

# The Zeash Investment Thesis

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*A Privacy-Enhanced,  
Store of Value for the  
Digital Economy*



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# The Zcash Investment Thesis

*A Privacy-Enhanced, Store-of-Value for the Digital Economy*

## Our Vision for Digital Currency as an Asset Class



*“Instead of adopting the currency of another country – such as the US dollar – some [economies] might see a growing use of virtual currencies. Call it dollarization 2.0. So in many ways, virtual currencies might just give existing currencies and monetary policy a run for their money. The best response by central bankers is to continue running effective monetary policy while being open to fresh ideas and new demands, as economies evolve.”*

[Christine Lagarde, Managing Director of the International Monetary Fund](#)

In this next wave of the digital revolution, digital currencies have emerged as what many believe to be the greatest innovation since the advent of the internet. For the first time in history, value can be sent anywhere in the world at the same speed as information, in a secure and trustless way. However, digital currencies are more than just payment facilitators. They offer an alternative to the economic, political, and social systems run by a handful of large institutions. Powered by millions of peers within globally distributed networks, digital currencies are democratizing information and value in incredible new ways. We believe in a future of multiple digital assets, each with unique comparative advantages that will enable them to play distinct roles in driving economic growth and in diversifying modern investment portfolios.

We first stated this vision in our Ethereum Classic investment thesis, [Into the Ether with Ethereum Classic](#), back in March 2017. It is important to highlight this before introducing Zcash (“ZEC”) as our latest conviction investment opportunity



because: (i) it reinforces our investment thesis for the entire digital currency asset class (a new beta); and (ii) it guides our asset selection framework as we seek to identify investable digital currencies with unique drivers of return that can complement one another in a portfolio (alpha). In this paper, we explore:

- The origins of the Zcash Network
- The fundamental factors supporting ZEC's investability
- The investment opportunity for ZEC as a privacy-enhanced store-of-value and medium of exchange
- How a strategic allocation to ZEC, in addition to other digital currencies, like Bitcoin ("BTC") and Ether Classic ("ETC"), can improve the efficiency of investor portfolios

## An Introduction to Zcash

“Zcash’s privacy tech makes it the most interesting Bitcoin alternative. Bitcoin is great, but if it’s not private, it’s not safe.”

[Edward Snowden](#)

[Zcash](#) was publicly launched on October, 28, 2016, by a team of world-class cryptographers, engineers, and computer scientists from the [ZeroCoin Electric Coin Company](#) (the “Zcash Company”), as one of many new digital currency projects intended to expand upon the capabilities of Bitcoin. The goal of the project was simple: to build a permissionless financial network that would offer greater freedom and security to its users through the use of innovative cryptographic methods that preserve financial privacy. Born out of the [ZeroCoin Project](#) and led by Zcash Company Founder and CEO, [Zooko Wilcox](#), the Zcash team has decades of experience in distributed systems, cryptographic security, and multistage entrepreneurial ventures.

The team took a ‘first principles’ approach to building Zcash, based on the following core tenets:

**Privacy Matters:** Privacy is a basic human right that is worth fighting for. In a digital world where privacy is rapidly deteriorating, there is a real-world use case for a financial network that restores this right and promotes economic freedom. Privacy also optimizes the fungibility of a currency, which is necessary in order for it to become a liquid medium of exchange. Since the absence of knowledge about the source or prior use of ZEC is generally accepted as a feature of the Zcash Network, the costs of accepting all ZEC are the same.

**Preserve What Bitcoin Got Right:** Zcash preserves many of the same attributes as Bitcoin, including governance principles of decentralization and immutability, a disinflationary economic model with a finite supply, and a battle-tested Proof-of-Work (“PoW”) consensus mechanism for trustless transaction verification. We will cover each of these elements in greater detail later in this paper.



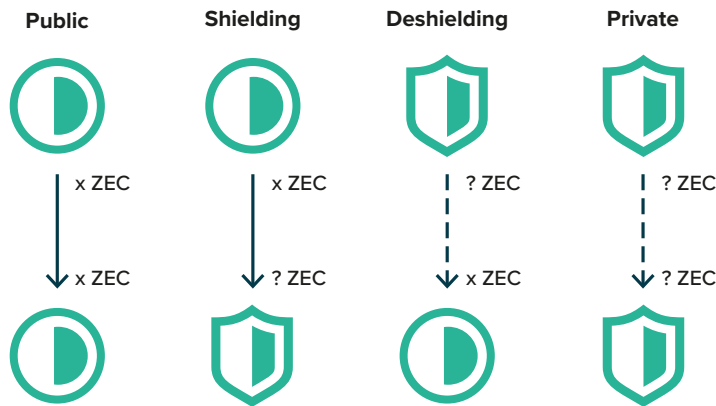
## How Zcash Works

Zcash uses a novel cryptographic technique known as zk-SNARKs (“Zero-Knowledge Succinct Non-Interactive Argument of Knowledge”), based on zero-knowledge cryptography, allowing transactions and balances on the Zcash Network to be verified by miners without requiring users to reveal any details about their identities, the transaction value, or other metadata. It relies on a proof construction where one can prove possession of certain information (e.g. a secret key), without revealing that information, and without any interaction between the prover and verifier.<sup>1</sup> With zk-SNARKs, Zcash offers its users the highest standard for privacy and fungibility of any existing digital currency network.

There are four types of transactions that can occur on the Zcash Network:

- 1. Public Transactions:** Public address → public address, where all balances and transaction amounts are revealed. Public, or transparent addresses, always begin with “t.”
- 2. Shielding Transactions:** Public address → private address, where the balance sent from the public address and the transaction amount are revealed at the beginning of the transaction, but become shielded upon receipt. Private, or shielded addresses, always begin with “z.”
- 3. Deshielding Transactions:** Private address → public address, where the transaction amount is revealed through the deshielding transaction, but the total balance in the private address remains shielded.
- 4. Private Transactions:** Private address → private address, where the balance held in each address and transaction amount are completely shielded, ensuring full financial privacy. These are the transactions that demonstrate the complete privacy capabilities of the Zcash Network.

FIGURE 1: BASIC ZEC SPEND TYPES<sup>2</sup>



1. Zcash Blog: What are zk-SNARKs? <https://z.cash/technology/zksnarks.html>.  
2. Zcash Blog: Anatomy of a Zcash Transaction. Paige Peterson, November 23, 2016. <https://z.cash/blog/anatomy-of-zcash.html>.



