Tom Sachs** from a recent series we made about the art market. He had a lot to say about the art market. Things like this …

> *SACHS: It is extremely unregulated and subject to all kinds of monkey business.*

And like this …

> *SACHS: There's this phrase coined by a friend of mine, called L.P.M.: lies per minute.*

After that series, we kept in touch with Sachs, and visited his studio in lower Manhattan. It is huge, most of it underground, and it feels like a mashup of woodshop, pirate ship, and circus. He has a lot of assistants and collaborators, a lot of workstations and power tools, all sorts of projects being built. One project in particular caught my eye — because it was related to the next podcast series we were planning to make. This one. So, we invited Sachs up to our studio to talk about his project. And he brought a prop.

> *SACHS: The rocket is 9.25 inches tall, and about an inch in diameter.*

Just to be clear, it's a model rocket. Some people might call it a toy rocket; but this one is much more than a toy, although it does look like a toy.

> *SACHS: The nose cone is about two inches tall. It's matte gray with a portrait of Brian Griffin, the dog on* Family Guy*. The body is about five inches, it's McDonald's red, and it's hand-painted golden arches. And this is supported by the base, which is a deep, deep navy blue with a hand-painted United States Postal Service logo.*
>
> *Stephen DUBNER: Can we launch this puppy?*
>
> *SACHS: Let's do it.*

We head outside, to Bryant Park, in midtown Manhattan. It's one of the first sunny days of spring.

> *SACHS: It's a beautiful green lawn. I think we'll launch it over the lawn, and hope for the best.*

The lawn itself is empty — because, technically, it's closed. But surrounding the lawn are hundreds of people sunning themselves, eating lunch.

> *SACHS: I'm nervous about where we're launching it because of trees. Trees are the enemy.*

As part of this new project, Sachs has been launching rockets all over the world — Los Angeles, Paris, Hamburg, Seoul.

> *SACHS: I'm just looking to stay away from people as much as possible. And these guys, because they have a bike, are going to be cool. If we launch a rocket right here, you guys are going to be cool with it, right? Are we interrupting your meeting? Sorry.*

Sachs and his team unpack the launch kit.

> *SACHS: Okay. I've got the launch pad ready to go. The rocket is eased down onto the launch tower through the launch tube. The igniter wires are protruding from the A8-3 rocket, which is an impulse of 0.8 newtons. And the wires are connected with alligator clips to the launch controller, which has got four little A.A. batteries in it. We're going to go out on the lawn. I'm writing the location on there. And that location is N.Y.C. And the serial number. And I'm going to do three, two, one, launch.*

Wait a minute. Why is Tom Sachs launching a model rocket in the middle of Manhattan? This goes back to the conversation we were having in the studio.

> *SACHS: I work with the* Rocket Factory*, the first trans-dimensional — what did we call it? What is the name of the thing, Erum? Sorry.*
>
> *DUBNER: Erum, you can talk.*
>
> *Erum SHAH: It's the first trans-dimensional factory.*
>
> *SACHS: It's the first trans-dimensional rocket factory. We make N.F.T.s. We make physical rockets that represent the N.F.T.s. We shoot off the rockets.*

> *DUBNER: And would this project exist at all, were it not for blockchain technology?*
>
> *SACHS: No. This is something that I was only able to do because of the blockchain.*

At this point, you may be asking yourself: what does a model rocket — painted with a McDonald's logo, a U.S. Postal Service logo, and Brian from *Family Guy* — have to do with the blockchain? I am so glad you asked. What comes to mind when you hear that word, "blockchain"? Some people think about Bitcoin and other cryptocurrencies — those utopian, speculative money-ish tokens that shot way up in value and lately, have been crashing. Some people think of it as a new and better internet, Web3, that's supposed to fundamentally improve how all of us do just about everything. And some people, when they hear the word "blockchain," they just tune out; they've come to think of it as some combination of boring, intimidating, and fraudulent, a cesspool of hypemasters and crypto bros. So who's right? Is it possible that everyone is right? We'll try to answer that question, and many more — if we can ever get Tom Sachs's N.F.T. rocket off the ground.

> *SACHS: Three, two, one, launch. Dud — we need another igniter.*

* * *

If you've been reading any headlines lately, you may think that the cryptocurrency craze is over. Just as we're heading into the calendrical summer, we've entered a so-called Crypto Winter. Bitcoin has lost more than two-thirds of its value since peaking last fall; the big U.S. crypto exchange Coinbase just fired nearly one-fifth of its workforce. But if we use history as our guide to the future — and it's probably the best guide we have — you will see that most new technologies have big booms and busts. The dotcom bubble and crash in the early 2000s, looked, to some people, like a failure of the internet; but it wasn't. So we'd probably be wise to take a long view of cryptocurrencies and the underlying blockchain technology. It is true that one Bitcoin is currently worth "only" about $20,000 today, down from around $68,000 a few months ago; but it's also true that Bitcoin was only invented in 2008 and had a starting value of zero. True believers will tell you this recent crash is in fact good news for the long-term, because it flushes out the pretenders. Investors who bought Bitcoin at $68,000 will likely disagree. In any case, let's assume that crypto isn't going to disappear, at least no time soon. And let's begin with a simple question: how does someone become a crypto believer? As we spoke with people for this series, we noticed one interesting theme. Here is **Arianna Simpson**.

