



GLOBAL X ETFs RESEARCH

# Four Companies Leading the Rise of Blockchain Technology

While many investors may be familiar with cryptocurrencies such as bitcoin and ether, investors are oftentimes less familiar with the burgeoning ecosystem of companies aiding in the development of the blockchain and digital assets space more broadly. In this piece, we identify four key segments in the blockchain equity space today, as well as a key business that operates in each segment, including:

- **Blockchain & Digital Asset Hardware: Canaan** - A fabless integrated circuit designer, delivering supercomputing solutions through their proprietary high-performance application-specific integrated circuits (ASICs). The vast majority of their revenue comes through sales of ASICs for bitcoin mining today.
- **Digital Asset Mining: Riot Blockchain** - A leading U.S. bitcoin miner and hosting service provider. Riot operates the Whinstone data center which is the largest bitcoin mining and hosting facility in North America.
- **Blockchain & Digital Asset Transactions: Coinbase** - A large cryptocurrency exchange and a leading provider of end-to-end financial infrastructure for the crypto economy.
- **Blockchain Applications: Overstock** - An e-commerce business that accepts payment in cryptocurrency and maintains a portfolio of venture investments in blockchain companies.

## Canaan: A manufacturer of bitcoin mining equipment

Canaan is one of the largest manufacturers of bitcoin mining equipment alongside Bitmain, MicroBT, Ebang, and a few smaller manufacturers. Canaan employs a fabless model where they primarily focus on product design and R&D, while employing leading fabrication partners such as SMIC, TSMC, and Samsung for the chip fabrication.<sup>1</sup>

The hardware required to profitably mine bitcoin has evolved tremendously alongside the network's expansion. Early miners utilized central processing units (CPUs), then graphics processing units (GPUs), then field-programmable gate arrays (FPGAs), and now application-specific integrated circuits (ASICs) which are the last viable hardware solution to profitably mine bitcoin today.<sup>2</sup> Canaan led the latest stage of this transition being the first company to develop bitcoin miners utilizing ASIC technology in 2013.<sup>3</sup>

ASICs are chips designed to solve a specific application as opposed to general purpose computation. In the case of ASICs for bitcoin mining, these are chips designed solely to calculate the output of the SHA-256 cryptographic hash function as quickly as possible (See [Bitcoin: The Basics](#) for more detail on bitcoin mining and cryptographic hash functions).

Canaan's primary business is selling ASICs for bitcoin mining under their AvalonMiner brand, but they additionally sell parts for bitcoin miners, after-sale technical services, and they have a miner leasing operation as well. More recently they additionally entered a joint mining operation utilizing their AvalonMiners in Kazakhstan.<sup>4</sup> Canaan's technical supercomputing expertise gained through the

Authored by:

**Matt Kunke, CFA**  
Research Analyst

Date: January 18, 2022

Topics: [Blockchain](#), [Digital Assets](#)



### Related ETFs

Please click below for fund holdings and important performance information.

[BKCH – Global X Blockchain ETF](#)

[BITS – Global X Blockchain & Bitcoin Strategy ETF](#)