The remainder of this paper will focus on the investment merits of ZEC, but for those interested in learning more about the technical attributes of the Zcash protocol, we encourage you to read the [Zcash Blog](#) and [FAQ Page](#). There you'll find a wealth of information directly from the Zcash team and other open-source contributors who are dedicated to building this permissionless and private, digital financial system.

## A Principled Protocol with Strong Fundamentals

Governance, economic, and development principles are key factors to consider when evaluating the merit of any digital currency network. These foundational principles guide the evolution of the network and ultimately ensure a structure that supports the collective values of participants. We believe ZEC offers long-term investability by preserving many of the same principles that have made Bitcoin organically successful. We will explore these principles in greater detail with a particular focus on how they manifest in the Zcash protocol design.

### Zcash Preserves Governance Principles of Decentralization & Immutability

As highlighted in the [Ethereum Classic investment thesis](#), there is a growing base of quantitative and qualitative research evidencing a positive relationship between good governance and the long-term performance of traditional assets, like equities and bonds.<sup>3</sup> This concept extends to digital currencies and is perhaps even more important in determining their investability.

Zcash's design reflects an antifragile system, borrowing the principles of decentralization and immutability that have led to the organic success of Bitcoin as an open and permissionless financial network, free from fraud, censorship, and unjust interference by a central actor. Like Bitcoin, Zcash employs a stress-tested PoW consensus mechanism for verifying transactions, but the development team also introduced Equihash, a memory-hard algorithm that is distinct from Bitcoin's SHA-256 hash function. Equihash seeks to minimize the advantage that specialized hardware miners (e.g. ASICs) have over commodity hardware (e.g. typical computers and smartphones) while also optimizing lightweight privacy operation verification, an important feature for making applications like [zk-SNARKs on Ethereum](#) affordable.<sup>4</sup> Generally, the Zcash community believes Equihash is the best consensus solution available to accomplish the network's goals. However, it should be noted that the Zcash team has indicated they could move away from Equihash if it becomes apparent that there are flaws in the algorithm that could compromise decentralization or security.

3. Source: MSCI: Can ESG Add Alpha? An Analysis of ESG Tilt and Momentum Strategies, June 2015, Zoltan Nagy et al. Grant & Eisenhofer P.A: Does Corporate Governance Matter to Investment Returns? 2010, Jay Eisenhofer.

4. Source: Openwall.com. An analysis of Zcash's use of the Equihash proof-of-work scheme. Solar Designer, November 18, 2016. <https://www.openwall.com/articles/Zcash-Equihash-Analysis>.



## Zcash Has a Sound Economic Model That Resembles Bitcoin

The Zcash monetary model closely resembles Bitcoin, preserving an incentive structure that is sound from a game theory perspective and that balances the economic interests of investors, developers, network users, and miners. Importantly, the monetary model exhibits the following key features:

- *The supply of ZEC is finite and capped at 21 million tokens.*
- *The ZEC supply schedule is disinflationary and the number of ZEC tokens awarded to miners of a block will be “halved” roughly every four years. As of January 24, 2018, there were approximately 3.13 million ZEC in circulation. It is anticipated that more than 90% of the total ZEC supply will be online by 2032.*

The model also institutes two unique features that are not significant departures from the economic framework employed by Bitcoin, but are well-suited for Zcash given the state of the network and maturity of the broader digital asset market:

- *Zcash introduced a “slow-start” for mining at the time it was launched. This was designed to inhibit a gold-rush effect and gave developers a method to slowly test the network without exposing it to a major security vulnerability; and*
- *Zcash is carving out 20% of the monetary base for the first 4 years of the network’s operation for the “Founders’ Reward.” This will ultimately comprise 10% of the total ZEC monetary base when all ZEC are mined.*

The beneficiaries of the “Founders’ Reward” include investors (1.65%), founders, employees, and advisors (5.72%), the Zcash Company Strategic Reserve (1.19%), and the [Zcash Foundation](#) (1.44%), a [501\(c\)\(3\) public charity](#) that was established to financially support the continued development of the Zcash Network. The other 90% of ZEC that will enter circulation over time will be awarded to the network’s miners as compensation for verifying transactions and ensuring the security, speed, and continued viability of the Zcash blockchain.

The following figures outline the distribution plan for the “Founders’ Reward” as well as the monetary policy and supply schedule for ZEC:



FIGURE 2: THE DISTRIBUTION OF ZCASH & THE “FOUNDERS’ REWARD”<sup>5</sup>

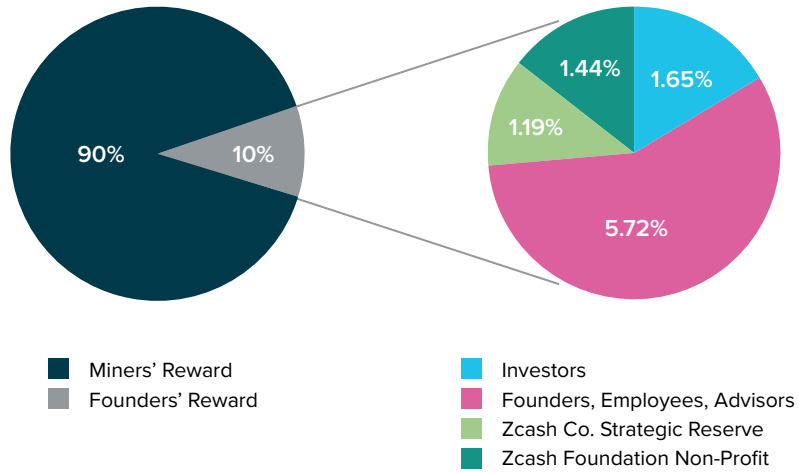
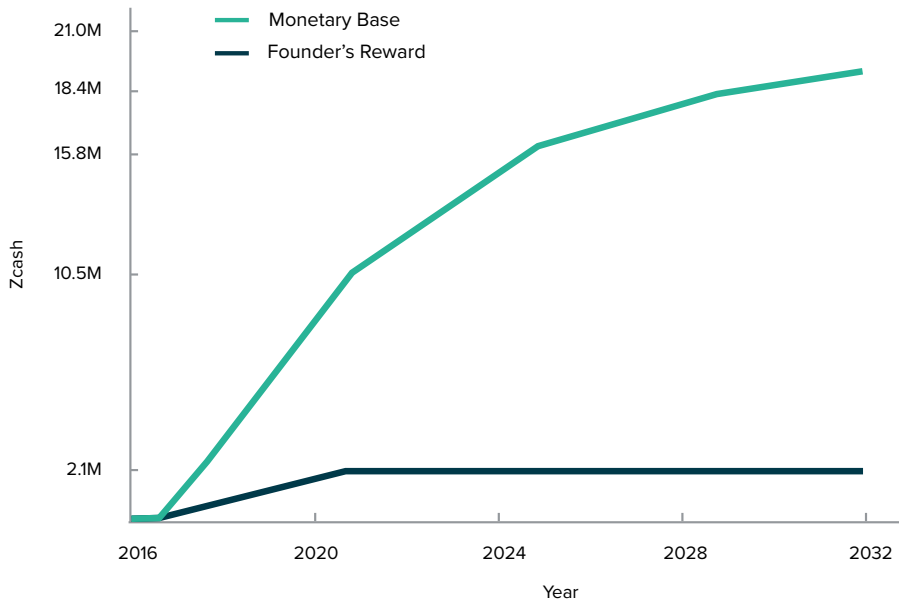