> *Arianna SIMPSON: I spent a couple of months traveling around southern Africa, including Zimbabwe. I was there a couple years after the worst of their hyperinflation. The president/dictator Robert Mugabe had been recklessly printing money to pay off his military. And the result was that the country suffered from crazy, crazy hyperinflation. At its peak, the currency was losing about half of its value every 25 hours, which meant that obviously everyone's savings evaporated.*

These days, Simpson works in venture capital.

> *SIMPSON: I am a general partner in Andreessen Horowitz, focused on the web3 and crypto vertical.*

Andreessen Horowitz is one of the biggest V.C. firms out there, having raised tens of billions of investment dollars. Roughly a quarter of that has gone to some sort of crypto startup. Among its most successful investments is Coinbase, the crypto exchange we mentioned earlier — it's basically a website to buy and sell cryptocurrencies. Coinbase claims nearly 100 million global users, but it's also been getting hammered by falling crypto prices. **Brian Armstrong** is a co-founder and C.E.O. of Coinbase, and his crypto origin story is similar to Arianna Simpson's.

> *Brian ARMSTRONG: I had spent a year living in Buenos Aires, Argentina. I got to see a country that had gone through hyperinflation, and how the wealth of really the poorest people in society was eroded by inflation because, of course, the wealthier people could invest in stocks or real estate — things that would adjust for inflation. But it was really people living with cash that got their wealth eroded, and it changed the whole culture of that country. It gave people pessimism about the future instead of optimism.*

Arianna Simpson, meanwhile, when she returned to the U.S. from Zimbabwe …

> *SIMPSON: I was thinking a lot about monetary policy and what might be possible in a world in which hyperinflation of that sort couldn't exist. And a friend of mine was like, "Oh, Bitcoin is very relevant to what you're talking about." And so I went, and I read the whitepaper.*

"The whitepaper." In the crypto universe, "the whitepaper" refers to an eight-page document called "Bitcoin: A Peer-to-Peer Electronic Cash System." It was circulated in 2008 under the name Satoshi Nakamoto. That turned out to be a pseudonym, and to this day Nakamoto's identity is a mystery. The whitepaper marked the invention of Bitcoin and the blockchain as we know them today.

> *ARMSTRONG: When I first saw the Bitcoin whitepaper, I said, "I have no idea if it will ever work, but I couldn't stop thinking about it." I think a lot of people who only have grown up in the U.S. and haven't seen what an unstable currency looks like, didn't quite get crypto when they first saw it.*
>
> *SIMPSON: I just remember having this holy-smokes moment where I was like, "Wow, there are so many ways in which this might not work, but if it does work, it will change a lot of things." And so I sort of became obsessed.*

In 2013, Arianna Simpson was working at Facebook, in global marketing. She tried to persuade her boss to start a Bitcoin-related project. When that didn't work, she quit. She joined a crypto startup, then launched her own investment fund, and in 2020, she graduated to Andreessen Horowitz.

> *SIMPSON: It's been a crazy almost-ten-year journey now to see the technology really expand. At this point, the industry is many multiples what it was a few years ago, and I think that's a really positive thing. It just means that the technology is being built and people are getting excited about it. There's a lot of utility for it, which I think is why it's drawing in so many people.*
>
> *DUBNER: I find that a lot of people, the minute they hear the words "crypto" or "blockchain", they turn off. And they turn off out of a combination of confusion and intimidation. So let me ask you to speak right now to that kind of person. Describe*

what blockchains are, what cryptocurrencies are, the relationship between the two, and how viable is one without the other?

SIMPSON: So blockchains are fundamentally systems that require incentives to be managed through a token.

DUBNER: Oh, good sentence.

SIMPSON: So, what I mean by that is, in order to coordinate different stakeholders, especially in systems where they don't necessarily already trust each other, having a token that provides an economic incentive for good behavior is really important. And cryptocurrency — it really may have been a bit of an original misnomer, and we're still trying to dig ourselves out of that. These are not currencies in the way that we have historically thought about them, which generally means state-run, fiat issuance of money. These tokens are more like pieces of the blockchains which are required in order to orchestrate user behavior.

DUBNER: If you could rename them now, and you don't have to use the word "crypto" or "currency" — what would you call them?

