0x ($ZRX) Analysis and Valuation

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December 14, 2017

Introduction

In the cryptocurrency ecosystem, centralized exchanges are arguably the most fragile piece of infrastructure. These exchanges regularly make the news for their failures— they've been hacked, issued fake money, and have become insolvent, among other serious failures.

Centralized exchanges have many problems:

1. **Counterparty risk**: Users must actually send their cryptoassets to the exchange. Upon receipt, the exchange will credit the user's account on its own internal ledger. Centralized exchanges maintain private, internal books. Some have been found to have been running fractional reserves and subsequently have gone insolvent. Others are suspected of market manipulation and front-running their customers.
2. **Speed**: To minimize counterparty risk, users must withdraw their cryptoassets when they have finished trading. This is a slow process, especially if the user hits withdrawal limits imposed by the exchange.
3. **Regulatory risk**: Centralized exchanges are subject to local regulations. This can lead to delisting of assets and issues with liquidity that may affect prices. Exchanges may also be shut down by regulators and have customer assets seized.
4. **Attack risk**: Exchanges take complete control of users' funds and keep them in a limited number of wallet addresses, thus becoming prime targets for hackers.

5. **Cost**: Trading fees in crypto are an order of magnitude higher than those of equity exchanges. For example, Bittrex (one of the largest exchanges by volume) charges 0.25% on each trade for both market makers and takers.

The number of centralized cryptoasset exchanges that have been compromised is too large to list in its entirety. The most notable, Mt. Gox, lost 850,000 BTC, worth $450 million at the time (over $5B today), in a hack or potential inside job that sent shockwaves through the entire industry. Bitfinex, another exchange, lost $65 million in a 2016 hack. Cryptsy shut down after being hacked in 2016. These events have become so common that they are actually expected. The #1 rule of crypto is "never leave your tokens on an exchange."

While users know they are at risk every time they use an exchange, they continue to do so because the exchanges are a necessary piece of infrastructure for trading. While users can mitigate risk by immediately withdrawing cryptoassets after trading, the process is still insecure. Customers of various exchanges often report issues and time delays when withdrawing, leading to rumors of exchange insolvency. Other exchanges are suspected of facilitating wash trading. It has become painfully obvious that an alternative solution is needed.

Why Decentralized Exchanges Matter

Decentralized exchanges (DEXs) are one of the most exciting innovations in crypto today. Most industry experts are looking for an alternative to centralized exchanges because of the problems listed above. The main structural advantage that centralized exchanges have over DEXs is support for fiat currencies and the ability to interface with the legacy banking system.

We can't overstate the immense value that DEXs will bring to the ecosystem. The most important feature of decentralized exchanges is that users maintain control of their cryptoassets at all times. This is otherwise known as self custody. In most DEXs, the actual execution of the trade is done by an open-source smart contract, so users never have to trust a third party with their assets. This is a major improvement over current centralized infrastructure. For the first time ever, people all over the world can instantly exchange tokens without any counterparty risk.

There are five fundamental benefits of DEXs:

1. **Security**
   - No counterparty risk. It's hard for crypto to become a serious asset class when industry participants are in perpetual fear of losing assets held by a centralized exchange.
   - The smart contracts that execute the trades are open source and can be continuously audited.
   - No risk of an exchange running on fractional reserves or going insolvent.

2. **Speed**
   - Depositing assets on centralized exchanges commonly takes 10-90 minutes. Sophisticated crypto investors know to send a small test transaction to an exchange before sending the full transaction, effectively doubling the times listed above. Using DEXs, this step doesn't exist. Users trade directly from their own wallets.

3. **Censorship Resistance**
   - DEXs have no central servers or operating companies that can be shut down by unfriendly regulators.
   - DEXs are global, meaning that all trade possibilities and token pairs are available to all users. Currently, users in certain countries must wait for local exchanges to list certain cryptoassets before being able to purchase them. DEXs will create opportunities for global liquidity pools. This has never been possible before.
   - Because users are in control of their assets at all times, DEXs are not subject to any capital controls. No one likes withdrawal limits.

4. **Application Integration**
   - DEXs offer the possibility of direct integration with DApps, allowing users to seamlessly trade for tokens at the time they need them. In the future, users won't care about what token is necessary to interact with a service. Payment processors that integrate DEXs will handle asset trades in real time using the global liquidity pools that DEXs offer.