FIGURE 3: ZCASH MONETARY BASE & SUPPLY SCHEDULE<sup>6</sup>



5. Zcash Blog: Continued Funding and Transparency. Zooko Wilcox, September 23, 2016. <https://z.cash/blog/continued-funding-and-transparency.html>.  
 6. Zcash Blog: Founders' Reward Transfers. Nathan Wilcox, November 15, 2016. <https://z.cash/blog/founders-reward-transfers.html>.





## Zcash has Radically Transparent, Open-Source Development, Led by Experts

Zcash's development and maintenance is conducted by an expert team of security-specialized engineers and cryptographers, leveraging Bitcoin's open-source development framework and tested codebase. Through a science-driven process, the Zcash team has constructed the first financial network that combines complete privacy, via strong encryption, with a global blockchain.<sup>7</sup> The coupling of these features is useful not only for financial transactions, but also for private messaging, time-stamping, and securely storing and sharing proprietary data such as health or business records. In fact, J.P. Morgan has already integrated Zcash's zero-knowledge privacy technology with Quorum, their enterprise smart contract platform for institutional financial markets. We view this as a strong testament to the quality, scalability, and utility of Zcash's privacy technology in commercial applications.

In addition to building quality technology, the Zcash team has consistently demonstrated an operating model of radical transparency with respect to the evolving governance, economic, and technical aspects of the protocol. That's because they believe that the "project's success depends on the goodwill of the public, and the public have a stake in knowing the financial structure of the ecosystem."<sup>8</sup> In particular, the team has published a series of straightforward blog posts, as they seek to build a global, privacy-enhanced financial network, related to:

- [Code audits conducted to identify and resolve protocol vulnerabilities;](#)
- [Details on the Zcash economic model and distribution policy;](#) and
- [Risks associated with protocol design decisions](#)

For example, zk-SNARKs is the cryptographic innovation that underpins Zcash's superior privacy technology. Introducing zk-SNARKs into the Zcash protocol requires a [Trusted Setup](#), involving a certain number of "Witnesses" in a ceremony that is the equivalent to generating a public/private keypair. Each Witness will have access to a "shard" (e.g. a unique piece) of the private key and must destroy it in order to ensure that a nefarious actor cannot reconstruct the private key. The risk is that if all of the Witnesses involved in the ceremony were to collude, they could reconstruct the private key, allowing them to counterfeit an unlimited amount of ZEC. In order to preserve the fixed supply of ZEC, it is necessary for only a single Witness to destroy their shard.

7. Zcash Blog: The Encrypted Memo Field. Zooko Wilcox & Paige Peterson, December 5, 2016. <https://z.cash/blog/encrypted-memo-field.html>.

8. Zcash Blog: Continued Funding and Transparency. Zooko Wilcox, September 23, 2016. <https://z.cash/blog/continued-funding-and-transparency.html>.



To address this risk, coinciding with Zcash's upcoming upgrade, codenamed Sapling, a [new zk-SNARKs ceremony](#) is underway, [this time involving hundreds \(or even thousands\) of participants](#).<sup>9</sup> As the number of participants in the ceremony grows, the probability of all participants becoming compromised (e.g., not destroying their private key shards and colluding) is exceedingly low (asymptotically approaching 0).<sup>10</sup> However, if this risk were to materialize, it could carry significant consequences.

Ultimately, we view the publication of risks as a positive attribute of an open-source system. A high degree of transparency facilitates rapid resolution of problems and a holistic view of the risks. It is up to investors to determine if this is a risk that they are comfortable bearing within the context of the return potential offered by ZEC, which we will outline in the next section of this paper.

## The Investment Opportunity for ZEC

Using our framework for assessing the investability of digital assets, we've identified two potential drivers of alpha for ZEC.

First, ZEC possesses store of value properties similar to precious metals, BTC, and ETC, making it an inflation hedge over long investment horizons. In particular, the privacy-enhanced features that ZEC offers perhaps make it even more resilient as a store of value than BTC, since selective disclosure reduces susceptibility to government intervention. We think of ZEC as the first globally accessible "offshore" investment opportunity; a Swiss bank account in your pocket, so to speak.

Second, ZEC can serve as the privatized global currency that promotes free trade in a secure and trustless way. As a privatized medium of exchange that can be transacted instantly across borders with lower costs, ZEC stands to capture a portion of the economic surplus from the open commerce it can promote. Throughout this section, we'll outline the rationale supporting each of these fundamental drivers and evaluate the market opportunity across both dimensions.

### A Diversifying Digital Store-of-Value

There are several core properties that are essential to the investability of an asset as a store of value, be it physical or digital. Gold, silver, platinum, BTC, ETC, and ZEC share the following characteristics that we believe are key to the success and sustainability of store of value assets:

9. Source: CoinDesk: More Devs, More Destruction: Another Zcash Crypto Ceremony Is Underway. Alyssa Hertig, November 30, 2017. <https://www.coindesk.com/devs-destruction-inside-zcashs-second-crypto-ceremony/>.

10. Source: The Zcash Foundation: Announcing the world's largest multi-party computation ceremony. Andrew Miller, November 11, 2017. <https://z.cash.foundation/blog/powers-of-tau/>.



