

## Fidelity Connects

### Digital Assets: Outlook

**Chris Kuiper**, Director, Research, Fidelity Digital Assets (FMR)

**Colin Randall**, Host

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**Announcer:** Hello and welcome to Fidelity Connects, a Fidelity Investments Canada podcast, connecting you to the world of investing and helping you stay ahead.

On today's show, we welcome Chris Kuiper, Director of Research at Fidelity Digital Assets, based out of Boston. Chris joins host Colin Randall, Director of Research at Fidelity Investments Canada to discuss all things digital assets.

One of the most anticipated and significant events in digital assets relatively short history occurred in the early hours of September 15<sup>th</sup>. Dubbed "The Merge," the event marks the Ethereum blockchain's transition move from a proof-of-work consensus mechanism to a proof-of-stake mechanism.

Chris unpacks what this means, including how the Merge represents significant change in Ethereum's technical structure, its economics and environmental footprint, which some say will reduce the blockchain's energy consumption by more than 99%.

Also, Chris and Colin discuss the differences between the Ethereum and Bitcoin networks, also what's driving the price drops in Bitcoin and Ethereum this year, and how cryptocurrencies could fit into a portfolio.

Today's podcast was recorded on September 21, 2022.

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**Colin Randall:** Hello and welcome to Fidelity Connects. Chris, welcome and thanks for joining us today.

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**Chris Kuiper:** Thank you, and thank you for having me. Happy to be here.

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**Colin Randall:** Let's start by perhaps taking a step back and talk about what exactly Ethereum is. It's been described by some observers as an early-stage world computer. What do people mean by that?

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**Chris Kuiper:** I'll take it a step back even more and we'll just briefly review Bitcoin. The Bitcoin network, when we talk about it, is really just a bunch of computers all running the same code and so they're connected together. They make

up the Bitcoin network. The Ethereum network is the same. It takes some of the same ideas and breakthroughs that the Bitcoin network did with the discovery or creation by Satoshi Nakamoto. It takes some of the same code and all of the computers running the Ethereum code make up the Ethereum network. So that's all it is, distributed decentralized computers all running the same code.

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The Ethereum network, to be clear, is completely different than the Bitcoin network. It's separate. There's not the same thing between them. They're different computers running different code. The main difference, though, is that the Ethereum network takes the Bitcoin code and it added a few tweaks to it. It made it more programmable, more flexible, and it really had in mind this vision of a platform or, as you say, a world supercomputer.

The idea with the Ethereum network is that all these computers running this code make up one kind of giant computer, one platform, that anyone can build applications on top of. So, if you've heard of smart contracts, this is how they do that. They code up these little pieces of code called smart contracts, those run on the Ethereum network.

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To give you kind of a basic example, if you have a text messaging app on your phone or an email or a banking app, you don't know exactly how it works but I think we all know somewhere that app runs on a central server somewhere, either Bank of America server or your cell phone provider server for your text messaging. If that server goes down or that company closes down, your app isn't going to work.

With the Ethereum network, if I program an application on top of the Ethereum network, because no one person controls that network, it's a decentralized application, so that text messaging app doesn't have a central server, it doesn't have a single point of failure. That's the key difference here and why people call this a world computing platform, if you will.

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**Colin Randall:** That's excellent. You mentioned smart contracts and that sounds to be one of the key differentiators between the Bitcoin blockchain and the Ethereum blockchain. You mentioned there are applications that can be built with these smart contracts. What are the different kinds of applications that we're seeing today being built on the Ethereum network?

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**Chris Kuiper:** Because it's kind of a generic or multipurpose platform, people have found some pretty ingenious ways to build on top of it. The biggest use case today is decentralized finance or defi, if you've heard of this. If you think of traditional finance things like saving, investing, borrowing and lending, those are typically done through a bank or some kind of central intermediary.