5. **Cost**
   - DEXs have a structural cost advantage compared to centralized exchanges due to lack of overhead. This is possible because DEXs don't custody assets, dramatically reducing operational overhead in areas such as support as compliance.

What Makes a Good Exchange

The following are the key elements that make a good exchange:

1. High liquidity
2. Low fees
3. Well-designed UX
4. Fast execution of trades
5. High guarantees of security (users should maintain complete control of their funds throughout the trading process)
6. Support of different types of financial products (shorts, derivatives, etc.)
7. Support for many different trading pairs
8. APIs for extensibility
9. No capital controls

The Ethereum DEX Ecosystem

While there are several projects outside of the Ethereum ecosystem that are tackling the DEX opportunity (BitShares, Waves, Stellar, etc.), this report will focus on DEXs within the Ethereum ecosystem as these other DEXs are proprietary to their respective ecosystems and are a fraction the size of the Ethereum ecosystem. In time, cross-chain atomic swaps will enable trustless cross-chain DEXs. However, these opportunities are further out.

	0x	Kyber Network	AirSwap	OmiseGo	EtherDelta	ShapeShift
Token	ZRX	KNC	AST	OMG	n/a	n/a
On-Chain Order Books?	No	No order book	No order book	Yes	No	No
On-Chain Settlement?	Yes	Yes	Yes	Yes	Yes	Yes
Trustless	Yes	Yes	Yes	Yes	Yes	No
Order Matching Method	Relayers that host off-chain order books	Smart Contract / Reserves	Indexes	Order Book	Takers fill posted orders	n/a
Token Utility	Fees / Governance	Reserves must have minimum KNC balance and pay fees in KNC	Access to Index	Fees	n/a	n/a
Fully Diluted Network Value	$376,227,000	$357,938,079	$136,052,000	$1,520,260,114	n/a	n/a

Project status (live, beta, concept, etc)	Live	In Development	In Development	In Development	Live	Live

SUMMARY

Intro

0x is a protocol for decentralized exchange of ERC20 tokens. ZRX is the native token of the protocol. At its core, 0x is a system of smart contracts that can be used by anyone—it is open-source and completely free to use. Developers can use the 0x protocol as infrastructure to build user-facing decentralized exchange applications. 0x is one of the early examples of a protocol using the franchising go-to-market strategy.

Of the many technical approaches to building DEXs, we believe that 0x's is the best. 0x utilizes off-chain matching of orders and on-chain execution of trades. This allows for a large number of individual trades to take place quickly without bloating the blockchain with unfilled/cancelled orders.

0x accomplishes this through a novel form of private key-signed messages. Users who wish to conduct a trade create a message that includes specific parameters about the trade—which tokens they'd like to trade, the price, and the order expiry. This message is signed by the user as authorization and broadcast to the network. Once broadcast, this order is open and can be filled by counterparties. Alternatively, the user can name a specific counterparty and send the order directly to that party to fill. The order can only be filled according to the parameters set by the user that generated the order. When the taker signs the order, it is submitted to the Ethereum blockchain, where the trade is executed trustlessly by the 0x smart contract. This means that the smart contract simultaneously takes balances from both the maker and the taker and sends them to the counterparty at the exact same time. No third party must be trusted.

0x is an open source protocol for order discovery and execution. The 0x team aims to provide a real exchange with order books and liquidity. As such, the protocol incentivizes third parties to create channels, called "relayers," for users to generate and broadcast these messages. 0x allows relayers to charge a fee, denominated in ZRX, for their services. While 0x offers the back-end infrastructure for decentralized exchange, relayers will provide the front-end services that allow 0x to compete with existing centralized services. Relayers will be explained in detail below.

Background

0x was founded by Will Warren and Amir Bandeali, who currently act as CEO and CTO, respectively. The 0x team is primarily based in San Francisco, CA, USA. The protocol was built to address both the security flaws of centralized exchanges, as well as the growing need for token-to-token transfers within the Ethereum ecosystem.