- **Scarcity:** Like BTC, ZEC is a scarce asset. The overall supply of ZEC that will enter circulation is limited to 21 million. As of January 24, 2018, there were approximately 3.13 million ZEC in circulation.<sup>11</sup>
- **Divisibility:** Digital currencies represent some of the most divisible forms of payment available in the world. The smallest possible unit of ZEC, a “zatoshi” represents 0.00000001 of a single token. ZEC can be displayed out to eight decimal places, creating one hundred million units within each token.
- **Portability:** ZEC can be sent across borders electronically and clear almost instantly, making it an alternative to BTC and far more portable than precious metals or fiat currency.
- **Fungibility:** One unit of ZEC represents the same exact value as another unit of equal size. Moreover, the introduction of private addresses and transactions optimizes fungibility.
- **Verifiability:** ZEC are unique cryptographic tokens that can be verified on the blockchain, with selective disclosure, in real-time, from anywhere in the world.
- **Recognizability:** ZEC is gaining broader recognition as a transactional token with perceived utility, with thousands of transactions taking place on a daily basis, and rising.<sup>12</sup>

Furthermore, the protocol underlying a digital currency must also possess the following properties to qualify its token as a store-of-value:

- **Decentralization:** Zcash operates as an open-source, decentralized network. Decentralized networks are more secure and stable than centralized networks because there is no single point of failure. Internet protocols, like SMTP for email and HTTP for the web, are examples of widely-used decentralized networks.
- **Immutability:** Zcash maintains an immutable global ledger, preventing the possibility of fraud, censorship, or unjust interference by any actor.
- **Adaptability:** The open-source nature of the Zcash protocol allows for continuous adaptation and improvement. Adaptability is essential to the future viability of any technology.

11. Source: OnChainFX.com, January 24, 2018.

12. Source: BitInfoCharts.com. <https://bitinfocharts.com/comparison/zcash-transactions.html>.



## A Swiss Bank Account in Your Pocket

We're experiencing a paradigm shift in the global economic order that is being driven by two major secular forces – digitization and decentralization. As digital currencies accelerate these forces, they are changing our perception of what the optimal form of money looks like in a digital economy and disintermediating traditional financial services at an unprecedented rate.

For example, the offshore wealth management industry has historically served to protect the financial privacy of clients' assets. A recent article in the *Financial Times* titled, "[\*The decline of the Swiss private bank\*](#)" highlights some of the major structural challenges that the offshore banking sector is facing as a result of added pressure on tax evasion and increased competition. However, these challenges are miniscule compared to the disruptive force that lay on the horizon. With a digital currency like ZEC, a Swiss bank is no longer necessary to privately store wealth or transact.

There are three components to how a privatized, digital store-of-value, like ZEC, improves upon the traditional Swiss bank account. First, in a decentralized financial network, like Zcash, there is no single point of failure. Investors are not bound to the success or failure of a single entity, political regime, or economy as they are when they privately store wealth in a Swiss bank account. Second, the costs associated with privatized wealth storage are greatly reduced within a decentralized system, as there is no longer a need to compensate a trusted intermediary for their services. Third, offshore banking services have historically only been available to the wealthiest individuals and entities. As a borderless digital currency, ZEC may be the first globally accessible, offshore investment opportunity, available to anyone, anywhere.

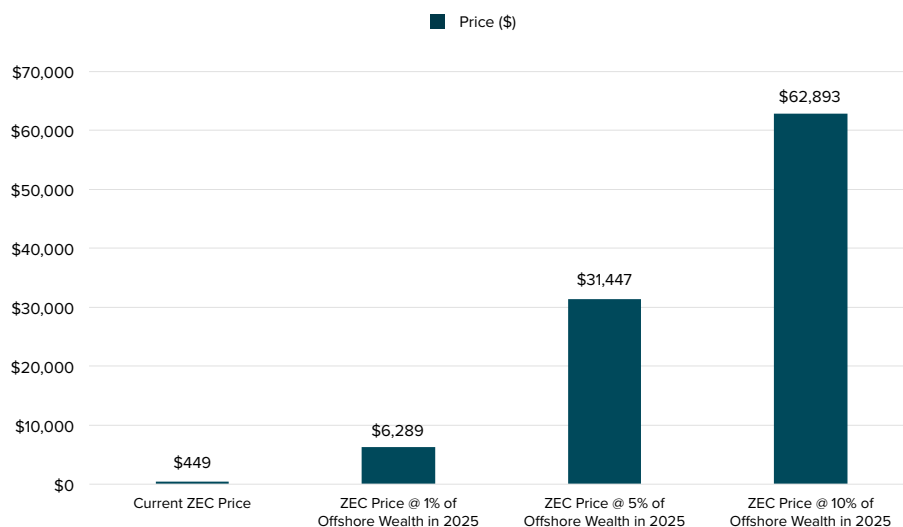
In a working paper from the National Bureau of Economic Research titled, "[\*Who Owns the Wealth in Tax Havens? Macro Evidence and Implications For Global Inequality\*](#)", Alstadsaeter et al draw upon the latest available international investment positions data to determine how much global wealth is held offshore. They found that roughly 8% of the world's household wealth – equivalent to 10% of Gross World Product ("GWP") – is held in offshore investment accounts.<sup>13</sup> By our estimate, the market for offshore wealth could reach approximately \$10 trillion in just a few years' time, given that its size relative to GWP has been largely stable and that the OECD's long-term GWP forecast for 2025 is roughly \$96 trillion.<sup>14</sup> Based on the premise that ZEC is well-suited to capture a portion of the offshore investment market, we outline its return potential through a market share framework:

13. Source: National Bureau of Economic Research, Working Paper Series: Who owns the Wealth in Tax Havens? Macro Evidence and Implications for Global Inequality. Alstadsaeter, Johannesen, Zucman, September 2017.

14. Source: OECD.org.



FIGURE 4: GLOBAL OFFSHORE WEALTH MARKET SHARE<sup>15</sup>  
Hypothetical Value of ZEC as a % of Offshore Wealth in 2025<sup>16</sup>



For example, if ZEC were to capture just 1% of the market for offshore wealth, its price could hypothetically reach nearly \$6,300 per coin – more than 14 times its January 24, 2018 market price. Moreover, if ZEC were to capture 10% of the market for offshore wealth, its price could hypothetically be more than 140 times its current value.

## Lai-ZEC Faire



*“Free trade, one of the greatest blessings which a government can confer on a people, is in almost every country unpopular”*

[Thomas Babington Macaulay](#)

A privacy-enhanced currency and financial network such as Zcash provides global citizens with the freedom to choose how they allocate and spend capital to meet their own economic interests in a way that breeds competition and fuels innovation. Protectionism, trade barriers, capital controls and other restrictions on global trade have led to a net drag in productivity and income growth over time; a cost ultimately borne by the global citizenship. While it is difficult to accurately quantify the effects of open trade (or lack thereof) on economic growth, there is a growing body of research from policymakers, investment practitioners, and academics seeking to do just that.

