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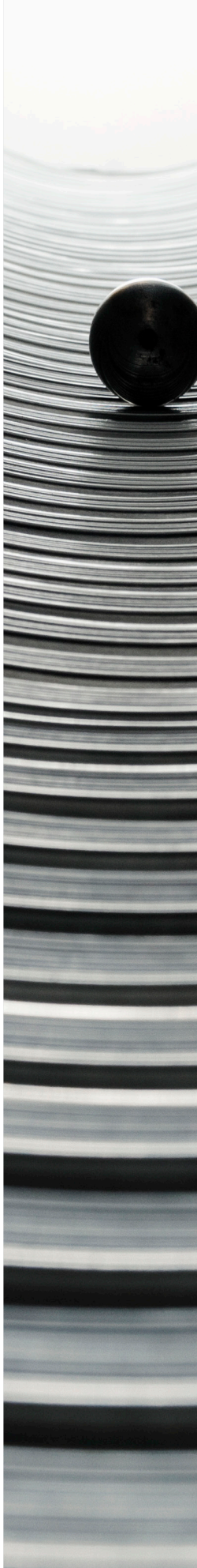

Counterpoint Global Insights

Blockchain

EDGE | MAY 2018

WELCOME TO THE EDGE.
Morgan Stanley Investment Management's Counterpoint Global shares their proprietary views on a big idea that has the potential to trigger far-reaching consequences—ideas such as autonomous vehicles, machine learning and gene editing.

Counterpoint Global's long-term ownership mindset emphasizes perspective, insight and thinking across categories, while our investment process focuses on identifying unique companies with sustainable competitive advantages. Through The EDGE, we share our framework for thinking about change and our process for recognizing patterns that may drastically alter the investment landscape over the longer term.

This work complements our team's more traditional, fundamental research to create a framework for long-term investing that is grounded in intellectual curiosity and flexibility, perspective, self-awareness and partnership.

As the price of cryptocurrencies like bitcoin have fluctuated wildly over the last year, bitcoin, and blockchain, the underlying technology that powers it, have captured the popular imagination.

Blockchain at its heart is a distributed-ledger technology that employs cryptography to ensure the integrity of the data it stores. For all its hype, blockchain is basically just a novel approach to database architecture where control of the data is distributed among all the parties using it. This architecture is enabled by cryptography and the use of tokens (e.g. cryptocurrencies) as incentives for participants to perform the work to ensure the data's integrity. What makes blockchain so disruptive is its shared ledger eliminates the need for intermediaries to establish trust and authenticate identity between two untrusted parties who want to transact. As a result, blockchain has the potential to cut out the financial middleman.

How it works

Blockchain is a protocol for a shared ledger similar to the way that TCP/IP is a protocol enabling the internet. ▶

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▶ Just as the internet has multiple websites, there are multiple blockchains including the most famous ones, bitcoin and ethereum. While each permissionless blockchain is slightly different in design, most share common features.

A permissionless blockchain is open to the public, meaning all the data is readable by every participant. The power of blockchain comes from this shared data, which can include anything from the ownership of a single bitcoin to property titles. Because the data is open to the public, care must be taken to ensure its integrity. Here, the key innovations of blockchain—using cryptography and proof of work to secure the contents of the shared ledger—come into play.

For example, take the bitcoin blockchain. Every ten minutes, a new block is added to the chain. Each block consists of three components: (1) the new transactions being added to the chain, (2) the previous block's "hash" (a fixed length output generated from an input string), and (3) a random number called a "nonce." Miners around the world compete to find a nonce that satisfies the requirements for the hash for the current block set forth by the bitcoin protocol. This protocol dynamically adjusts the difficulty of this task, depending on the amount of computing power currently dedicated to finding the next nonce, to ensure it always takes 10 minutes to find a nonce for each new block added to the chain *(Display 1)*. The first miner or team of miners to discover a valid nonce receives tokens (in this example, bitcoin) from the blockchain as a reward. Referred to as "proof of work," these token grants are the incentive that persuade miners to invest in and operate the infrastructure to confirm transactions.