According to Etherscan, there are more than 18,000 ERC20 tokens, with a combined network value of several billion dollars. This ecosystem continues to grow as new applications, many of which have their own proprietary token, are built on top of Ethereum. Currently, if a user wishes to trade one ERC20 token for another, they must do so through a centralized exchange. Although both of the tokens a user wishes to trade might exist within the Ethereum ecosystem, the user must leave the Ethereum ecosystem to trade them. 0x provides a way for these trades to happen entirely within Ethereum, eliminating third-party frictions and security risks.

As a diverse ecosystem of DApps emerges, users will need the ability to instantaneously exchange any tokens they hold for the tokens necessary to interact with a particular DApp. The token ecosystem will simply be too large for users to be expected to hold balances of tokens for every DApp they use. 0x allows users to convert their ETH into the DApp's native token at the market price at the time of exchange. This will allow Ethereum users to interact with any DApp in the Ethereum ecosystem seamlessly, without ever having to leave the ecosystem.

Independently of free standing relayers, many Ethereum projects are integrating 0x directly into their respective protocols. Augur, Aragon, Maker, and Melonport are all taking this approach. A complete list can be found on 0x's website.
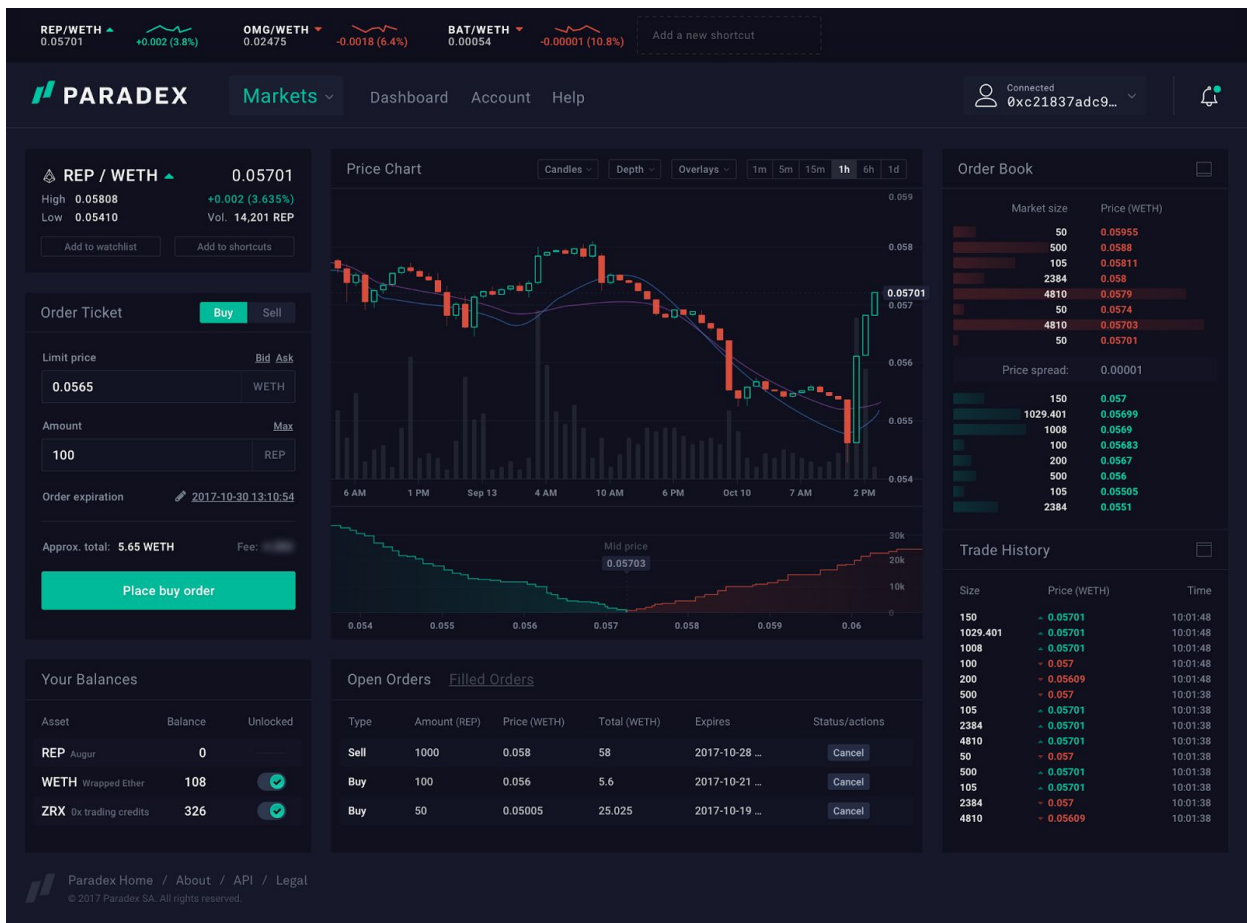
Relayers