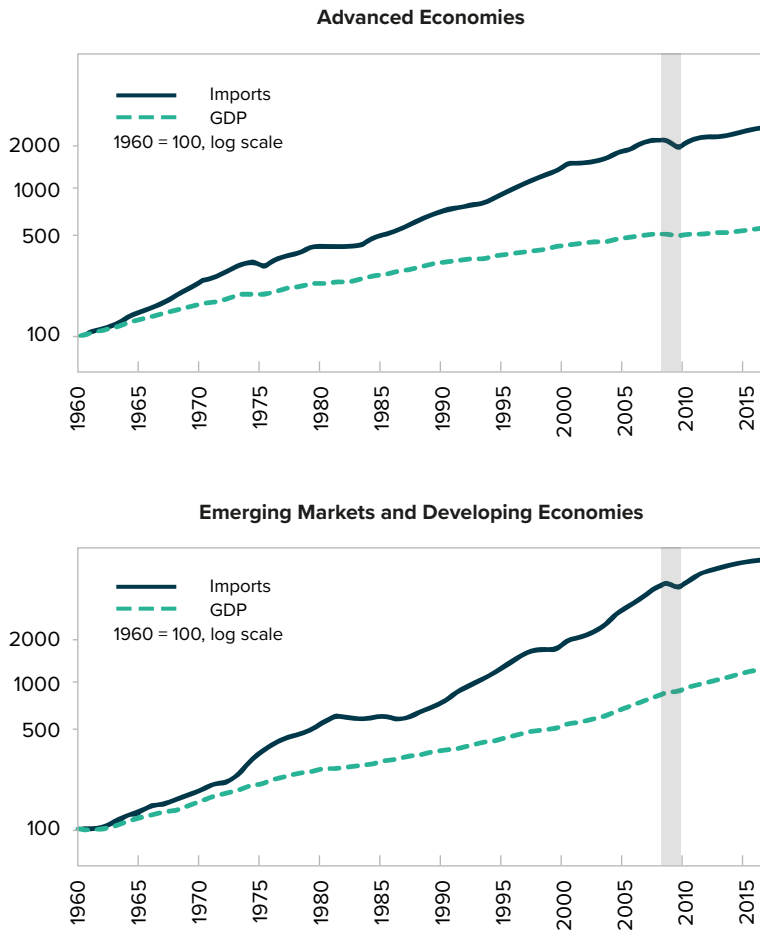
15. Source: See footnotes 13.

16. Source: TradeBlock, Inc. Current ZEC price is based on the TradeBlock ZEC Composite 24-hour VWAP value as of January 24, 2018. Simulated price estimates are based on an estimated ZEC supply of 15.9 million in January 2025. THE FUTURE ZEC PRICES SHOWN ARE PURELY HYPOTHETICAL AND SPECIFICALLY ASSUME THAT ZEC PRICES WILL INCREASE. ZEC has historically experienced significant intraday and long-term price swings. Past performance is not necessarily indicative of future results and the financial projections set forth herein are subject to great uncertainty. There can be no assurance that the projected hypothetical prices will be achieved. Actual future prices will depend on numerous factors, including the future liquidity of ZEC, all of which may differ from the assumptions on which the hypothetical prices contained herein are based. NO REPRESENTATION IS BEING MADE THAT ANY RESULTS WILL OR ARE LIKELY TO ACHIEVE PRICES SIMILAR TO THOSE SHOWN.



The fundamental principle that free trade can lead to Pareto optimal efficiency is strongly supported by both economic theory and statistical reality. A recent report titled, *“Making Trade an Engine of Growth for All: The Case for Trade and for Policies to Facilitate Adjustment”*, prepared by staff of the International Monetary Fund, The World Bank, and the World Trade Organization in March 2017, highlights the important connection between free trade and real GDP growth in both developed and emerging economies. As shown in the below charts, between 1960 and the Global Financial Crisis in 2007, global trade in goods and services increased at an average real rate of about 6% per year, driven by accommodative policies and new technologies that directly improved trade efficiency. During that same period, real GWP grew at a rate of roughly 3% per year, evidencing that global trade is a key driver of economic growth.<sup>17</sup>

FIGURE 5: REAL TRADE AND REAL GDP, 1960-2016<sup>18</sup>



17. Source: International Monetary Fund: Making Trade an Engine for Growth for All: The Case for Trade and for Policies to Facilitate Adjustment. Prepared by Staff of the IMF, The World Bank, and World Trade Organization, March 2017. <https://www.imf.org/en/Publications/Policy-Papers/Issues/2017/04/08/making-trade-an-engine-of-growth-for-all>.

18. Source: See footnote 17.

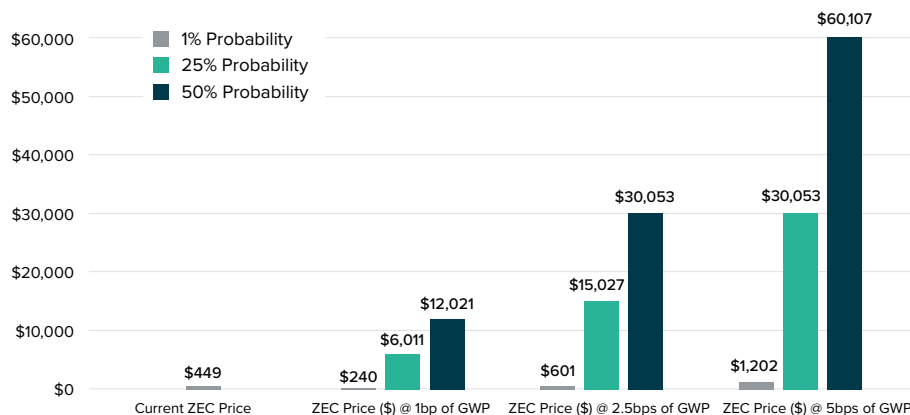


Furthermore, a February 2012 article from Harvard Business Review, titled *“Quantifying the Gains from Increased Global Integration”*, written by Dr. Pankaj Ghemawat, Global Professor of Management and Strategy at NYU Stern School of Business, lays out a systematic framework for quantifying the effects of increased global integration and free trade. Ghemawat approximates that the economic benefits from increased globalization as a function of expanding trade, capital, and information flows could equate to an 8% increase in GWP.<sup>19</sup>

Based on the properties of ZEC as a privatized digital currency and borderless payment rail, it’s not difficult to see how it could further promote global integration and free trade. Below we outline an imperfect, yet logical, macroeconomic framework that can be used to assess the return potential that ZEC may offer if it were to gain global adoption as a privatized medium of exchange for cross-border transactions.