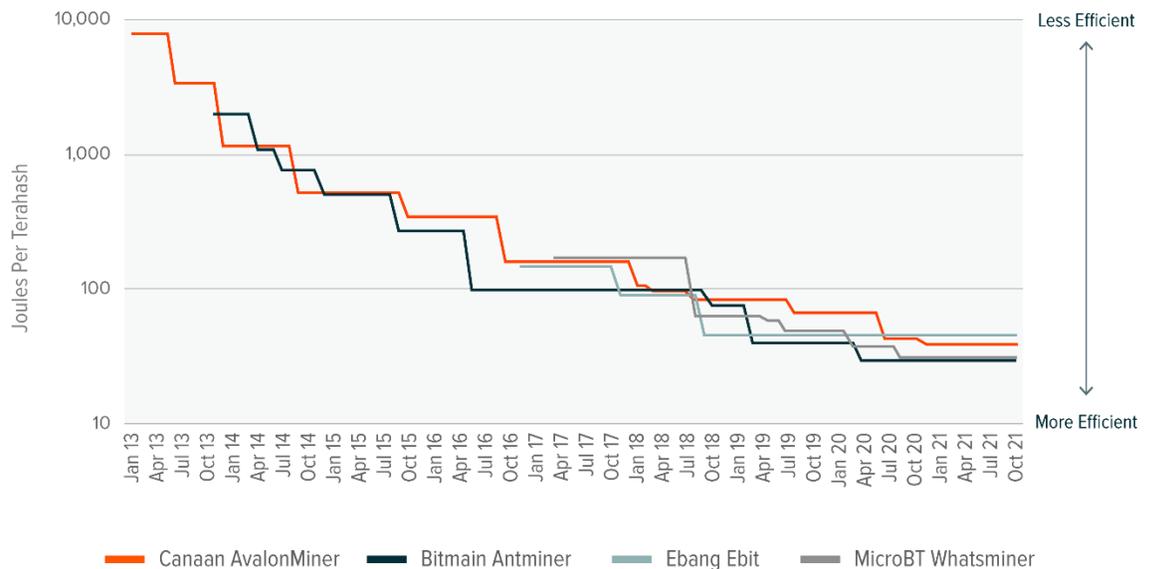


development of ASICs for bitcoin mining has allowed them to additionally enter the ASIC market designed for AI applications, although this remains a miniscule portion of their business today.

While Canaan previously enjoyed the benefit of being first to market, they have faced steep challenges in recent periods. Canaan has fallen behind the two privately held industry leaders in Bitmain and MicroBT with the efficiency of Canaan’s AvalonMiner series lagging behind that of Bitmain’s Antminer series and MicroBT’s Whatsminer series. Additionally, Canaan and their primary competitors are all Chinese companies, so they may have a heightened exposure to regulatory risks given China’s recent ban on cryptocurrency trading and mining.<sup>5</sup>

### ASIC MINER EFFICIENCY BY MANUFACTURER

Source: Global X, miner efficiency data aggregated from Asicminervalue.com, company websites, and company SEC filings as of December 10th, 2021.



However, the overall demand for bitcoin miners today may exceed the headwinds from these challenges. Bitcoin is very profitable to mine today across a variety of ASIC machines and given the backdrop of supply constraints in the chip market, it may take multiple years for marginal cost to approach marginal revenue. This creates demand for ASICs beyond the state-of-the-art chips produced by Bitmain and MicroBT today. For example, using the bitcoin price and network hash rate as of 12/9/2021 and assuming an industrial energy cost of \$0.03 per kilowatt hour – in line with energy costs noted by hosting service provider Bitfury<sup>6</sup> – Canaan’s AvalonMiner 1246 is still generating a profit of roughly \$25 per day.<sup>7</sup> As a comparison, the top-of-the-line miners from Bitmain and MicroBT could profit closer to \$31 per day under these same conditions, but they also have a correspondingly higher purchase price. Continued demand for AvalonMiners is evidenced by recent purchase orders from large mining operations such as Hive Blockchain, Genesis Digital Assets, and Mawson.<sup>8, 9, 10</sup>

### Riot Blockchain: A U.S. cryptocurrency mining business focused on bitcoin

Riot Blockchain is one of the largest publicly traded U.S. bitcoin miners, generating revenue from bitcoin mining and data center hosting services. Simply put, bitcoin miners are in the business of acquiring bitcoin mining hardware (ASICs) and finding data centers with the lowest power cost to deploy them at.

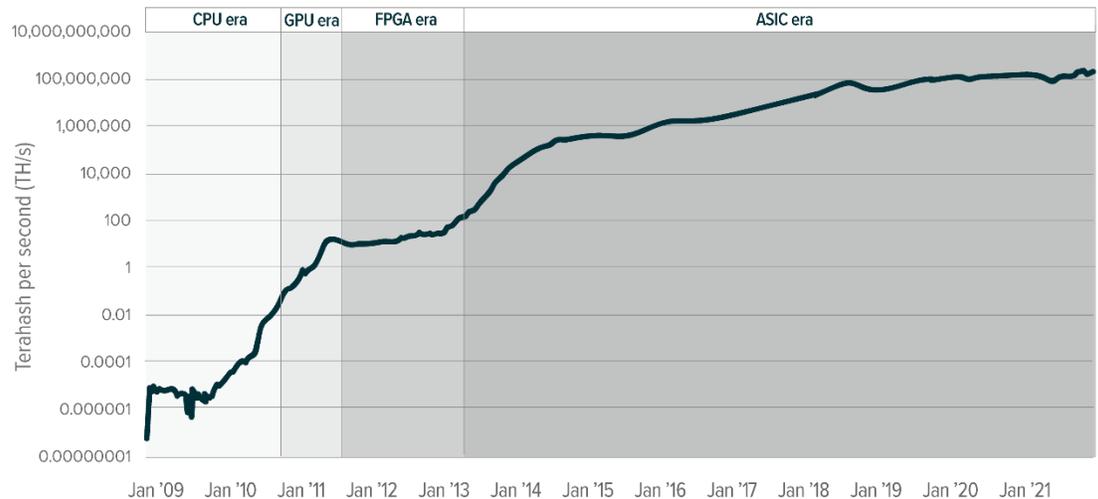
Bitcoin mining is the act of utilizing electricity and advanced hardware to secure the Bitcoin blockchain by a process of brute-force computation. Bitcoin miners iterate different inputs through the SHA-256 cryptographic hash function as quickly as possible, searching for a rare output. The output of a cryptographic hash function is known as a hash, and the hash rate is a measure of the number of hashes that can be calculated per second.

