Investing in the Blockchain Ecosystem

Introduction
When investors hear the term 'Blockchain', most probably think of cryptocurrencies (which are digital currencies, operated independently from a central bank), with Bitcoin being the most well-known.

Beyond the cryptocurrency landscape, there's much more to understanding and investing in the broader blockchain technology and the ecosystem that powers it. The global blockchain technology market is forecast to grow to USD $2.3 billion by 2021.¹

Fueling the appeal of investing in blockchain is its potential to fundamentally change the way we exchange stores of value – whether that value is information or currency. With blockchain's ability to transform the way transactions and operations occur across industries and sectors, observers have deemed the technology as disruptive – and the world has taken note.

Nine in ten government organizations plan to invest in blockchain technology in 2018 for purposes relating to financial transaction management, asset management, contract management and regulatory compliance, according to an IBM report surveying 200 government officials in 16 countries.²

In 2016, more than USD $500 million in global venture capital was invested in blockchain and blockchain-adjacent startups. Only a year later, 2017 saw more than USD $900 million invested in the technology’s fintech applications. 2018 is already anticipated to surpass 2017’s record.³

Currently, investors have the ability to capitalize on unprecedented levels of growth and innovation within blockchain ecosystems, as it develops a staple technology platform, like the 'Cloud' and the internet that preceded it. However, as with investing in any asset class, it's important to first understand the basics of how the sector or industry works, as well as the associated risk/reward trade-offs.

What is Blockchain?
A blockchain is a digitized place where information of value, such as transactions or assets, can be logged and tracked into an online and sharable repository. Its structure resembles a general ledger made up of a chain of “blocks”, arranged in chronological order and collectively managed by its users.

While most digital transactions are centralized, blockchain is decentralized and is a peer-to-peer sharing platform.

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There are different types of blockchains, with their structure dependent on the type of data stored. For instance, if the stored data relates to transactions, one block could contain information regarding a sender, receiver and the amount of value being exchanged.

All of this is contained within a uniquely generated string of code called a “cryptographic hash” or “hash” for short. A hash has identifying properties and works much like how a fingerprint identifies a person. Each block contains its own hash and the hash of the previous block it is connected to within the chain. Hashing mechanisms maintain order and ensure secure activity within the blockchain, making it difficult to tamper with any record in the ledger once it’s shared among parties.

This hash process can be explained by using an example of three blocks, as illustrated in the transactional blockchain diagram below. Block #1 contains a copy of its own hash, but does not have a copy of a hash from a prior block since it is the first (or genesis) block in the chain. Block #2 and #3 contain their own hash and a copy of the hash from the previous block within the chain.

Attempting to tamper with the second block by manipulating the recorded exchange value would cause the hash in the second block to change. However, the third block and all subsequent blocks would subsequently result in an error alert, as the third block is coded to match a copy of the second block’s initial hash – not the manipulated hash. Changing a single block in the blockchain will make all following blocks invalid. As a result, the change in the second block is rejected and the records in the blockchain remain secure. Before any new blocks are added to the chain, their authenticity must be validated by this hashing technique. This domino-logic is what makes the records of data transactions extremely resistant to tampering.

Blockchains are publically distributed online where the history of all value exchanges can be verified and seen as proof of being executed. Anyone can join a blockchain network by downloading a copy of a blockchain onto their computer or “node”. Complex mathematical principles ensure that all nodes automatically and continuously agree about the current state of the blockchain and everything recorded in it. Different parties, within and between organizations, can gain access to the blockchain and add information to it by consensus without the need for any intermediaries. This is why blockchain is often referred to as a “distributed ledger technology”.

Blockchain empowers users to engage in decentralized and accurate transactions, including everything from currency transactions to supply chain orders to even medical records. These records can be accessed online immediately, while ensuring they’re accurate and up-to-date.
The Blockchain and Cryptocurrency
Blockchain is well-known for being the underlying technology behind cryptocurrencies such as Bitcoin. To understand how cryptocurrencies work, it's important to understand the concept of “fiat money”, i.e. money that is issued, authorized and backed by a central authority like a bank or government. Cryptocurrencies are non-fiat, digital currencies, created and managed by their users on a blockchain network. They can be used like ordinary fiat money to make transactions, but their transaction details are facilitated and approved within the blockchain instead of by a financial authority such as a bank. This decentralized feature means that cryptocurrencies are largely free from regulators, which can result in quicker transactions and exempt users from incurring bank fees or credit card charges.