In 2025, it is estimated that GWP will be roughly \$96 trillion.<sup>20</sup> If we (i) assume that a certain amount of value could accrue to ZEC on an annual basis as a driver of economic growth from more open trade, and (ii) factor in some degree of probability that this use case for ZEC is realized, we can run simulations and assess the fair value of ZEC based on this simple two-factor model. For example, if we assign a 25% probability that 2.5 bps of GWP will begin accruing to ZEC in 2025 based on the expansionary impact it could have on the global economy, it may be reasonable to see the price of a single ZEC token at more than \$15,000. Furthermore, if we assign a 50% probability that 5 bps of GWP will accrue to ZEC, the fair value of a single coin could reach north of \$60,000.<sup>21</sup>

FIGURE 6: DRIVING GLOBAL GROWTH THROUGH FREE TRADE  
Hypothetical Value of ZEC as % of Gross World Product (“GWP”) in 2025<sup>22</sup>



19. Source: Harvard Business Review: Quantifying the Gains from Increased Global Integration. Pankaj Ghemawat, February 23, 2012. <https://hbr.org/2012/02/quantifying-the-gains-from-inc>.

20. Source: OECD.org.

21. Source: TradeBlock. OECD.org. WSJ.com. Current ZEC price is based on the TradeBlock ZEC Composite 24-hour VWAP value as of January 24, 2018. Simulated price estimates are based on an estimated ZEC supply of 15.9 million as of January 2025. THE FUTURE ZEC PRICES SHOWN ARE PURELY HYPOTHETICAL AND SPECIFICALLY ASSUME THAT ZEC PRICES WILL INCREASE. Hypothetical values are determined based on the present value of the assumed annual economic benefit in perpetuity, discounted at the 30-Year US Treasury Yield, and multiplied by the assumed probability of each potential outcome. ZEC has historically experienced significant intraday and long-term price swings. Past performance is not necessarily indicative of future results and the financial projections set forth herein are subject to great uncertainty. There can be no assurance that the projected hypothetical prices will be achieved. Actual future prices will depend on numerous factors, including the future liquidity of ZEC, all of which may differ from the assumptions on which the hypothetical prices contained herein are based. NO REPRESENTATION IS BEING MADE THAT ANY RESULTS WILL OR ARE LIKELY TO ACHIEVE PRICES SIMILAR TO THOSE SHOWN.

22. See footnote 21.



We are not forecasting that this will be the case, but rather we seek to provide a framework to evaluate the asymmetric return potential of ZEC based on a set of assumptions. By giving global citizens and enterprises a common currency to transact that promotes complete financial freedom, ZEC can stimulate economic growth through more open trade.

## **ZEC in Portfolio Construction**

As digital currencies promote economic growth in innovative ways, ZEC offers investors an opportunity to build more efficient portfolios. Slowing global growth, secular-high debt burdens, deteriorating effectiveness of monetary policies, and low yielding assets are all contributing to a savings crisis that threatens the economic welfare of future generations. We have entered a low return environment with significant downside risk, rendering it difficult for many investors to achieve their target returns. There are two options available to them. They can:

- 1. Increase exposure to risky assets already held in their portfolios, in hope of generating higher returns. However, this will mean holding more concentrated, less diversified portfolios, with higher risk of ruin; or*
- 2. Identify uncorrelated assets with positive expected returns and use them to build more diversified portfolios.*

As an investment that is uncorrelated to other asset classes, and imperfectly correlated to other digital currencies, ZEC can broaden a digital currency allocation and further diversify investors' portfolios.

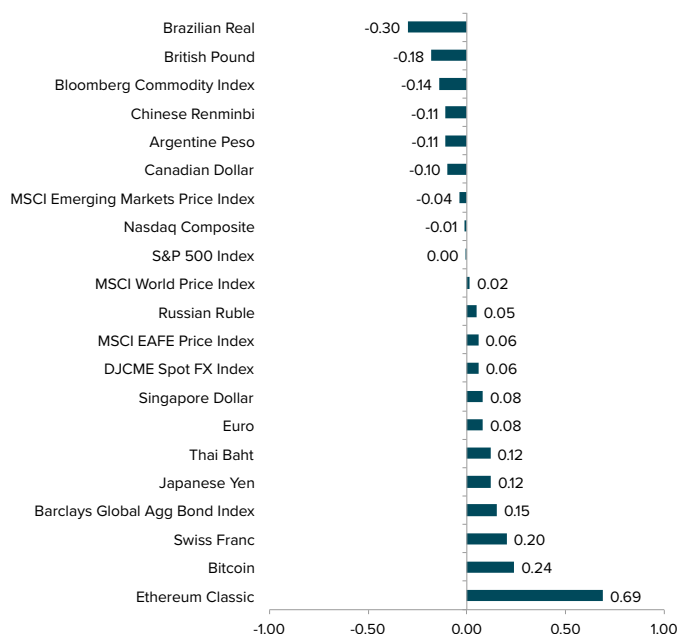
As evidenced by Figure 7, between December 31, 2016 and January 24, 2018, ZEC had an average cross-sectional correlation of zero with the major asset classes and currencies shown. Further, ZEC had an average cross-sectional correlation of 0.47 with BTC and ETC.





FIGURE 7: CORRELATION OF ZEC TO ASSET CLASSES & CURRENCIES<sup>23</sup>

Based on Rolling 10-Day Returns



To gain a deeper understanding of the diversification benefits that ZEC can offer, we conducted a series of simulations on both digital currency and traditional investment portfolios. In the first example, we looked at two digital currency portfolios, consisting of *90% BTC + 10% ZEC* and *80% BTC + 10% ZEC + 10% ETC*, respectively, to see how they may have performed versus a portfolio solely invested in BTC. We ran these simulations for the following reasons:

- ZEC shares common properties with investable digital currencies like BTC and ETC that fundamentally support its role as a store-of-value asset and inflation hedge over long investment horizons.
- While BTC, ETC, and ZEC are all digital assets with store of value properties, each has unique, diversifying characteristics. For example, ZEC could become the dominant digital currency for private wealth storage and transactions. On the other hand, BTC may continue to be the dominant peer-to-peer digital currency, but will likely require users to sacrifice more privacy as it gains mainstream adoption and regulatory acceptance around the world.
- Analytical exercises such as these can provide insight as to whether a diversified investment in a basket of select digital currencies might deliver better risk-adjusted returns than a standalone investment in BTC.