An individual miner's hash rate measures the size of a mining operation, while the total Bitcoin network hash rate is the sum of all the individual miners' hash rates, and it's a measure of the total computational power securing the Bitcoin network in aggregate. Hash rate is often measured per second in terahashes (TH/s), petahashes (PH/s), or exahashes (EH/s), but for consistency we'll utilize terahashes which each denote one trillion hashes.

Riot's hash rate as of December 2021 is approximately 3,000,000 TH/s, representing ~1.7% of the Bitcoin networks total hash rate of 173,000,000 TH/s.<sup>11, 12</sup> Furthermore, Riot is expecting to grow their hash rate to 12,800,000 TH/s by the end of 2022, a 327% increase reflecting a large purchase agreement of Bitmain Antminers coming online monthly through Q4 2022.<sup>13</sup> In recent periods, Riot has tapped the capital markets to fund their operations, providing flexibility to hold their mined bitcoin as an investment on their balance sheet. As of December 2021, Riot held approximately 4,889 bitcoins on their balance sheet.<sup>14</sup>

### BITCOIN NETWORK HASH RATE (LOG SCALE)

Source: Blockchain.com, The Evolution of Bitcoin Hardware. Data as December 8, 2021.



Note: Shaded regions represent the evolution of the hardware utilized to mine bitcoin, beginning with CPUs, then GPUs, then FPGAs, then ASICs.

The expected revenue generated from bitcoin mining is largely predictable and measured as the bitcoin miner's hash rate as a proportion of the total network hash rate. Currently, 900 new bitcoins are mined per day on average, and assuming no change in the Bitcoin network's hash rate, Riot would be expected to mine ~1.7% of these bitcoins, or ~15.3 bitcoin per day. Riot would receive additional mining revenue beyond this from transaction fees, but transaction fees are more dynamic and difficult to forecast, while also only representing approximately 1-2% of the total revenue generated from mining currently.<sup>15</sup>

Riot has taken the approach of vertically integrating their business, acquiring both bitcoin miners and the hosting facilities to deploy their machines. In 2021, Riot completed the blockbuster acquisition of Whinstone US, the largest bitcoin mining and hosting facility in North America.<sup>16</sup> Whinstone, based in Rockdale, Texas, is located on a 100-acre site with 300 megawatts (MW) of currently developed power capacity and an



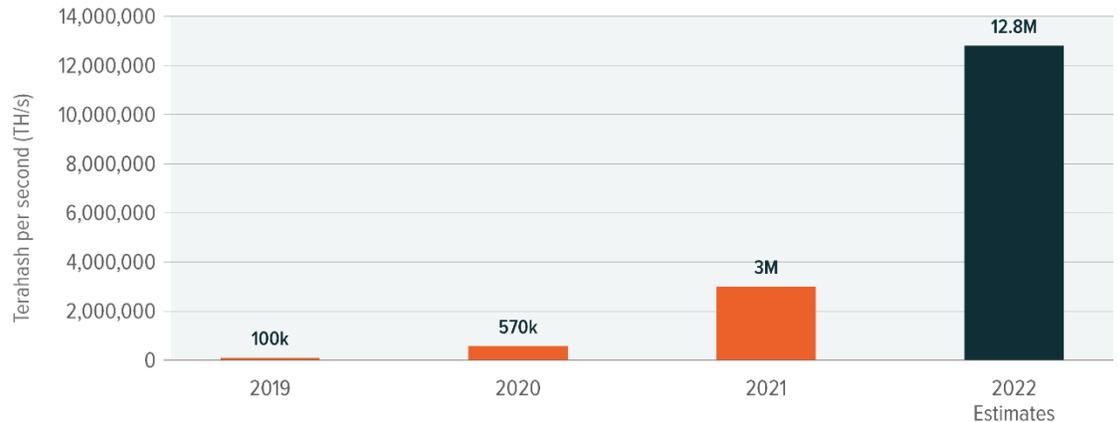
additional 400 MW infrastructure expansion currently in process.<sup>17</sup> The site is subject to a long-term lease agreement with electricity provided via a long-term power supply contract with the state.<sup>18</sup>