> What makes blockchain so disruptive is its potential to cut out the financial middleman.

Validation mechanisms vary among different blockchains, but they all work off the premise that people are rewarded for validating the transactions of the shared ledger. There are real costs to validating a transaction: time, computing power and electricity.

Because each prior block's hash is needed to generate the current block's hash, the system ensures that no one can go back

and independently alter prior records in the blockchain (e.g. to give themselves more bitcoins). An altered record would immediately show discrepancies with other nodes in the blockchain and thus the protocol ignores the block that has a discrepancy from the rest of the blocks in the chain.

All told, blockchain is an open, shared technology that rewards hard work, and incorporates a system of security checks to ensure the integrity of the chain.

Why It's Disruptive

What makes blockchain so disruptive is its decentralization of the ledger. All users of a given blockchain agree to the same set of facts, the ledger. This agreement eliminates the need for trust among participants and leads to new possibilities. For instance, titles to everything from property to securities to cryptocurrency can be written into blockchain. If two parties want to transact using the same blockchain, they can both verify that the other party has title to what they claim without the need for a financial intermediary facilitating the transaction. Blockchain effectively eliminates the clearing function in financial transactions and allows the parties to move almost immediately from execution to settlement. Hence, the time required for settlement collapses from multiple days to minutes. This change offers the potential to eliminate not only the back-office costs associated with clearing, but also the costs associated with putting up margin until a transaction closes.

While blockchain technology can be adopted by existing financial institutions to facilitate transactions, blockchain has the potential to enable a new set of payment rails that circumvents the existing financial establishment. In particular, cryptocurrencies are gaining traction as a form of payment for e-commerce transactions where there is a high risk of fraud and/or chargebacks. By accepting cryptocurrencies, merchants can bypass elevated credit card processing fees and lower their overall costs. Companies are also using blockchain in a range of other financial applications. For instance T0 is using blockchain to target the prime brokerage market.

In addition, blockchain has new capabilities such as the ability to deploy "smart contracts" that do not exist today. A smart contract is a self-executing contract that is written into the computer code. If the mutually agreed upon conditions of the transacting parties are met, the smart contract will execute automatically with transparency and no reversibility. The appeal of a smart contract lies in its potential to reduce transaction costs.

It is still unclear if bitcoin will become a lasting piece of the financial firmament or is just a passing fad. That said, at its heart, bitcoin provides the three key functions of a currency—it functions as a store of value, a mechanism of transaction, and a unit of account. Particularly in countries that have histories of financial instability, bitcoin could prove to be an attractive alternative to local currencies. It could potentially play a similar role to the one gold has historically, as a hedge against uncertainty. To put it in context, the bitcoin in circulation today is worth around $125 billion while the value of all gold ever mined is worth around $7.9 trillion. If bitcoin began to function more like gold on the world stage, those valuations could converge.

Challenges

We believe there are three key challenges that blockchain will need to overcome.

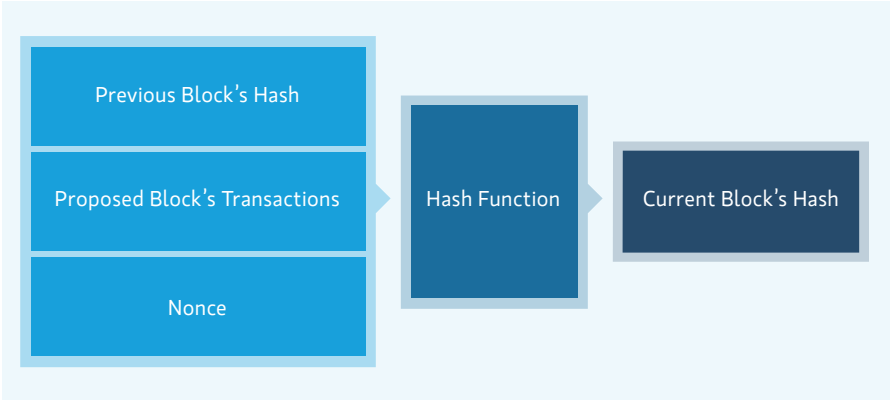
First, achieving critical mass. Blockchain-related technologies benefit from a network effect, meaning the addition of each person to the network increases the value of being on the network to everyone else. While a network effect is a strong competitive advantage in a mature business, the downside is that they are very difficult to start, in part because small networks are not nearly as valuable as large networks to the end customer. It is possible that no blockchain will gain critical mass, which would prevent its advantages over traditional methods from materializing.