With the Ethereum network you can build these defi, decentralized applications, for finance on top of it and you can replicate these same things without a central intermediary. So, you and I can borrow or lend to people on the network without having a central bank in control. We can trade without going through a centralized stock exchange. They have entire decentralized exchanges built on top of this. That's one of the bigger categories. There's other categories that you may have heard of like Stablecoins. There's a whole category of NFTs, nonfungible tokens where people are trading things like art and music and different rights on top of it. That's where you see kind of this blossoming of innovation on top of it.

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**Colin Randall:** Ethereum sounds like it's programmable. It can be many different things using these smart contracts. Whereas bitcoin is really, it seems focused on a more, I guess, narrow range of use cases. Is that a fair assessment?

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**Chris Kuiper:** I'm really glad you brought that up and the way you framed that because that's exactly how I and we like to look at it at Fidelity Digital Assets. People hear, oh, Ethereum took Bitcoin's code and evolved it or added functionality or made it more programmable, therefore it's better. I say to people, it's kind of like if I asked you, what's a better vehicle, a 4-door hybrid sedan or a 4-wheel drive diesel truck? Well, the answer is it depends. It depends on what you need it for, what you're trying to do. If you're trying to get to work and want to save gas and you can drive on nice highways, the sedan is probably the way to go. If you live out in the middle of Alaska, that 4-wheel drive diesel truck literally might mean life or death for you to get out of there or be able to get food or water.

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I think it's the same thing with Bitcoin and Ethereum. It's not either/or; it's not one's better or more advanced. They're clearly built for different use cases. Some of the founders of Ethereum clearly laid this out. They wanted to have a platform; they want to have this flexibility. Ethereum has changed its code; it's adapted. Bitcoin, on the other hand, was clearly built as a monetary network. It's the first time we've had a completely open source, permissionless, censorship-resistant, monetary global network. We've never had that before in the history of humanity. And on top of it you have the Bitcoin token which is this potential emerging form of money that's the first non-state, non-sovereign form of money, also something we've never had.

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If you want a monetary network, you want, like you say, a narrow use case that focuses just on things like security, decentralization, you actually want the code to be harder to change, more ossified, more resistant to the latest whims of what people might want or need. But on the other hand, Ethereum has all these different use cases and abilities, but it makes some inherent trade-offs. People just need to be aware of that and need to know that there are engineering trade-offs made between the two. It's not a free lunch.

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**Colin Randall:** The news about Ethereum merging just last week, a continuation of the evolution of the code, I think some pundits are looking at and saying, this is a good thing and is it leaving Bitcoin behind? I think what you're saying is the very sort of stability of the Bitcoin code, of its structure, is a feature not a bug.

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**Chris Kuiper:** Absolutely. I think that's exactly the way to think about it.

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**Colin Randall:** Before we move to the Merge, wanted to talk a little bit about consensus mechanisms because this is really at the heart of what happened in Ethereum's merge just recently. This being the Ethereum network moved from a proof-of-work consensus mechanism to a proof-of-stake mechanism. Bitcoin remains on a proof-of-work mechanism. Could you talk a little bit about the differences between these consensus mechanisms and what are the trade-offs involved.

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**Chris Kuiper:** I'll start with what a consensus mechanism is. As I alluded to before, these networks, both Bitcoin and Ethereum, are just a bunch of computers all running the same code and they're decentralized. No one person, entity, government, institution, corporation, controls them. If you have a bunch of computers all running the same code and they're all keeping track of some kind of ledger, a shared ledger, the question is obviously, well, how do you know which one is correct? How do you come to an agreement on what the source of truth is? How do you come to a consensus? Obviously you need a consensus mechanism.

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Bitcoin was the first one to use proof-of-work. Satoshi Nakamoto did not invent proof-of-work. Proof-of-work existed before, but Satoshi was the first one to bring that piece into Bitcoin, to kind of pull this all together and really make it work and align all the incentives. Without getting too technical, if I can kind of come at it from a not quite technically correct way but just to illustrate the point, if you want a consensus mechanism between a group, if you want a group to decide, voting is usually the way you do it. You all get together and you vote on what is the agreed upon rules or the state of your ledger.