The Whinstone acquisition secured the data center infrastructure for Riot’s large purchases of bitcoin miners coming online throughout 2022, but it additionally diversified Riot’s top line by allowing them to sell data center hosting services to other miners. Data center hosting sales made up ~17% of Riot’s revenue in Q3 2021 with bitcoin mining revenue generating the remainder.<sup>19</sup>

The purchase of Whinstone additionally provided flexibility to innovate on the infrastructure side of the business. In October 2021, Riot announced the development of the first industrial-scale immersion-cooled bitcoin mining operation, noting that 200 MW of their expansion would utilize immersion cooling instead of air-cooling. Immersion cooling allows machines to run with lower internal temperatures, prolonging equipment longevity and reducing maintenance costs. Immersion cooling additionally allows for overclocking machines, which Riot expects will increase their hash rate per machine by 25%, potentially as much as 50%.<sup>20</sup>

**RIOT BLOCKCHAIN’S HASH RATE**

Source: Company filings. Estimates as of Jan 5, 2022.



**Coinbase: A digital assets exchange and leading provider of cryptocurrency infrastructure**

Coinbase is one of the largest cryptocurrency exchanges and cryptocurrency infrastructure and service providers. Coinbase was launched in 2012 with the mission of providing anyone access to bitcoin. The company has expanded tremendously throughout the years beyond their core exchange business culminating in their direct listing on the NASDAQ in April 2021. As of December 2021, Coinbase had more than 73mm verified users, they operated in more than 100 countries, and their cryptocurrency volume traded in the past quarter nearly eclipsed \$330 billion dollars.<sup>21</sup>

Coinbase is a full-service crypto platform today with operations spanning retail and institutional trading, lending, custody, wallets, staking, debit cards, blockchain analytics, commerce integration, cloud services, a soon-to-launch non-fungible token (NFT) marketplace, and more. While Coinbase’s revenue is still dominated by retail trading today, institutional trading revenue and subscription and services revenue are making up a growing portion of their topline. Subscription and services revenue encompasses a very



diversified mix of revenues, and this segment grew by a staggering 1256% quarter-over-quarter as of 9/30/2021.<sup>22</sup>

**COINBASE Q3 2021 REVENUE DECOMPOSITION (\$MM)**

Source: Company filings.



Within the subscription and services segment, revenue from blockchain rewards is the largest contributor. This line item was bolstered by Coinbase’s acquisition of Bison Trails in January 2021, a blockchain infrastructure platform-as-a-service company.<sup>23</sup> Bison Trails allows anyone to participate in proof of stake blockchain networks without requiring the technical know-how of running a validator node. Bison Trails provides services allowing individuals, custodians, crypto exchanges, and funds the ability to earn a staking yield on certain cryptocurrencies which they take a performance fee on.

Another key business for Coinbase is their cryptocurrency custody business. Coinbase Custody offers a standalone and independently-capitalized business providing custodial solutions for funds, institutional clients, and high net worth individuals. Coinbase Custody was built through the acquisition of Xapo’s institutional business in August 2019, and it’s believed that Coinbase Custody is the largest cryptocurrency custodian in the world, maintaining custody of the assets held across Grayscale’s full suite of products, amongst many other clients.<sup>24</sup>

Other drivers of service revenue include the Coinbase Earn program, where cryptoasset issuers use Coinbase as a medium to disseminate educational content about their cryptocurrency or token to Coinbase’s large retail user-base. These cryptoasset issuers provide the end-user with a nominal amount of the cryptocurrency for consuming the educational content about their network, and Coinbase charges a small distribution fee for providing this access.<sup>25</sup> Coinbase also generates interest revenue by providing crypto-backed loans to retail and institutional clients.<sup>26</sup>