In addition to facilitating exchanges within existing DApps, the 0x protocol also makes it possible for any third party to run a dedicated decentralized exchange built directly on top of 0x. These parties are called relayers; they run their own order books and user interfaces but conduct trades using the 0x contracts. Radar Relay, The 0cean, Kin Alpha, Paradex, and EthFinex are all independent companies that are building 0x relayers. Other projects such as dYdX, Dharma, and Market are building derivatives and other financial products using 0x.

Relayers are one of the most important parts of the 0x ecosystem, and will likely be critical to the success of the protocol. By creating a set of smart contracts that any relayer can use, 0x will benefit from the natural competition that emerges among different relayers. There are currently upwards of 9 relayers building on 0x, with more to come. Each of these relayers will compete for customers, and each will independently market their services and bring new users into the 0x ecosystem.

Relayers offer the best traits of the centralized exchange model and the decentralized exchange model. Relayers can invest in high-quality user interfaces and charge additional fees for specialized services, but they are never in control of users' funds. Furthermore, the barrier to entry for building a relayer is orders of magnitude lower than the barrier to entry for building a centralized exchange (primarily due lack of need to maintain an internal ledger of customer balances, build settlement infrastructure, and most importantly no need to conduct KYC/AML due to lack of asset custody). There will be a diverse ecosystem of relayers competing for customers and catering to different niches.

0x also offers a way for relayers to share order books, creating a global liquidity pool and associated network effect that will benefit all stakeholders in the 0x ecosystem.


Screenshot from Paradex
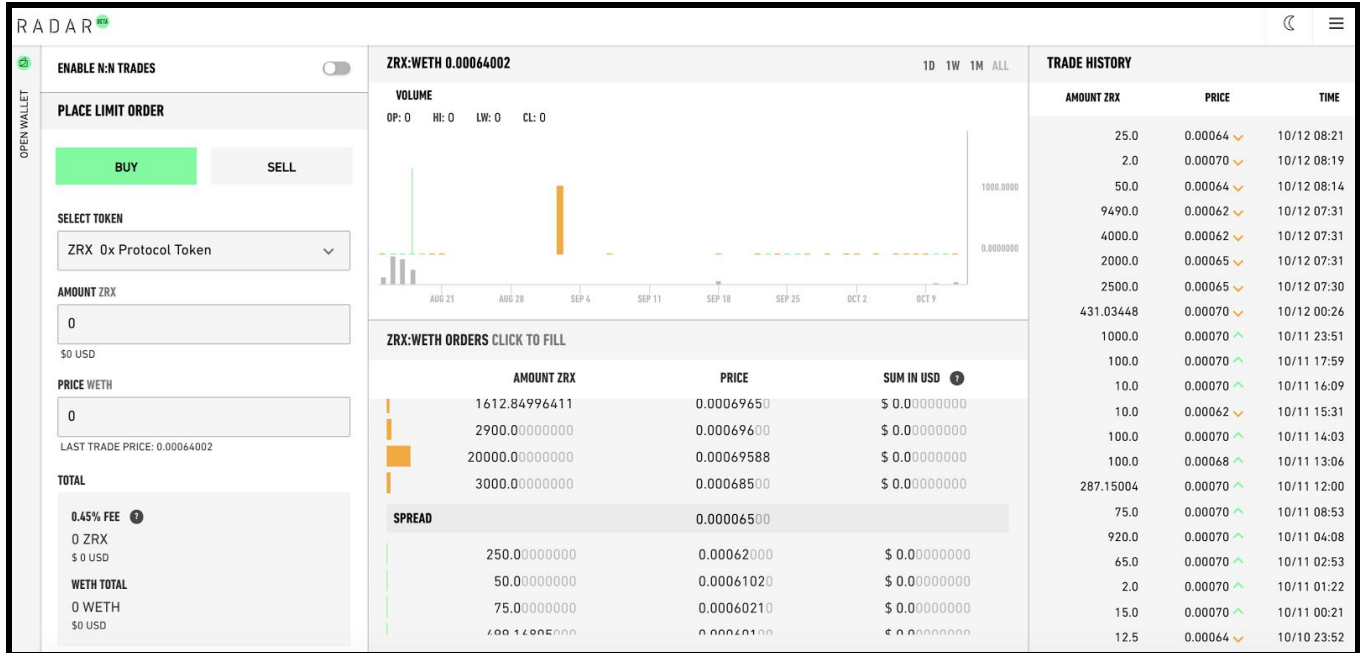
Screenshot from Radar Relay Beta