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Of course, you might be thinking, well, one vote per person. But that doesn't work because you have different people running computers, you don't know if one person is behind it or if one person controls 100 computers. You'd have to introduce a central intermediary, like we do with our political voting systems, to make sure there's only one vote per person, so that isn't going to work. Satoshi, in his actual ... or they, her or whoever Satoshi is, we don't know ... but in the paper, Satoshi outlines, well, you could have one IP address per vote but then says, well, this wouldn't work either. People could spin up a bunch of computers, launch a bunch of IP addresses.

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The key element here is to make it one vote per unit of computing power. That's what proof-of-work is. It's expending computing power, making a computer do calculations and burn electricity as a type of voting mechanism. If people have a financial stake, if there's a cost to that vote, it aligns their incentives to act truthfully and for this service, for helping to secure the network and making sure it's accurate, they're rewarded with new Bitcoin. That's proof-of-work.

Ethereum started with proof-of-work, too, and the miners, they're called, the people who expend electricity and computing power, they got new Ethereum. Now they're going to move to a different consensus mechanism. Proof-of-work is one way to achieve consensus.

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The one Ethereum has recently moved to is called proof-of-stake or POS. In this, instead of expending electricity to help secure the network, you lock up your funds. You're kind of locking them up like a bond or collateral. The people who lock up their funds get to help validate their true transactions.

Again, the object is to try to align those economic incentives. If they act dishonestly, they can get their funds slashed or a fee taken off of them. Obviously, the big change here is you don't need to burn electricity you just need to lock up funds. This is the big deal with Ethereum and why from day one they wanted to move to proof-of-stake. They thought they would do it about a year after Ethereum launched in 2015. Seven years later, we're finally there. The problem turned out to be a lot harder than they thought but as you stated, September 15, it actually happened.

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**Colin Randall:** That's great. Maybe we could talk a little bit more about the rationale for moving toward this new consensus mechanism and proof-of-stake. What are some of the purported benefits? You touched on environmental but I think there are other benefits that are being claimed for this move, including yield, impacts to issuance of ether as well as potential security benefit.

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**Chris Kuiper:** The big one was the energy usage, as you said. Ethereum's network has dropped its energy consumption or electricity consumption by about 99% or even more. You basically don't need it anymore. You just need a minimum amount of energy to run these staking validators and the computers that run the code. The second big thing that's changing is the issuance schedule. Miners used to get newly minted ether. There are still going to be some newly minted ether but it's about 90% less than what was going on before the Merge. Your issuance goes down by 90%. Then there was a change to the Ethereum code before the Merge where every time a transaction is done on the Ethereum network, some of the transaction fee is burned, meaning nobody gets it - it ceased to exist.

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There is a potential now for the supply of Ethereum to actually be deflationary. The supply could actually go down. Depending on your viewpoint of whether this could be a good thing in terms of storing value or being a more valuable asset that isn't being inflated as much is up to you.

The third point, as you mentioned, was you can now get yield because these people lock up their ether, their tokens, their money, their capital, to help secure the network, why would they do this? Why are they incentivized to do it? Well, they get some of these newly minted ether as well as some of the transaction fee money. They're getting a yield from that. Before the Merge, they were getting about 4% and now it's a little bit higher. So there's the incentive there as well.

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**Colin Randall:** Maybe we could talk a little bit about the risks that are potentially apparent as a result of this merge.

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**Chris Kuiper:** Pre Merge, there was a lot of skepticism a) would it actually happen, they were doing different tests in stages. They found some bugs earlier so everyone was kind of holding their breath when it happened, is this going to work? People likened it to the equivalent of changing out an airplane's engine while in mid-flight. Very risky, very technical. There's a lot of value and money on the line. But they did it and it seemingly has gone off without a hitch, so my hats are off to them, all the engineers, because I realize this was a very technical problem.