SIMPSON: I would just call them tokens. Because it doesn't have the baggage of "crypto" — which I think people have associated with various things that may or may not be representative of the industry today. But also, people assume certain things about how "currencies" work that don't necessarily apply. So I think tokens is a cleaner word. These are fundamentally new units. It enables new kinds of behavior that were not possible before, because there was no incentive to perform whatever the action was.

DUBNER: Okay, so in terms of these "new behaviors," what would be some of your favorites? When you're in your most utopian, optimistic mode, what would you say are the best outcomes of blockchain behavior?

SIMPSON: I think protocols that are designed to allocate scarce digital resources are really interesting. Let's say I have an excess of bandwidth on my WiFi network. I would like to be able to share that with my neighbor and get paid for that. So, by paying me with a token, the neighbor can plug into my system, I receive

> *compensation, and everybody wins. There are similar models that can be applied to things like file storage as well. And a lot of these protocols are still in their infancy, but they have never really worked in the past because why would I share my resource if I can't be compensated for it? It doesn't make sense. The token piece is the critical element that allows these systems to actually work now. People say, "Oh, well, I love blockchain technology, but I think tokens or cryptocurrencies are bad." And that doesn't really make any sense because if you remove the token incentive, a blockchain is really just a database.*

Okay, let's take a beat here. Without a token incentive, "a blockchain is really just a database." And with a token incentive, you can share your WiFi network with your neighbor. Really? That's the amazing blockchain future we've all been waiting for? Maybe this is why so many people have failed to buy into the crypto revolution. But let's press on, see if we can find some more appealing applications. What do we know so far? First: a cryptocurrency is a token. Bitcoin, Ether, Tether, Dogecoin — these are all different kinds of tokens, and as Simpson said, they incentivize people to do things on a blockchain. And what's a blockchain? Let's stick with the database image Simpson gave us. You could think of an Excel or Google spreadsheet — or, if you want to go back further, one of those big, leather-bound ledgers where a 19th-century shopkeeper would record every transaction. In either case, it's information organized in neat rows. But there are two things that make a blockchain database special. Number one: It's immutable. You can add rows to the bottom of the spreadsheet, but you can't edit or delete the existing rows. Once information has been added to the blockchain, it is there forever. And number two: This is what's called a distributed ledger.

> *Mary LACITY: I think you need to understand what a distributed ledger is.*

Okay, let's understand it; this is **Mary Lacity**.

> *LACITY: I'm an information-systems professor, and I'm the director of the Blockchain Center of Excellence at the University of Arkansas.*

Her center is funded by firms like Walmart and FedEx. They are using blockchain-powered databases to improve their workflow.

> *LACITY: Let's first talk about what a ledger is. A ledger is just a record of transactions. And before blockchains, those records are stored by one central party. For example, if you have a bank statement, the bank owns that ledger, and it keeps track of all of your debits and credits. And if you disagree with it, good luck trying to fight your bank on it, right? Because they own and control that ledger.*

But no one owns and controls a blockchain ledger. It's stored on thousands of computers around the world, each of them controlled by someone different, and those computers constantly communicate with one another to ensure the ledger is in sync. This distributed ledger is presumably more secure than the ledger of, let's say, an individual bank.

> *LACITY: It's easy to hack a bank, maybe. You got one surface area to attack. It's almost impossible to attack something like Bitcoin. You're talking tens of thousands of computers that you'd be trying to hack at the same time to change or rewrite a transaction history.*

So how are the companies Lacity works with using these distributed ledgers?

> *LACITY: Let's go to Canada, where we have Walmart Canada. And they engage at least 70 different freight carriers to deliver all of their goods.*

As you can imagine, the choreography of having 70 companies deliver your goods can get complicated.

> *LACITY: After delivery, the freight carrier would send an invoice to Walmart, and Walmart was going, "Whoa, what are all these excess charges?" And "This trip should have taken four hours. Why is it eight hours?" So we have two different systems of record: "I think the invoice should say this. You're telling me it should say that." Walmart Canada had 70 percent of its freight invoices in dispute at any given moment. And so they had to hire a third party to do the investigations for*

> *reconciliations, which was very expensive. The freight carriers are frustrated because they're not getting paid. So nobody was happy.*

To clean up this supply-chain mess, Walmart wound up building a blockchain-enabled app.

> *LACITY: Walmart Canada actually starts the invoice with the original tender offer. Then, as that freight moves through the supply chain, they have devices that are adding charges to the invoice. They can tell the G.P.S. location, this is the distance, so this is how much you can charge for that. If Walmart thinks that trip should have only taken four hours and it takes eight — well, the truck driver is still in the truck, there's a traffic accident ahead of us. In the old days, you get an invoice after the fact, how do you even find that truck driver?*

How much did the blockchain help?