**Overstock: An eCommerce business that supports cryptocurrencies and invests in their innovation**

Overstock is predominantly known as an e-commerce business providing a range of products such as furniture, home décor, and housewares. However, beginning in 2014, Overstock implemented a multifaceted



approach to increase its exposure to blockchain technology and cryptocurrencies. First, the company partnered with Coinbase to allow their e-commerce customers to pay with bitcoin, and Overstock added the flexibility to hold portions of this bitcoin earned on their balance sheet.<sup>27, 28</sup> Second, Overstock began a more holistic initiative to develop and advance blockchain technology through their subsidiaries which were collectively referred to as the Medici business.<sup>29</sup>

Medici's focus was to leverage the transparency and security properties of blockchain technology to solve problems across six core areas: identity management, property rights and management, central banking and currencies, capital markets, supply chains and commerce, and voting systems. The Medici business was primarily comprised of Medici Ventures, a venture capital business investing in blockchain companies, and tZERO, a business applying blockchain technology to capital markets, predominantly in the area of digital asset securities.

tZERO operates a regulated alternative trading system (ATS) for the continuous trading of security tokens. Private companies can engage tZERO to have a portion of their capital structure digitized, allowing for the continuous trading of a private security through traditional brokerage channels without requiring a liquidity event such as an IPO. The Aspen Digital Token (ASPD) which is listed for trading on tZERO is the most prominent example of a private security token. ASPD is a Tezos-based security token representing fractional ownership in the St. Regis Aspen Resort, a five-star, 179-room hotel in Aspen, Colorado.<sup>30</sup> Overstock and tZERO itself also have security tokens trading on tZERO.<sup>31, 32</sup> Beyond security tokens, tZERO also offers an app for trading cryptocurrencies, providing access to bitcoin and an array of other alternative cryptocurrencies.

## Conclusion

The four companies presented here represent key participants across the blockchain and digital assets ecosystem today. The ecosystem of publicly traded blockchain companies has evolved tremendously over the past few years, and there are dozens of companies operating across these segments today beyond those highlighted in this piece. Additionally, there is a rich pipeline of established blockchain companies expected to access the public capital markets for the first time through special purpose acquisition companies (SPACs) and initial public offerings (IPOs) over the coming year.

While many of these companies may not receive the investor attention commanded by cryptocurrencies today, these companies provide a broad, thematic exposure to the picks-and-shovels of the blockchain and digital assets space, and they could offer a complimentary exposure to direct cryptocurrency investing

## Related ETFs

**BKCH – The Global X Blockchain ETF (BKCH)** invests in companies positioned to benefit from the increased adoption of blockchain technology.

**BITS – The Global X Blockchain & Bitcoin Strategy ETF (BITS)** invests in a mix of bitcoin futures and companies positioned to benefit from the increased adoption of blockchain technology. BITS will not invest directly in bitcoin.

*Click the fund name above to view the fund's current holdings. Holdings subject to change. Current and future holdings subject to risk.*