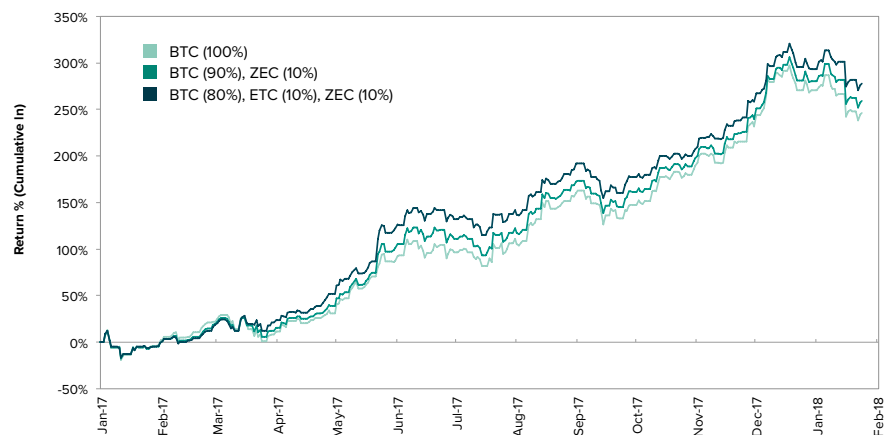
23. Source: Bloomberg, TradeBlock. PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS. As the period during which ZEC has been available for trading is limited, the correlations may not be meaningful when considering longer periods. Correlations are based on 10-day rolling returns from December 31, 2016 through January 24, 2018. Performance of ZEC is based on the daily values provided by Bitfinex. Performance of BTC is based on the daily values of the Bloomberg Bitcoin/US Dollar Spot Price. Performance of ETC is based on the daily values provided by the TradeBlock ECX Index.



FIGURE 8: HYPOTHETICAL SIMULATED PORTFOLIO PERFORMANCE<sup>24</sup>  
December 31, 2016 through January 24, 2018

PORTFOLIO	BTC (100%)	BTC (90%) <sup>25</sup> ZEC (10%)	BTC (80%) <sup>25</sup> ETC (10%) ZEC (10%)
Total Return (Cumulative)	1075.1%	1239.0%	1504.9%
Total Return (Annualized)	914.4%	1046.9%	1259.8%
Risk (Annualized Std Dev)	90.5%	85.5%	83.6%
Sharpe Ratio	10.08	12.21	15.04
Incremental Return (Annualized)	--	132.5%	345.4%
Incremental Risk (Annualized Std Dev)	--	-4.9%	-6.9%
Sharpe Ratio Improvement (Annualized)	--	21%	49%

FIGURE 9: HYPOTHETICAL SIMULATED PORTFOLIO PERFORMANCE  
Cumulative (ln)



As the previous figures show, the blended portfolios, containing 90% BTC + 10% ZEC and 80% BTC + 10% ZEC + 10% ETC, produced hypothetical simulated cumulative returns that were roughly 164% and 430% higher than that of a pure BTC portfolio, respectively, with lower volatility.<sup>26</sup>

24. HYPOTHETICAL SIMULATED PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. There is no guarantee that the market conditions during the past period will be present in the future. Rather, it is most likely that the future market conditions will differ significantly from those of this past period, which could have a materially adverse impact on future returns. Unlike an actual performance record, simulated results do not represent actual trading or the costs of managing the portfolio. Also, since the trades have not actually been executed, the results may have under or over compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THOSE SHOWN. DIGITAL CURRENCIES HAVE HISTORICALLY EXPERIENCED SIGNIFICANT INTRADAY AND LONG-TERM PRICE SWINGS AND PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS. SEE "NOTE ON HYPOTHETICAL SIMULATED PERFORMANCE RESULTS" IN IMPORTANT DISCLOSURES FOR ADDITIONAL DISCLOSURES.

25. Source: Bloomberg, TradeBlock. Performance is shown from December 31, 2016 through January 24, 2018. Annualized figures are based on 252 trading days. Performance of BTC is based on the daily values of the Bloomberg Bitcoin/US Dollar Spot Price. Performance of ETC is based on the daily values of the TradeBlock ECX Index. Performance of ZEC is based on the daily values provided by Bitfinex. THE "90% BTC + 10% ZEC" AND "80% BTC + 10% ZEC + 10% ETC" RESULTS ARE HYPOTHETICAL AND ARE NOT BASED ON ACTUAL RETURNS OR HISTORICAL PERFORMANCE. Component asset weights are held constant over the period. The Sharpe Ratio is calculated as the annualized excess return of the portfolio over the 3-month US T-Bill divided by the standard deviation of excess returns.

26. See footnote 25.

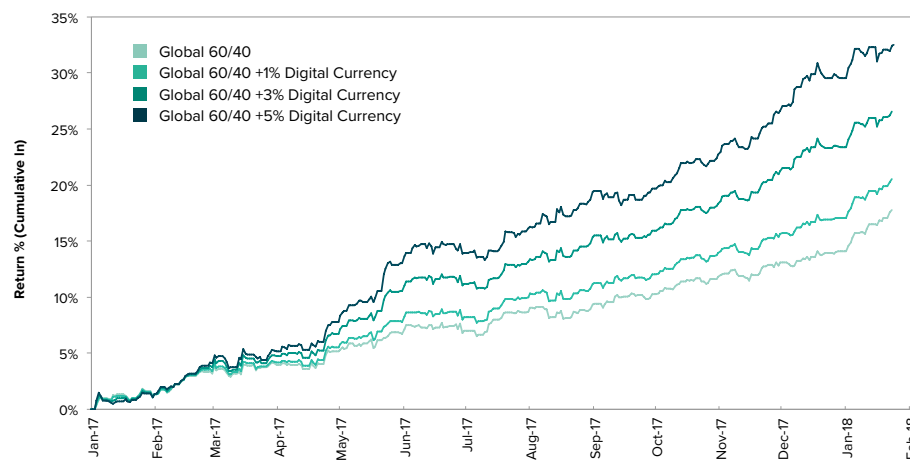


In the second example, we looked at the incremental effects of adding a digital currency allocation (1-5%), comprised of BTC (80%), ZEC (10%), and ETC (10%) to a portfolio of global equities and bonds (the "Global 60/40"). Since digital currencies provide exposure to market opportunities not captured by traditional asset classes, we were eager to quantify their potential benefits.