> *LACITY: After this blockchain-enabled application, fewer than 2 percent of these invoices require any kind of reconciliation. They each have their own copy of an invoice that's guaranteed to be in sync. That's the beauty of a blockchain.*

Okay, so that may strike you as a more substantial improvement than sharing your surplus WiFi bandwidth. And it sounds like good news for Walmart. But building a better private ledger to manage your business — that is not exactly revolutionary. The key word there is "private." The Walmart Canada blockchain is a distributed ledger — but it's distributed only to those Walmart employees and partners who are given permission. That makes sense; you don't want your business rivals snooping in your ledger. So this is what's called a permissioned blockchain. The real game-changer, and what Nakamoto invented in 2008, is the permissionless blockchain: a public ledger, distributed among a massive network of computers. Consider the Bitcoin blockchain.

> *Eric BUDISH: What Nakamoto invented is a way to have trust in a dataset of transactions that doesn't rely on a trusted party.*

That's **Eric Budish**; he's an economist at the University of Chicago.

> *BUDISH: I like to start by imagining a Google spreadsheet keeping track of transactions like, "Eric sends Stephen three Bitcoin, signed by Eric." And we're building a history, and that history tells us who has how much money.*

When you have a bank account, you're trusting the bank to keep track of how much you deposit and how much you withdraw. You assume the bank isn't going to steal your money because they have a reputation — and regulators — to worry about. They are part of a sprawling (and expensive) financial system that was built to generate trust. A distributed and permissionless blockchain offers a different mechanism to generate trust.

> *BUDISH: This Google doc, if you will, is collectively maintained by a distributed, quite humongous, and also anonymous set of computer power all over the world.*

But what sort of incentive is there for this humongous, anonymous network to maintain the ledger? In the case of a bank, the incentives are clear. As for this blockchain community …

> *BUDISH: It's incentivized by the promise of being paid with new Bitcoins. This is the mining tournament.*

Ah, mining for Bitcoin. This you have surely heard about. You've also heard that it requires massive amounts of computing power and, therefore, electricity. As of last year, Bitcoin mining consumed more than 0.5 percent of all global electricity production — although the crypto universe says that changes are underway that will shrink that share. So how does crypto mining work, and what is the point? Remember, the Bitcoin blockchain is a spreadsheet and people are constantly adding new rows to the bottom.

> *BUDISH: Every 10 minutes, there is a new block of transactions added to the Bitcoin database.*

But who gets to add those new rows to the spreadsheet? If anyone had access, there'd be nothing to stop a bad actor from manipulating the data in their favor, and we couldn't trust the database. So, Satoshi Nakamoto essentially created a game in which all the computers in the network compete for the right to add data.

> *BUDISH: And to get the right to add a new block to the Bitcoin data structure requires solving an elaborate computational riddle. It's really like a search for a needle in a haystack or a lucky random number. It's currently clocking at about 200 million-trillion random numbers checked per second.*

This number-checking is called proof-of-work. And the computer that wins the competition gets to add the new block to the chain.

> *BUDISH: It essentially makes it computationally difficult to manipulate the data structure, to go back in history and subtract old transactions or add new transactions.*

So this is where the incentive comes from.

> *BUDISH: Mining is the compensation for winning this elaborate computational tournament. If you happen to find a string of numbers that allows you to mine a block, you get paid 6.25 Bitcoins.*

Six-and-a-quarter Bitcoins at today's valuation is around $125,000. And that's up for grabs every 10 minutes.

> *BUDISH: It's a lot of prize money.*

Yes, it's a lot of prize money — but this whole endeavor can also sound a bit circular. People get paid in Bitcoin to solve the math puzzles that maintain the integrity of the Bitcoin system. So, does

Bitcoin have any intrinsic value? Or let's put it another way: Why is Bitcoin worth what it's worth?

> *BUDISH: "Why is Bitcoin worth what it's worth?" is a question that a Chicago economist could easily get fired for trying to answer with too much confidence. There is a real use case, which is black-market transactions. That's always been part of the appeal of Bitcoin is, you can transfer money anonymously. And that could be used for black-market purposes. It could also be used to circumvent regulations around getting money overseas. So that's one grounding of value. I think objectively, a lot of the volume in cryptocurrencies is speculative.*

"Speculative" meaning a sort of gambling parlor disguised as an investing ecosystem.

> *BUDISH: I think there's some chance — I don't know if it's 1 percent or 10 percent or what — there's some chance that we're in the midst of a massive speculative bubble that we'll look back at as sort of a Tulip Mania.*

Tulip mania, you may recall, was a speculative bubble during the Dutch Golden Age of the 17th century. People were paying thousands of Dutch guilders for a single tulip bulb. For that price, they could have bought one of the best mansions in Amsterdam. And the investors who came in late were crushed.