0x PROTOCOL MECHANICS

The 0x Protocol has the following components:

- **Makers** are those who initiate orders.
- **Takers** are counterparties who fill orders.
- **Relayers** are parties who host order books and match makers and takers.
- The 0x **Smart Contracts** are the Ethereum accounts that execute orders trustlessly on the blockchain.
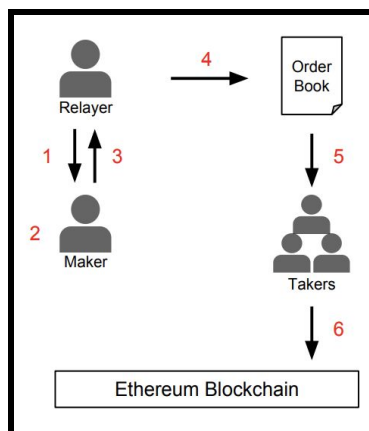
How it Works:

1. Relayers offer a front-end interface that allows users to interact with the 0x protocol. They can specify required fees for their services.
   - All fees in the 0x system must be paid in ZRX.
   - Relayers can offer any fee structure they'd like; relayers are likely to be price competitive.

2. Users generate an order (signed with their private key) with a specific set of parameters and send it to a relayer. Parameters include:
   - Which token pair and amount they'd like to trade.
   - The price at which they're willing to trade.
   - A fee to be paid to the relayer.
   - A time at which the order will expire.

3. Relayers add the order to their order book, as long as it's valid and includes the relayer's (optional) fees.

4. Takers scan the order book and find orders that they'd like to fill. Once they've found an order, they can execute the order by sending it to the 0x smart contract.
   - Alternatively, some relayers will provide "automatic matching" services so that takers are automatically matched with counterparties without having to scan the order book.

5. The Ethereum smart contract executes orders on-chain. Makers and takers receive their new tokens, and relayers receive their fees.
   - 0x users trade directly from their own wallets. The smart contract takes balances from both the maker and the taker and swaps them at exactly the same time.

ZRX Token Utility

0x's native token, ZRX, has two primary functions:

1. ZRX is used to pay fees to relayers.
2. ZRX *will* be used to establish some form of decentralized governance of the 0x protocol by token holders.

The hard truth is that ZRX tokens are not necessary for the current functioning of the protocol. Because 0x is open-source, it would certainly be possible for a third party to fork the 0x source code,

remove the ZRX token, and replace it with ETH. Whether or not this is likely is an important topic of discussion.

Denominating fees in ZRX places a slight friction on first-time users of the protocol, who must acquire ZRX tokens prior to trading on a 0x relayer. Radar Relay, in an attempt to address this friction, allows users to trade ETH for ZRX with no fees. Due to the growing network effects in the 0x ecosystem, we don't believe that users would switch to an "unofficial" ZRX-free forked version of the software. A much more likely scenario is that relayers find other ways of circumventing this friction, for example by not charging transaction fees at all and rather monetizing through alternative channels (e.g. how Robinhood offers free stock trades but profits on offering leverage and other products) or serving as market makers on their relay and building their fees into the spread.

Because relayers have far less overhead than centralized exchanges, we're expecting 0x-based relayers to offer much lower fees. As competition among relayers grows, fees may be driven down even further— possibly even to zero. This scenario, which we regard as highly likely, would cause a sustained decline in the price of ZRX tokens, assuming no speculative price action. However, the ZRX token may derive its value from its second utility—as a governance tool for the protocol.