1. Canaan SEC Form 20-F, as of Dec 31, 2020.



2. Computer, "The Evolution of Bitcoin Hardware," Sep 2017.
3. Canaan.io, as of Dec 17, 2021
4. CoinDesk, "ASIC Maker Canaan Diversified Into Bitcoin Mining in Kazakhstan," Jun 23, 2021.
5. Reuters, "China's top regulators ban crypto trading and mining, sending bitcoin tumbling," Sep 24, 2021.
6. Bitfury.com, as of Dec 17, 2021.
7. Asicminervalue.com, as of Dec 12, 2021.
8. CoinDesk, "Hive Blockchain Orders Another 6,500 Bitcoin Mining Machines From Canaan," Oct 29, 2021.
9. Bitcoin Magazine, "Mawson Infrastructure Group Buys 17,352 Bitcoin Mining Rigs From Canaan," Aug 13, 2021.
10. Cointelegraph, "Genesis Digital Assets buys 20K Bitcoin miners after \$125M raise," Aug 31, 2021.
11. Riotblockchain.com, as of Dec 21, 2021.
12. Blockchain.com, as of Dec 21, 2021.
13. Riot Blockchain Press Releases, "Riot Blockchain Announces December Production and Operations Updates," Jan 5, 2022.
14. Ibid.
15. Blockchain.com, as of Dec 21, 2021.
16. Riot Blockchain Press Releases, "Riot Blockchain Completes Acquisition of Whinstone US, Creating Leading North American Bitcoin Mining Company," May 26, 2021.
17. Riot Blockchain Press Releases, "Riot Blockchain Announces Investor Site Tour," Sep 29, 2021.
18. Riot Blockchain Press Releases, "Riot To Acquire Whinstone, Creating a US-Based Industry Leader In Bitcoin Mining," Apr 8, 2021.
19. Riot Blockchain SEC Form 10-Q, as of Sep 30, 2021.
20. Riot Blockchain Press Releases, "Riot Announces First Industrial-Scale Immersion-Cooled Bitcoin Mining Operation," Oct 19, 2021.
21. Coinbase.com, as of Dec 22, 2021.
22. Coinbase SEC Form 10-Q, as of Sep 30, 2021.
23. The Coinbase Blog, "Coinbase to acquire leading blockchain infrastructure platform, Bison Trails," Jan 19, 2021.
24. The Coinbase Blog, "Coinbase Custody acquires Xapo's institutional business, becoming the world's largest crypto custodian," Aug 15, 2019.
25. Coinbase SEC Form 10-Q, as of Sep 30, 2021.
26. Ibid.
27. CoinDesk, "Overstock.com Becomes First Major Retailer to Accept Bitcoins," Jan 9, 2014.
28. Overstock SEC Form 10-K, as of Dec 31, 2020.
29. Ibid.
30. Cointelegraph, "Aspen launches on tZERO amid record security token volume," Aug 26, 2020.
31. Cointelegraph, "Overstock Airdrops 4.37m Security Tokens to Shareholders," May 21, 2020.
32. Businesswire, "tZERO Security Tokens Now Tradable by Non-Accredited Investors," Aug 12, 2019.

---

**Past performance does not guarantee future results. Bitcoin and bitcoin futures are a relatively new asset class. They are subject to unique and substantial risks, and historically, have been subject to significant price volatility. The value of an investment in the Fund could decline significantly and without warning, including to zero. You should be prepared to lose your entire investment.**

Investing involves risk, including the possible loss of principal. BITS is actively managed and invests in bitcoin futures contracts. The ETF does not invest directly in or hold bitcoin. The price and performance of bitcoin futures should be expected to differ from the current "spot" price of bitcoin. These differences could be significant. Bitcoin futures are subject to margin requirements, collateral requirements and other limits that may prevent the ETF from achieving its objective. Margin requirements for futures and costs associated with rolling (buying and selling) futures may have a negative impact on the fund's performance and its ability to achieve its investment objective.

Bitcoin is largely unregulated and bitcoin investments may be more susceptible to fraud and manipulation than more regulated investments. Bitcoin and bitcoin futures are subject to rapid price swings, including as a result of actions and statements by influencers and the media.



Narrowly focused investments typically exhibit higher volatility. Investments in blockchain companies may be subject to the following risks: the technology is new and many of its uses may be untested; theft, loss or destruction of key(s) to access the blockchain; intense competition and rapid product obsolescence; cybersecurity incidents; lack of liquid markets; slow adoption rates; lack of regulation; third party product defects or vulnerabilities; reliance on the Internet; and line of business risk. Blockchain technology may never develop optimized transactional processes that lead to realized economic returns for any company in which the Funds invest. International investments may involve risk of capital loss from unfavorable fluctuation in currency values, from differences in generally accepted accounting principles or from social, economic or political instability in other nations. BITS and BKCH are non-diversified.

Shares of ETFs are bought and sold at market price (not NAV) and are not individually redeemed from the Fund. Brokerage commissions will reduce returns.

***Carefully consider the Funds' investment objectives, risks, and charges and expenses before investing. This and other information can be found in the Funds' summary or full prospectuses, which may be obtained at [globalxetfs.com](http://globalxetfs.com). Please read the prospectus carefully before investing.***

Global X Management Company LLC serves as an advisor to Global X Funds. The Funds are distributed by SEI Investments Distribution Co. (SIDCO), which is not affiliated with Global X Management Company LLC or Mirae Asset Global Investments. Neither SIDCO, Global X nor Mirae Asset Global Investments are affiliated.