> *BUDISH: So, Bob Shiller has talked about — he calls it "naturally occurring Ponzi process."*

Bob Shiller is a Nobel laureate economist who wrote the book *Irrational Exuberance*.

> *BUDISH: A traditional Ponzi scheme is you recruit each new layer of the pyramid. What Shiller talks about is when Ponzi-like processes occur but there's not a man behind the curtain who's in charge of it, it just sort of happens culturally. But when you have a naturally occurring Ponzi process, you really worry about the bottom of*

> *the pyramid. In the 2006 housing collapse, who were the last purchasers of houses? I kind of worry about the bottom rung of the pyramid this time around.*

When you listen to crypto enthusiasts like Arianna Simpson from Andreesen Horowitz and Brian Armstrong from Coinbase, it's easy to imagine a bright future, to think that the Crypto Winter will give way to a glorious and neverending crypto spring. When you listen to an economist like Eric Budish — well, unless you're the kind of person who's willing to pay mansion money for a single tulip bulb, you may have some doubts. Maybe what we need to sort things out here is some sort of CryptoDad.

> *Chris GIANCARLO: Yeah. Chris Giancarlo, former chairman of the U.S. Commodity Futures Trading Commission.*

Coming up: CryptoDad explains why the U.S. needs a digital dollar and why it's taken so long for cryptocurrencies to behave like currency.

* * *

> *GIANCARLO: When something new comes along, the first thing they do is ridicule you. The second thing they do is ignore you. The third thing they do is fight you. And the fourth thing they do is adopt you. We're somewhere between the fight and adopt phase.*

That, again, is **Chris Giancarlo**. He recently published a book called *CryptoDad: The Fight for the Future of Money*.

> *GIANCARLO: I've had a 38-year career, and if I were to put it in a pie chart, I'd say it's one-third finance, one-third law, and one-third technology.*

These days, he's executive chairman of something he started called the Digital Dollar Project. Why did he start that?

> *GIANCARLO: We had several objectives. One was to actually convince the federal government that even if we don't develop a digital dollar — a U.S. central bank digital currency, known as a C.B.D.C. — that the United States could not surrender leadership in developing that technology to our economic competitors or economic adversaries like China. Over 80 percent of the world's major economies are now exploring central bank digital currency.*

Before the Digital Dollar Project, Giancarlo spent five years on the Commodity Futures Trading Commission, the last two years as chairman. The C.F.T.C. is the primary U.S. government regulator of Bitcoin.

> *GIANCARLO: I joined the commission and immediately started asking, "What are we doing in terms of blockchain technology?" And it became apparent to me that there was not a lot being done. And in 2015, I issued a call for Congress to take a "do-no-harm" approach to blockchain technology to let it flourish.*
>
> *DUBNER: And when you say "let it flourish," are you talking about blockchain technology overall? Are you talking about cryptocurrencies as an asset class?*
>
> *GIANCARLO: Let's talk about what is the "it." I just came from Washington, where I was speaking with a number of policymakers, and I said to them, "If you think this is just about cryptocurrency, some sort of new asset class, some new fad — you're missing the big picture. This is as fundamental as the first wave of the internet." So what was the first wave of the internet? It recognized that there were billions of computers around the world, and instead of moving information through a phone line or a singular wire from A to B — let's use this giant web of computers and have them all talk to each other to confirm the information, validate the information, and move it around the globe seamlessly, costless, instantaneously.*
>
> *DUBNER: Yeah, okay.*
>
> *GIANCARLO: Now we're talking about the internet of value. Heretofore, value was controlled by intermediaries like banks and exchanges — through rails operated by*

them. The exact opposite of what the internet was doing with information. Now, instead of relying on a bank to confirm who owns what, what if the internet — using a series of algorithms and that enormous computing power of billions of computers — could validate the ownership of anything of value and the movement of it around the globe. Like the first wave of the internet, it's almost impossible to see all the ramifications of that, but it's a whole new architecture of things of value, of banking, finance, and money itself.

DUBNER: It sounds like in some ways, we're talking about a digital version of current dollars. And I do see the benefits of the digital version. On the other hand, it's not so different from what a lot of people are already doing. And I understand that not everyone is able to do this now. But if you look around the U.S., the people who — at least who bank, people are using PayPal, they're using Zelle, they're using Venmo, they're using Apple Pay. In other parts of the world, they're using M-Pesa and so on. So in what ways for those use cases is a cryptocurrency or digital currency superior?