The issue of decentralized governance has been one of the most widely discussed in the cryptocurrency sphere as of late. Many projects, including Tezos, which raised $232M in its token sale, have made governance a core feature of their platforms. The current block size debate in the Bitcoin ecosystem has highlighted this concern. Vlad Zamfir of Ethereum and Fred Ehrsam (formerly of Coinbase) have publicly expressed opposing viewpoints on this issue. Several different governance systems are being explored:

- Stake-based voting by token holders
- Masternode voting (like Dash)
- Stake-based voting for elected decision makers (like EOS and Tezos)
- Stake-based voting for anyone who locks up tokens for an extended period (Dfinity)
- Pseudo-random voting by token holders who purchase voting "lottery tickets" (like Decred)

The 0x team has not yet outlined exactly how they plan to implement decentralized governance. This is prudent given that decentralized governance is still experimental. The 0x team has said that they will be actively following developments and researching their own methods. While we don't know *how* governance will be implemented in 0x, the need for protocol governance is obvious in order to prevent forking and fracturing liquidity pools.

If 0x is successful, the protocol will likely become responsible for a large percentage of total transaction volume on the Ethereum network in the near term. As a comparison, EtherDelta is one of

the most widely used DApps in the Ethereum ecosystem, regularly comprising a significant portion of transactions on the Ethereum network. The Ethereum protocol itself is still in active development, and will continue to undergo major changes over time. Some have been outlined by the core development team, while other unforeseen changes may emerge in the future. As these changes occur, the 0x protocol will need to evolve and change in response. 0x also has proposed major features, such as cross-chain atomic swaps, that will be built in the future. These features would greatly increase the utility of the 0x protocol, and users need a way to decide upon when and how to integrate these changes when they're technically ready.

The most likely scenario we foresee is that most of this voting will be done by relayer operators and DApps that heavily rely on 0x. Relayers and DApps, as the businesses built on top of 0x, have a strong interest in ensuring the continued success and evolution of the protocol. It's not hard to imagine a scenario in which relayers maintain large balances of ZRX in order to participate in the governance of the protocol, even if ZRX were not being used to pay fees. If this were the case, ZRX ownership would likely be highly concentrated and velocity would likely be very low. Unfortunately, quantitatively valuing governance is basically impossible today. Decentralized governance is too immature, abstract, and untested to quantitatively value. A number of traditional public equities lack voting rights, and equity analysts have tried to assign a discount rate for lack of voting rights. However, this scenario is not analogous as protocol governance is substantially different from electing a board of directors.

ZRX VALUATION

Assigning a price target for ZRX tokens is a difficult exercise because there are so many factors at play. Not only must we make estimates for variables like trading volume, fees, velocity, and percentage of tokens being held as investments (vs. being used for their actual utility), but we must also consider the token economics of ZRX, the speculative premium that applies to nearly every cryptoasset in this market, and more.

Our bullishness on the 0x project ultimately stems from the fact that 0x has an extremely talented team that is tackling one of the most pressing needs in the crypto ecosystem using the best technical approach (off-chain relay with on-chain settlement) coupled with strong market validation. The ecosystem that has emerged around 0x is incredible-- not only are relayers building traditional exchanges on 0x, but others are using the protocol to offer other financial instruments, and many of the biggest projects in the Ethereum ecosystem are integrating 0x directly.

In the short-term, we foresee significant upward price movement in ZRX from two factors:

The first is utility. As relayers go live, users will need to acquire ZRX tokens in order to use them. Both Radar Relay and Paradex will launch soon, and we expect that, at a minimum, they will quickly surpass EtherDelta in volume. New users will have to purchase ZRX tokens in order to trade, and frequent traders will likely hold a balance of ZRX in order to not have to go through the friction of acquiring tokens for each trade. This influx of capital will likely cause short-term price appreciation.

The second is speculation. 0x-powered relayers will go live soon, and these relayers will serve as powerful proofs of concept for the potential that the 0x protocol has. Cryptoasset markets are not yet mature enough to trade on utility value alone, and hype and speculation continue to be major factors in price movements. As users begin to trade using 0x relayers, we believe they will recognize this potential and purchase and hold ZRX. Decentralized exchange is one of the biggest opportunities in all of crypto, and we expect serious market speculation on this vertical as investors place bets on the protocols they expect to win. The 0x team has consistently proven their ability to execute, and new advancements on their end will likely fuel this speculation.