People known as “miners” are responsible for the creation of new units of cryptocurrency – essentially new blocks on a cryptocurrency blockchain. Miners use special software and computing hardware that attempts to solve complex calculations related to the verification of transactions on the blockchain. Once a certain number of transactions or blocks of data are verified in a particular sequence, they are rewarded with newly minted units of the cryptocurrency. Bitcoin is known to have a theoretical capped supply of 21 million units and there is a pre-defined schedule of how quickly it is being released up until 2040. When Bitcoin entered the market in 2009, mining was less resource and time-intensive than what’s currently required. With more people mining Bitcoin, it has become much more computationally challenging and demanding of energy and equipment costs, as the number of Bitcoins reaches its supply cap.

Smart Contracts – Resource Intensive Technology
Blockchain has evolved far beyond storing and securing virtual currency. It can also store and secure complex informational materials of value such as “smart contracts” into its ledger-based structure. Smart contracts are digital agreements between two parties where all of the terms, conditions and funds for services rendered are written directly into code inside blocks within the blockchain. The smart contract self-executes based on triggered actions or events that follow an “if-then-that” logic. Using a basic example, if a person is presented with a smart contract from a business and is satisfied with its terms and conditions, they will digitally sign it. The act of signing is an action that will trigger them to make payment, which can be made with cryptocurrency. The funds from the payment are held in the smart contract until the end of the contract. If the goal of the contract is reached, the funds held in the smart contract will transfer to the business. If the goal of contract is not reached, the funds will be returned to the individual.

The Role of Semiconductors in the Blockchain
Blockchain technology involves massive amounts of computing power for the hashing computations that maintain and expand its ledger. The largest inputs to hashing are electricity and high performance hardware. Thus, blockchain relies heavily on large quantities of devices containing semiconductors such memory chips, graphics cards and computer processors. GPU (graphics processing units) chips made by companies such as AMD and NVIDA were found to be much better at blockchain hash computations than standard CPUs (central processing units). Such efficiencies in computing power, combined with the declining costs of hardware, will likely continue to support the emergence and growth of blockchain technologies.

The Impact of Blockchain in the Financial Industry
Investment firms and banks have to deal with countless transactions on a daily basis. Harnessing the protective properties of blockchain technology has the potential to revolutionize the security and transparency of transactions in the financial services sector.

Current implementation of blockchain technology within the financial industry has focused on new ways of improving payment settlements and reconciliation. Such applications have the potential to result in significant cost savings. According to a Goldman Sachs report, blockchain technology could save banks around the world USD $6 billion in costs by streamlining back office activities by reducing trade errors and eliminating manual reconciliation. Additionally, there could be global savings in between USD $3 and $5 billion from its usage in fighting anti-money laundering practices. Blockchain technology could improve the quality of data verification and create compliance procedures efficiencies by reducing the number of falsely identified “suspicious” transactions.

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4 Source: A simple guide to Bitcoin: http://www.wired.co.uk/article/Bitcoin-101
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How to Invest in Blockchain

Currently, there are only a few ways to invest in blockchain technology:

- Investing in a cryptocurrency, such as Bitcoin, Ether and/or Ripple
- Investing in ‘pure-play’ blockchain companies, which focus on mining technology
- Investing in ancillary blockchain service providers: companies which manufacture the hardware and software that make crypto-mining and blockchain systems possible

Each method of investing in blockchain technology has its own risk/reward trade-off:

When considering investing in the leading cryptocurrencies, it is important for an investor to realize that values have fluctuated wildly. For instance, in April of 2016, the price of a single Bitcoin was around USD $1,000. Bitcoin’s value surged past USD $16,000 in November of 2017, only to crash down below USD $7,000 in February of 2018.7