GIANCARLO: That's a great question. I think I can answer it in a very simple way, but I need to give a little bit of background. I'm going to divide human history into two very simple concepts. The concept of tokenized money and the concept of bank money. From the mists of time, humans have used tokens as money. Whether it was shells, beads, clay tablets, or Roman coins with an emperor's head on it. And to make a transaction, you'd need to confirm the thing itself — that's really Emperor Nero's head. Okay, fine. That's value. I'll accept that. And even today, with paper money, when somebody gives you a $10 bill, you hold it up to the light, and if that's the $10 bill, we're done, transaction done. Now the beauty of that system is — I don't need to know who I'm transacting with. If I go into a deli to buy a $10 sandwich, I give him a $10 bill, he doesn't need to know who I am, where I live, where I bank, how much money I have in the bank. All he needs to know is it's a real $10 bill. That system worked really well, until its one major shortcoming was discovered when merchants would travel around Europe and they would find their Dutch guilders weren't accepted in Venice. The shortcoming being that token money is local. Even today, your $10 dollar bill won't work to get a baguette in Paris. It'll buy you a ham sandwich in New York, but not in Paris. Those Dutch merchants came up with a

different system. They went to the Bank of Amsterdam, and they said, "We'll deposit our guilders in your basement, and you'll give us a bank note that tells a bank in Venice that you're good for the money." And that's 90 percent of the money we use today, is the bank-note system. Whether you're using Zelle or Venmo or a credit card — it's not money that's moving from your mobile device to the reader. It's a series of messages that tells your bank to credit another bank. And to do that, you need to establish identity in every case. And the shortcomings of that system are — it's costly. You've got to pay people to do all that debiting and crediting. It's slow because you've got to confirm all that identity. And the worst part — it's exclusive. Because if you don't have identity, you can't use it. Now, here in the United States, we all pretty much have identity, except for 5 percent of our population. But in the world at large, a billion and a half don't have sufficient identity, so they're excluded from this bank-note system. So, what is crypto? Well, crypto goes back to the token system. It uses that world wide web of computers to talk to each other to confirm that you really do have $10 on your phone, and the $10 moves from you to the cash register. When I buy that sandwich with a cryptocurrency, it looks like the same transaction that I did with Apple Pay. But here's the difference: No messages are moving to some bank somewhere. The money goes directly to the merchant. If you're the merchant, I'm no longer waiting 30 days for my money. I've got my money the moment you walk out the door with your sandwich. That increases the velocity of money. It's really good for the merchant. If I'm an expatriate living in America but sending money home to my family in the Philippines, I'm no longer paying 7 percent or 17 percent to transmit money around the globe. I hit send on my phone and the money moves itself, not through five different banks and maybe it's there in a week. It's there immediately.

DUBNER: If one of the big upsides of digital currencies is that they will, as you've explained, lower transaction costs, they will lessen friction, and they will increase inclusivity, can you put a number on it? Let's say just the transaction costs. How many billions, or I assume trillions, of dollars are we talking about — annual savings maybe 10 years from now?

GIANCARLO: Okay, so.

DUBNER: That was an easy question, wasn't it?

GIANCARLO: My understanding is it costs the world about 1 to 2 percent of its G.D.P. just to move money around the globe. So that's a huge savings. I talked about the velocity of money. If you're a merchant waiting 30 days to get paid, that means all your suppliers are waiting to get paid. Imagine if we can move that to instantaneous? It costs most merchants about 3 percent in the United States to accept those credit-card transactions. Take that 3 percent out, that improves their bottom line. Three percent could be the difference between profit and failure for a lot of small merchants. That's a huge savings. Now, I don't want to take money out of the pocket of those payment providers, but lowering the cost is a big deal. This is a big deal for a modern economy.

DUBNER: What you just described sounds tantalizing and frictionless in a number of ways, which is what we're all after in life, right? But we've also been told that what you just described was just around the corner with cryptocurrencies, including with Bitcoin, 10 years ago. And it's not. There are very few places where I can actually use Bitcoin or other cryptocurrencies to actually buy anything. Why has it taken so long?

GIANCARLO: I think it was Bill Gates who said, and I'm going to get this all wrong, but he said something like, "When it comes to technology, if you look forward, it looks like it's going to take forever. But when you look backwards, it says, 'Boy, that happened fast.'" I came out of law school in 1984 — to move information from one point to the other meant making the 8 p.m. FedEx delivery so that your package of documents would get there the next morning. Today, you hit send and the reader reads it immediately. And it's generational. My kids, who are in their 20s, they expect things to happen immediately. They send a text message, a photo, and yet they cannot understand why it takes three days to get their money out of the bank. So, it's going to happen.

Chris Giancarlo offers a pretty good practical argument for digital money: it can move at the speed of the internet, with the simplicity of cash. And perhaps central bank digital currencies, or a "digital

dollar," will help us get there. But the original version of digital money — Bitcoin — hasn't worked like that.