Second, regulatory uncertainty. Regulatory bodies across the globe have increased their focus on all aspects of blockchain related businesses. For instance, both China and South Korea have banned ICOs (initial coin offerings), a form of raising capital that has been gaining popularity. New regulations that limit what can be done with blockchain could reduce

DISPLAY 1

Miners compete to be the first to find a nonce that satisfies the hash requirement

Each hash is designed to take 10 minutes to solve

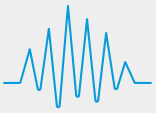


and/or eliminate its attractiveness versus traditional means of conducting financial transactions.

Third, high energy and storage demands. Challenges in scaling blockchains could prove insurmountable. Given that blockchains are distributed ledgers and that all the data stored on the blockchain is available at every node, the storage demands of such a system grow exponentially as more nodes/users are added to the overall system. The proof of work calculations needed to confirm bitcoin transactions also require a large amount of electricity. By some estimates, about as much electricity is used by the bitcoin proof of work calculations as by the entire country of Denmark.[1] In order to continue growing, changes to the protocols will need to be made to reduce their resource requirements.

Conclusions

Blockchain is still in the early innings of development. While it has the potential to become as ubiquitous as the internet over time, there are nevertheless many issues that need to be addressed. As with the internet, we will probably see a mixture of both blockchain native companies as well as companies adopting the technology to improve their existing business processes and to attack new market opportunities afforded by these new capabilities. We believe blockchain is a technology that will continue to garner increasing mindshare in the years ahead.



OTHER DISRUPTORS

Other themes the team is currently researching include

- Autonomous vehicles
- Machine learning
- Gene editing

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There is no assurance that a Portfolio will achieve its investment objective. Portfolios are subject to **market risk**, which is the possibility that the market values of securities owned by the Portfolio will decline and that the value of Portfolio shares may therefore be less than what you paid for them. Market values can change daily due to economic and other events (e.g. natural disasters, health crises, terrorism, conflicts and social unrest) that affect markets, countries, companies or governments. It is difficult to predict the timing, duration, and potential adverse effects (e.g. portfolio liquidity) of events. Accordingly, you can lose money investing in this Portfolio. Please be aware that this Portfolio may be subject to certain additional risks. In general, **equities securities'** values also fluctuate in response to activities specific to a company. Investments in **foreign markets** entail special risks such as currency, political, economic, market and liquidity risks. The risks of investing in **emerging market countries** are greater than risks associated with investments in foreign developed countries. **Privately placed and restricted securities** may be subject to resale restrictions as well as a lack of publicly available information, which will increase their illiquidity and could adversely affect the ability to value and sell them (liquidity risk). **Derivative instruments** may disproportionately increase losses and have a significant impact on performance. They also may be subject to counterparty, liquidity, valuation, correlation and market risks. **Illiquid securities** may be more difficult to sell and value than public traded securities (liquidity risk). **Cryptocurrency** (notably, Bitcoin) operates as a decentralized, peer-to-peer financial exchange and value storage that is used like money. It is not backed by any government. Federal, state or foreign governments may restrict the use and exchange of cryptocurrency. Cryptocurrency may experience very high volatility.

[1] Ars Technica, "Bitcoin's insane energy consumption, explained", December 6, 2017.

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