As for investing in more early stage, pure-play blockchain companies, these organizations include companies that have the potential to profit from a more widespread adoption of blockchain technology. They include “cryptocurrency mining firms” that have the potential to streamline and improve business-related processes that rely on hardware, software and database-driven applications. HIVE Blockchain Technologies Ltd. is an example of such a company and has defined its objective to become a world leader in crypto mining while building a bridge between crypto and traditional markets.8 The risk level of investing in these companies varies; it will depend on how likely it is that the company will succeed in creating and mining the technology.

Finally, investors can invest in ancillary companies or service providers in the blockchain ecosystem, which can provide a more diversified approach to pure-plays and buying cryptocurrencies. These companies include server providers and semi-conductor manufacturers that deliver the vital infrastructure needed to support blockchain technologies; memory and storage producers also provide critical services in commercial-scale currency mining.

Examples of public companies providing these services are:

- **Akamai Technologies, Inc.**, an American content delivery network and cloud service provider headquartered in Cambridge, Massachusetts. It has one of the world’s largest distributed computing platforms – a network of servers around the world – responsible for supporting between 15% and 30% of all web traffic worldwide
- **Intel Corporation** is an American multinational firm, well-known for producing computers parts such as semiconductors and processors for computer system manufacturers and producers
- **Western Digital Corporation** is an American computer data storage company and one of the largest computer hard disk drive manufacturers in the world

By investing in the various facets of the blockchain ecosystem, individuals can access the risk-mitigating benefits of diversification and potentially improve their risk-adjusted returns.

The Horizons Blockchain Technology & Hardware Index ETF

The Horizons Blockchain Technology & Hardware Index ETF (“BKCH”) seeks to replicate, to the extent possible, the performance of the Solactive Blockchain Technology & Hardware Index (the “Index”), net of expenses. This ETF trades on the Toronto Stock Exchange (“TSX”) under the ticker symbol BKCH.

The Index tracks a portfolio of global companies focused directly on three specific subsectors of the broader technology industry:

- **Development of blockchain technology**: Companies directly developing blockchain technologies
- **Semiconductors**: Companies focused on the hardware required for blockchain technology mining
- **Relevant hardware and services supporting blockchain technology**: Includes memory and storage producers, and services important to large-scale mining on a commercial level, such as data centre real estate investment trusts

7 Source: Blockchain Market Price (USD), May 2017 to April 2018: https://Blockchain.info/charts/market-price
8 Source: HIVE Blockchain Technologies Ltd.: https://www.hiveBlockchain.com/faq/#whats-the-big-idea-behind-hive
By using an index strategy that imposes important risk constraints, such as market capitalization limits and liquidity thresholds, the ETF reduces some of the risk of buying early stage, small-cap companies. The Index also provides flexibility for growth. As the blockchain industry grows, so too will the potential holdings of BKCH, as more companies invest in developing blockchain technology directly or developing technology that supports the blockchain ecosystem.

Although the ETF may provide exposure to cryptocurrency miners, cryptocurrency exchanges and other companies which may themselves have exposure to cryptocurrency miners, cryptocurrency exchanges and/or cryptocurrency, the ETF will not have direct exposure to crypto-assets and/or cryptocurrencies such as Bitcoin or initial coin offerings, and the ETF will not be directly involved in cryptocurrency mining.

BKCH is a diversified way to enter the blockchain investing without taking on a lot of the unknown risks of buying early stage technology companies. Investors get exposure to a global portfolio of some of the larger pure-play blockchain companies, alongside well-established global technology service and semi-conductor providers that are benefiting from the growing global investment in this transformative technology.

Commissions, management fees and expenses all may be associated with an investment in the Horizons Blockchain Technology & Hardware Index ETF (the “ETF”) managed by Horizons ETFs Management (Canada) Inc. The ETF is not guaranteed, its values change frequently and past performance may not be repeated. The prospectus contains important detailed information about the ETF. Please read the prospectus before investing.

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