That's not to say, though, that there could be more bugs in the future that haven't been discovered. There is a widespread acceptance that proof-of-stake is more complicated. Even the Ethereum, their own website, ethereum.org, notes this and they also note that proof-of-stake is not as battle-tested as proof-of-work. Proof-of-work has been running on Bitcoin since Bitcoin started in 2009, so going on 13 years. Proof-of-stake hasn't been done on this scale yet. We'll see, obviously, if all goes according to plan.

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The other risks that people mention are risks of centralization. Again, if you've got large entities locking up their capital and then they're also getting a yield on it, they'll continue to accrue value and now these entities are the ones that are in control. Rather than the miners, you've got these stakers that have the potential to control the network. There's a lot of questions of what level of centralization will happen or where that equilibrium will kind of come out to, but I think that's one of the other risks to be aware of as well.

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A third one is just kind of, we've never gone to such a massive scale of proof-of-stake where everything is now kind of virtual. Vitalik even mentioned this himself. It's like we are in a virtual world where we can kind of make our own physics. The advocates for Bitcoin say proof-of-work is the feature, not the bug. The fact that you have something so virtual, so ephemeral like Bitcoin and you tie it back to the physical world, the laws of physics can't be faked. To them, that's the feature, that's what anchors it and what gives them kind of that assurance that there's something of real value there. Again, some of these things we'll just have to wait to see how they play out and whether they become greater risks or not over time.

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**Colin Randall:** I would just mention, Vitalik, the gentleman you named, Vitalik Buterin is one of the co-founders of Ethereum and, I guess, one of the key designers of the blockchain and its development since then. Could I also ask about staking, I guess there are also some liquidity concerns that those individuals, organizations that are staking right now with Ethereum aren't able to pull their ether out at this time and potentially for some time to come.

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**Chris Kuiper:** That's exactly right. If you want to stake ether yourself, personally, without using another service or company DAO, a decentralized organization, it's a lot of work and a lot of money. It's very complex. You need to run some pretty high-powered computers and you need to stake 32 E. At today's prices you're talking \$40, \$50,000, whatever the price is. It's not cheap, it's not easy.

Furthermore, if you do choose to stake, you will get the reward but if you want to unstake and get your ether back, you are not allowed to do that at this time. It's currently locked up and the only time people will be able to unstake will be, they estimate, 6 to 12 months down the road when they implement another upgrade to the network. Again, depending on your timeframe and also kind of the probability of whether that 6 to 12 months will turn into years, kind of like the Merge itself happened, has yet to be seen but certainly something to be aware of.

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**Colin Randall:** Just to be clear, you don't have to stake, you can hold Ethereum and not stake. By not doing so, of course, you're not going to be earning the staking rewards, the yield that comes with doing so but important considerations for investors.

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**Chris Kuiper:** You'd still be exposed to the price appreciation or decline but you would at least have the liquidity. Right?

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**Colin Randall:** Well, so, so maybe could we talk about what the Merge isn't? You know, a lot of talk about whether this will involve a reduction in gas fees, a reduction in cost and using the network. Whether it's going to speed up the Ethereum network, which, you know, some observers have said is quite slow and hard to imagine a whole world using this blockchain today.

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**Chris Kuiper:** There's a number of misconceptions like you were talking about there. The number one is it's going to speed it up. There's a tiny, tiny grain of truth there. There's kind of this technical thing where the blocks are coming more regularly, so there's like a marginal speed improvement there whereas before it was more of a probabilistic thing. Most people should just ignore that, the speed and throughput of the network has not changed. That was not the point of the Merge, it never really was.

The other grain of truth, though, is that this upgrade had to happen first and they've got plans down the road to speed it up, make it more scalable. There's something called sharding that they plan to do down the road. Again, this is years later. That goes hand-in-hand with the gas fees then because if the network gets congested, the transaction or gas fees go up. That's not going to change. You still might see very high gas fees if the network becomes congested again. Again, that's something that's not changing, as you say.