FIGURE 10: **HYPOTHETICAL SIMULATED PORTFOLIO PERFORMANCE**<sup>27</sup>  
December 31, 2016 through January 24, 2018

PORTFOLIO	Global 60/40	Global 60/40 +1% Digital Currency <sup>28</sup>	Global 60/40 +3% Digital Currency <sup>28</sup>	Global 60/40 +5% Digital Currency <sup>28</sup>
Total Return (Cumulative)	19.4%	22.5%	29.9%	37.4%
Total Return (Annualized)	18.2%	21.1%	28.0%	35.0%
Risk (Annualized Std Dev)	4.0%	4.1%	4.8%	5.9%
Sharpe Ratio	4.38	5.00	5.73	5.83
<b>Incremental Return (Annualized)</b>	--	<b>2.8%</b>	<b>9.8%</b>	<b>16.7%</b>
<b>Incremental Risk (Annualized Std Dev)</b>	--	<b>0.1%</b>	<b>0.8%</b>	<b>1.9%</b>
<b>Sharpe Ratio Improvement (Annualized)</b>	--	<b>14%</b>	<b>31%</b>	<b>33%</b>

FIGURE 11: **HYPOTHETICAL SIMULATED PORTFOLIO PERFORMANCE**  
Cumulative (ln)



27. HYPOTHETICAL SIMULATED PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. SEE FOOTNOTE 24 AND "NOTE ON HYPOTHETICAL SIMULATED PERFORMANCE RESULTS" IN IMPORTANT DISCLOSURES FOR ADDITIONAL DISCLOSURES.  
28. Source: Bloomberg, TradeBlock. Performance is shown from December 31, 2016 through January 24, 2018. Annualized figures are based on 252 trading days. Global 60/40 consists of a 60% allocation to the iShares MSCI ACWI and a 40% allocation to the Vanguard Total International Bond ETF. Performance of BTC is based on the daily values of the Bloomberg Bitcoin/US Dollar Spot Price. Performance of ETC is based on the TradeBlock ECX Index. Performance of ZEC is based on the daily values provided by Bitfinex. "Digital Currency" consists of an 80% allocation to BTC, a 10% allocation to ZEC, and a 10% allocation to ETC. THE GLOBAL 60/40 + 1%/3%/5% DIGITAL CURRENCY RESULTS ARE HYPOTHETICAL AND ARE NOT BASED ON ACTUAL RETURNS OR HISTORICAL PERFORMANCE. DIGITAL CURRENCIES HAVE HISTORICALLY EXPERIENCED SIGNIFICANT INTRADAY AND LONG-TERM PRICE SWINGS AND PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS. Component asset weights are held constant over the period. The Sharpe Ratio is calculated as the annualized excess return of the portfolio over the 3-month US T-Bill divided by the standard deviation of excess returns.



Our analysis revealed that even small allocations to digital currency can significantly enhance the returns of traditional portfolios, without materially increasing volatility. For example:

- Adding a 1% digital currency allocation to the Global 60/40 increased the hypothetical simulated cumulative return by 302 bps, without materially increasing volatility to improve risk-adjusted returns by 14%.<sup>29</sup>
- Adding a 3% digital currency allocation to the Global 60/40 increased the hypothetical simulated cumulative return by 1,050 bps, without materially increasing volatility to improve risk-adjusted returns by 31%.<sup>30</sup>
- Adding a 5% digital currency allocation to the Global 60/40 increased the hypothetical simulated cumulative return by 1,796 bps, without materially increasing volatility to improve risk-adjusted returns by 33%.<sup>31</sup>

It is important to highlight that adding a small allocation to ZEC within the digital currency sleeve of the portfolio further enhanced the risk-adjusted returns of the Global 60/40 versus simulations only including BTC and ETC. We emphasize this point because the hypothetical simulated performance data supports our thesis that there are benefits that investors can realize by incorporating multiple investable digital currencies into the construction of their portfolios. It also reinforces that digital currency has grown to become a new asset class that encompasses more than just BTC. Although our hypothetical simulated analysis is limited by the short timeframe during which BTC, ETC, and ZEC have existed, our findings are consistent with the mathematical principle that uncorrelated assets with positive returns can improve the efficiency of investor portfolios.

## Conclusion

With new digital assets entering the market each and every day, it has become difficult to distinguish between those that are truly revolutionary and those that have no basis for sustainable value. Recognizing that this can be challenging for many investors, we have developed a framework to qualify digital currencies with long-term investability. Through this lens, we have come to believe that ZEC marks the next generation in a class of investable digital assets, complementing BTC and ETC, and broadening a dynamic new asset class. With its store-of-value properties, private transaction network, asymmetric return potential, and diversifying characteristics, ZEC can promote global growth while also providing investors with a new tool to build more efficient portfolios. We look forward to learning more from our experience with this exciting new asset and will continue to deliver investment insights on the broader digital currency ecosystem.

29. See footnote 24.  
30. See footnote 24.  
31. See footnote 24.



## About Grayscale Investments

Grayscale Investments, LLC (“Grayscale”) is the world’s largest digital currency asset manager, with a proven track record and unrivaled experience. We give investors the tools to make informed investing decisions in a burgeoning asset class. As part of Digital Currency Group, Grayscale accesses the world’s biggest network of digital currency intelligence to build better investment products. We have removed the barrier to entry so that institutions and investors can benefit from exposure to digital currencies. Now, forward-thinking investors can embrace a digital future within an institutional grade investment.

Grayscale is headquartered in New York City. For more information on Grayscale, please visit, please visit [www.grayscale.co](http://www.grayscale.co) or follow us on Twitter [@GrayscaleInvest](https://twitter.com/GrayscaleInvest).



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## Note On Hypothetical Simulated Performance Results

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The hypothetical simulated performance results are based on a model that used inputs that are based on assumptions about a variety of conditions and events and provides hypothetical not actual results. As with all mathematical models, results may vary significantly depending upon the value of the inputs given, so that a relatively minor modification of any assumption may have a significant impact on the result. Among other things, the hypothetical simulated performance calculations do not take into account all aspects of the applicable asset's characteristics under certain conditions, including characteristics that can have a significant impact on the results. Further, in evaluating the hypothetical simulated performance results herein, each prospective investor should understand that not all of the hypothetical assumptions used in the model are described herein, and conditions and events that are not accounted for by the model may have a significant adverse effect on the performance of the assets described herein. Prospective investors should consider whether the behavior of these assets should be tested based on different and/or additional assumptions from those included in the information herein.

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- **MARKET ADOPTION**  
It is possible that digital assets generally or any digital asset in particular will never be broadly adopted by either the retail or commercial marketplace, in which case, one or more digital assets may lose most, if not all, of its value.
- **GOVERNMENT REGULATION**  
The regulatory framework of digital assets remains unclear and application of existing regulations and/or future restrictions by federal and state authorities may have a significant impact on the value of digital assets.
- **SECURITY**  
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