> *GIANCARLO: Bitcoin is actually not a very good means of payment. In a similar way, gold is not. You don't go buy a sandwich with a bar of gold. But what Bitcoin is particularly good — it's proven itself to be pretty good — is as a store of value. In other words, people will put value in it and hold value in it, in the same way you do with gold.*

Maybe, but let's not forget that Bitcoin has lost more than two-thirds of its value in the past few months. So there's that, but also, there's this:

> *BUDISH: It's intrinsically really expensive.*

That, again, is the UChicago economist Eric Budish. The expense he's talking about is Bitcoin's method of creating trust.

> *BUDISH: It's intellectually exciting. It's ingenious. But economically it's an extremely expensive form of trust because it doesn't have any memory to it. Usually, economic incentives have some memory to them. I trust my employer in part because my employer and I have a relationship that goes back years, we have a contract, where there's a rule of law governing that relationship. I trust stores that I buy goods from, in part because they have reputations and brands. That all has memory to it. Bitcoin's trust is extremely memory-less. It's as trustworthy as the amount of compute power maintaining the trust right now.*

In a 2018 paper called "The Economic Limits of Bitcoin and the Blockchain," Budish argues that the true costs of Bitcoin's trust model haven't really been acknowledged. When Bitcoin was created, there was a limit set on the number of coins that could ever be mined.

> *BUDISH: If you mine a block of Bitcoins, you get 6.25 new ones. That 6.25 is going to halve to 3.125 in a few years. And eventually it's going to go down all the way to zero.*

This is not scheduled to happen for more than 100 years.

> *BUDISH: So by the time we hit 2140, we're in for a treat, which is the only way to get miners to pay attention to the Bitcoin dataset is going to be to actually directly pay them with transaction fees, not to pay them in this indirect way, through the issuance of new Bitcoin.*

And that could burden the system with huge fees. Budish has other concerns, especially if Bitcoin were to become part of the global finance system.

> *BUDISH: The thing I worry about is a rogue actor sends a billion dollars worth of Bitcoin to some financial institution, gets back a billion dollars worth of traditional financial assets — bonds or dollars — and then overwhelms the blockchain with computational force so that they delete that original transaction in which they sent the billion dollars worth of Bitcoin to the financial institution in the first place.*

This is called a "double-spend" attack: the rogue actor in this scenario gets $1 billion in assets from the bank and keeps their original Bitcoin. Budish says the amount of computing power needed to prevent a $1 billion "double-spend" attack could cost as much as $3 trillion annually, or 4 percent of global G.D.P. Until 2140, some of this cost is covered by the issuance of new Bitcoins. But at some point, miners will have to be paid if we all want a secure and trustworthy Bitcoin ledger.

> *BUDISH: This is the problem to worry about with anonymous, decentralized trust is — it's trustworthy, as long as a majority of the compute power is behaving honestly. But if you overwhelm the compute power with a larger majority, you can essentially rewrite history.*

And Bitcoin has other shortcomings as a currency. At the moment, the Bitcoin blockchain can only process 7 transactions per second. The credit-card company Visa does 1,700 per second. A lot of people still associate Bitcoin with fraud and illegal activity, some of which is probably inevitable with a system that allows anonymous money transfers. But the biggest problem for Bitcoin as a currency may be that our existing payment system works pretty well for most people, at least in a place like the U.S. Crypto boosters, meanwhile, say these criticisms are missing the point. They say the Bitcoin blockchain may have looked like an alternative currency system at first, but that it's evolved way beyond that.

> *ARMSTRONG: It's kind of like the birth of the internet. Nobody knows exactly what it's going to be.*

That again is Brian Armstrong, C.E.O. of Coinbase.

> *ARMSTRONG: It's the new way to build applications. Just like when the iPhone came out, everyone was starting to think, "How do you build iPhone apps now?" Before, we were just building web pages. And before web pages, we were building client-server applications or mainframes or whatever. So occasionally these new paradigms come along in computer software, and this is one of them. And I think, believe it or not, we're on a path where most startups are going to eventually have some kind of a crypto component to it, and we may not need to say "crypto app" anymore. It'll just be "my app."*
>
> *SIMPSON: It's not some sort of magical voodoo. It's really building top-tier software.*

And that again is Arianna Simpson of Andreessen Horowitz.

> *SIMPSON: These are technology companies. That's our focus. By the way, many of our founders are coming out of the top universities, the top companies, these are not washed-up people who have have no business building companies. These are really excellent folks.*

Brian Armstrong is in fact one of these “excellent folks” who was funded by Andreesen Horowitz. Simpson’s firm was the primary investor when Coinbase was a startup; and when they went public in 2021, the Andreesen Horowitz share was worth billions. So it’s worth keeping in mind that people like Armstrong and Simpson do have a vested interest in seeing a bright crypto future — and maybe some interest that isn’t even fully vested yet. A skeptic might say this creates an even stronger incentive for them to promote the whole crypto idea. Simpson has heard all the skepticism, and she thinks it’s misplaced.