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**Colin Randall:** I don't know if this is an instance here where people were buying on the "rumour" in the lead up to the Merge and sell on the news but we have seen pretty significant price declines for both ether and Bitcoin recently. Could you talk about what you think is driving that movement?

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**Chris Kuiper:** We'll start with Ethereum specifically. I think you're right. It was a classic "buy the rumour, sell the news." Ethereum was outperforming Bitcoin all the way back to July, really, or earlier as this anticipation heated up, as the tests were going well, as they got some more solidity around the date and when it would actually happen. People started running up Ethereum into that but then when it actually happened it seems like, I guess, most people thought it would happen and they sold off on that. If you look at a chart of Bitcoin versus Ethereum, it's kind of hit that resistance level. If you're looking at Ethereum as a percentage of Bitcoin's market cap, it just hasn't been able to break through the past few months where it's been hitting up there.

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Now, more broadly, you're right, the whole industry is down, right? Bitcoin's down about 70% from its last all-time highs last November and it's really been the macro environment that's driving this. We kind of feel like a broken record talking about it every week or every month but people continue to view digital assets like a risk asset, kind of like what we say a growth stock on steroids: very high beta, .7, .8 beta to the S&P 500 for Bitcoin. Come down just a little bit. That is the exception, though, not the norm. If you look at the whole history of Bitcoin's correlation, it fluctuates between a .2 and -.2. So really very uncorrelated. That was one of the big value propositions of Bitcoin in a portfolio is that it is uncorrelated to everything, stocks, bonds, gold, commodities, real estate.

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Lately, that hasn't been the case. Obviously, the big question is, is this the new normal going forward? Is it always going to trade like a growth stock on steroids, a risk asset or is that going to decouple? Of course, we can't say, time will tell but I think the characteristics of Bitcoin specifically, at least in my opinion, would lead to more of a decoupling again once people realize how different it is from a growth stock or some of these other asset classes. But again, all eyes on macro, we've got the Fed again today, so I expect it to behave accordingly.

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**Colin Randall:** We'll be watching with keen eyes, I'm sure. Could we talk a little bit sort of longer term? This is sort of the shorter-term price action. Some comments we see in the digital assets communities and perhaps beyond around is this perhaps the start of a flipping of Ethereum overtaking Bitcoin? We touched on this early in the webcast but what are your thoughts there?

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**Chris Kuiper:** The Ethereum community has been talking about this for a long time. Obviously, Bitcoin's dominance started at 100%. It was the only one out there, the only game in town. It's gone down to about as low as 40, 45% and gone back up to about 60%. If you're looking at the long-term chart, though, Bitcoin's dominance going down is not so much a feature of it declining in price as just all of these other things coming into the marketplace. The whole pie has gotten bigger. It's not that Bitcoin's slice has gotten smaller, it's just the pie has gotten bigger, so it's relative size to everything else has gotten smaller.

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Now, whether Ethereum is going to eventually overtake Bitcoin obviously depends on a lot of factors. I think if you have the view of Bitcoin as a digital gold, gold as a 10 to \$15 trillion asset class, other markets like stocks and bonds are obviously multiple times of that. But if Bitcoin finds more use cases than just purely a digital gold, then I think it's going to be a much bigger proportion of that pie. Again, we'll see over the coming years, for sure.

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**Colin Randall:** This is obviously a big momentous development for the Ethereum blockchain and I think it's safe to argue the crypto space more broadly, the Merge happening just recently. What's next for Ethereum? What comes next on the Ethereum roadmap?

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**Chris Kuiper:** I think we hit on kind of the main ones already. There's first that 6-to-12-months-from-now upgrade that will allow stakers to unstake and access their locked up or staked ether. That's called the Shanghai update if people want to be on the lookout for that one. Beyond that, they're going to start focusing on the scalability issues. Sharding is one area where you've got little shards of a chain and then they all roll up. Vitalik is on record saying in one article after the Merge, in his estimation, Ethereum will be 55% done. It kind of gives you a window into his mind of how far we are and how far he thinks it will still go.

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**Colin Randall:** I have another question here. Wondered if we could get your thoughts, Chris, on the role of digital assets in a portfolio today. Do you see this as a diversification opportunity, as a growth opportunity? What are your thoughts on the role of crypto in the portfolio?

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**Chris Kuiper:** It's hard to put Bitcoin into a specific traditional category of stock, bond, commodity, real estate, that sort of thing, because it has kind of characteristics of all these things but isn't quite one of these things. There's a famous article that I'd encourage everyone to read that really opened my mind when I discovered Bitcoin called "What Does Bitcoin and the Platypus Have in Common" by Spencer Bogart. I'll get to the punchline which is they're both category creators.

When the platypus was discovered people couldn't think or they argued about what kind of category, how to scientifically classify this animal. They obviously came down to the conclusion is we need to make a whole new category. It'll be interesting to see if the same thing happens with Bitcoin. Does it come into one of our traditional buckets or whether it truly is a new asset class?

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But again, I think it helps to differentiate between Bitcoin the network and Bitcoin the asset, to kind of think about the different investment thesis. You've got, once again, the world's first open permissionless global payment network that's ever been created. As that grows, as things get built on top of it, value will accrue to the tokens and then the tokens themselves, Bitcoin, the native token, is the world's first potential emerging non-sovereign, non-bank currency. How do you look at that in your portfolio in terms of what central banks are doing with expanding balance sheets, more fiscal spending, inflation on the rise, that sort of thing?

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Bitcoin's gone through different narratives. Digital assets have gone through some of these different narratives. They're still trying to find kind of where it fits but with each wave of adoption, each wave of a different investor looking at the space, it becomes more clear where they're putting this.

Again, going back to the correlation thing, if you think it's not correlated, that's going to be the norm, it's going to revert back to that mean, you've got potentially an asymmetric asset, a lot of upside, a limited downside that's uncorrelated to other things. Is the question something like that, should have 0% in your portfolio or maybe even just a small amount?

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**Colin Randall:** That's excellent. Last question for you, just a mindful of time, want to get your thoughts on the outlook for the space. In light of continued volatility that we're seeing in markets, digital markets and traditional markets, what is it that you're watching for on the horizon and what should investors be thinking about in terms of opportunities and digital assets?

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**Chris Kuiper:** If you took out all the price action and you looked at all the other data points and all the other news, I think you'd be surprised to find that Bitcoin is in such a bear market as well as all the other digital assets. If you look at fundamentals that we track and watch, things like number of addresses, and these are all on chain verifiable things: number of addresses, the balance in those addresses, the hash rate, that's a measure of the computing power for those

proof-of-work consensus mechanisms, hash rates at all-time high, the network has never been more secure, people are firing up these machines despite the price being down so low. If you look at some of those fundamentals, everything says there's more adoption happening and then you combine that with almost every day I see a new news piece of another institution announcing digital asset capabilities, building out some other service or infrastructure.

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To me, that tells me this isn't going away despite the bear market we're in but we've been in these bear markets before. This is the fourth one of 70, 80, 85% down. The technology is real. I'm fully convinced this is an absolute breakthrough in technology in terms of computer science, in terms of economics, and it's going to have profound implications.

Now, where that value settles out and accrues to, of course, is the next big question but the adoption continues and people keep building. That's what I'm looking at the long term, continue to look at those fundamentals to make sure my investment thesis hasn't changed.

In the short term, it's going to be macro, it's when or if central banks start to pivot and go back into easing mode for whatever reason, I think you're going to see the shift or flip happening with digital assets as well.

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**Colin Randall:** Chris, it's great to speak with you today. Thank you so much for joining us and sharing your insights on this evolving area of the markets. We really appreciate it.

[00:29:12]

**Chris Kuiper:** My pleasure. Thank you.

[00:29:15]

**Colin Randall:** Thanks again for joining us on Fidelity Connects.

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