> *SIMPSON: A lot of the skeptics are really looking from the outside in. I can tell you that if people were sitting where I sit, which is at one of the top venture-capital firms in this space, meeting with top founders, top engineers day in, day out — they would be a lot more positive on this space.*
>
> *DUBNER: Let’s pretend for a minute that I am Jamie Dimon, C.E.O. of J.P. Morgan Chase and an avowed crypto skeptic. But I still want to know what exactly are people like Arianna Simpson and Andreessen Horowitz so excited about that they’re raising billions of dollars to invest in this space? Maybe tell me about a specific portfolio company that you would want to introduce me to.*
>
> *SIMPSON: One project that is doing really interesting work is Arweave. They’re really focused on creating permanent file storage because the internet is fundamentally broken in that regard. The percentage of broken links and missing information is enormous. So they want to create this permaweb that has much better permanence of information and also enable file storage in a way that’s not centralized. So that’s a very concrete example of a project that’s tackling a real-world use case that has nothing to do with some of the more hyped categories.*
>
> *DUBNER: I love that idea but explain to me why that needs to be a blockchain technology. What problems does blockchain solve that weren’t solvable before?*
>
> *SIMPSON: Well, again, the fact that the internet has so many broken links and so much missing information is proof in and of itself that this is not a solved problem.*
>
> *DUBNER: So it’s an incentive problem then? Or it’s a coordination problem?*

> *SIMPSON: It's a combination. There is definitely the incentive component. The protocol has its native token. But also, having very centralized file storage can often be a problem. So if you see A.W.S. go down, half the internet breaks for that day. Creating redundancy and making sure that not everything is reliant on one behemoth piece of infrastructure — we think is very important. And of course, there are tradeoffs. Often there are tradeoffs in the form of speed or latency. But we think that over time, the technology will continue to improve to the point where it eventually becomes better than many of the centralized technologies that we have today.*
>
> *DUBNER: So you're telling me I should just shut up and wait for the rails to be fully built and then all the stuff I want will be happening.*
>
> *SIMPSON: It's happening. You said the "shut-up" part.*

So what'd we learn today? We learned that crypto firms are trying to transform Satoshi Nakamoto's idea of digital cash into a variety of new services that are decentralized, with the incentives managed by tokens. We also learned that cryptocurrencies are poorly named, and may never become what we typically think of as currencies. More than anything, we learned that blockchain technology is still in its relatively early days. A lot of the breakthrough uses are — let's be honest here — pretty boring. Or at least not what you'd call transformative. Better file storage? Better coordination of Walmart trucking? Trimming the cost of financial transactions? Is all that worth the hype? And speaking of hype, let's not forget the headlines these past few years about the skyrocketing value of cryptocurrencies — and now, suddenly, the plunging prices. The next round of headlines may be about all the class-action lawsuits, with crypto investors trying to claw back their lost trillions. Is this, as Eric Budish wondered, a "naturally occurring Ponzi scheme"? And we haven't even gotten to the N.F.T. boom — and subsequent bust. You remember this?

> *NEWS ANCHOR: Final sale price: $69.3 million. That's more than most Picassos, Monets, or Warhols. Now to repeat, that's $69 million for a digital token. Shocking. Insane.*

Coming up next time on the show, in the second part of our series: Is there any world in which an N.F.T., or non-fungible token, should be worth $69 million? And what does the most famous man in the cryptoeconomy think about those Bored Ape N.F.T.s?

> *Vitalik BUTERIN: I totally did not predict that people would be paying $3 million for a monkey.*

Also: we still need to launch Tom Sachs's model-rocket N.F.T., and see if this is all a big scam.

> *SACHS: I think we're going to look back in 10 years and be like, "What was CryptoPunks?" No one's going to care.*

Does N.F.T. actually stand for "no friggin' thanks"? That's next week on the show, in the second episode of our three-part series on blockchain technology and cryptocurrencies.

* * *

Freakonomics Radio is produced by Stitcher and Renbud Radio. This series is being produced by **Ryan Kelley**. Our staff also includes **Neal Carruth**, **Gabriel Roth**, **Greg Rippin**, **Zack Lapinski**, **Rebecca Lee Douglas**, **Julie Kanfer**, **Morgan Levey**, **Eleanor Osborne**, **Jasmin Klinger**, **Emma Tyrrell**, **Lyric Bowditch**, **Jacob Clemente**, and **Alina Kulman**; we had help this week from **Jeremy Johnston**. Our theme song is "Mr. Fortune," by the Hitchhikers; the rest of the music this week was composed by Luis Guerra. You can follow *Freakonomics Radio* on Apple Podcasts, Spotify, Stitcher, or wherever you get your podcasts.

COLLAPSE TRANSCRIPT

SOURCES

- Brian Armstrong, co-founder and C.E.O. of Coinbase.