In the medium-term, we believe that the token mechanics of ZRX will become much more of a factor. As new relayers enter the space and compete for customers, fees will collapse. Some relayers will likely abstract away ZRX-denominated fees entirely in order to provide a more fluid trading experience. As fees collapse and velocity increases, the monetary base needed to support the ZRX economy will become very small. This will likely mean a sustained price decrease for ZRX tokens.

In this same time frame, however, we'll see the emergence of a formalized governance system for 0x. Large token holders (relayers, investment funds, DApp developers, and speculators) will seek to protect their investments, and they'll have a process through which they can influence the direction of the project. This is exciting because it means that 0x will continue to evolve. The project is in the very early stages of its life cycle, and it will continue to change in response not only to market forces, but also to changes in Ethereum, its underlying blockchain. Ultimately, the vision for 0x is to be a blockchain-agnostic platform that facilitates cross-chain token exchange. Having a governance system is paramount to support this evolution.

We recognize the shortcomings of the current ZRX token mechanics in the long-term. Fees paid in ZRX would be more easily paid in ETH and will likely be abstracted away in time. It is entirely possible that participants in the 0x economy will seek to implement mechanisms like staking or burning that reduce velocity and supply. We see 0x in its current form as a blueprint for a protocol that will experience significant changes as time goes on. The core team that will guide it through its early stages is one of the most talented in the entire Ethereum space. The ecosystem of relayers, DApps, and other projects that has emerged around 0x is extremely impressive, and it has show itself to be a critical infrastructure component of the Ethereum stack. We are confident that the 0x protocol brings

huge value to Ethereum and to the crypto space as a whole, and we believe that there is a big opportunity to profit from that value creation.

ZRX Price Target

We've created a model to estimate the future value of ZRX tokens under a few different scenarios. This serves as a framework into which we can plug various assumptions about volume, fees, and growth. We strongly encourage readers to do the same.

For data on the number of coins in circulation, we drew directly from 0x's official statements. 50% of the total supply was sold in the crowd sale, and an additional 10% went to early investors. These tokens are liquid today. The founders were allocated 10% of supply on a 4-year vesting schedule with a 1-year cliff. An additional 15% was allocated to an external development fund, and another 15% was reserved by the 0x organization for future employee compensation packages and to sustain development of the protocol.

We segmented ZRX tokens into three buckets: those being used for utility (paying fees), those being held as investments, and those being held for governance. As relayers and DApps using 0x launch, we suspect that the number of ZRX tokens being used for utility will increase, while the number of tokens held as an investment will likely decrease. We also find it likely that the number of tokens being held for participation in future governance will increase. This will correspond not only to the 0x team outlining how governance will work, but also to more and more projects building on 0x that will seek to have a say in the future direction of the protocol. We've set a base of 25% based on our initial conversations with relayers and other funds.

Our estimates for fees are based on fee structures announced by relayers. We've conservatively estimated that fees will be 0.65% total to begin with and will decrease over time, as we expect other relayers to offer more competitive rates.

Finally, our estimates for volume are based on the daily trading volume of ERC20 tokens. We expect that, in time, the vast majority of this trading activity will migrate over to 0x due to strong network effects surrounding liquidity pools, and we also believe that this activity will experience sustained growth throughout the next few years as the entire crypto industry grows. While data on Ethereum DEXs exists through EtherDelta (currently doing an implied annual volume of ~$3B), we believe there are a number of factors that will drive orders of magnitude more volume than EtherDelta.

The first is ease-of-use. Beta-stage relayers are already better than EtherDelta; this gap will widen. The second is the fact that the 0x protocol will be used not just for trading ERC20 tokens like on EtherDelta. 0x will also be used for decentralized derivatives, powering prediction markets on Augur,

trading of tokenized securities and much, much more. In the future, 0x will likely be used for cross-chain trading, which will enable all sorts of additional use cases. As a reference, NASDAQ trades more than $72B in equities daily. 0x is in its infancy, but its total addressable market is enormous.

Based on these variables, we've come up with a base case, a bull case, and a bear case for ZRX price targets, based on the current price of ~$0.37.

(Note: when this analysis was first written, the price of ZRX was $0.20. The day of publication, the price rose to ~$0.37).

- Bear case: $0.51 implied value
- Base case: $1.19 implied value
- Bull case: $2.57 implied value

The model is available to download here. We've also made it available as a Google Sheets document. To use it, please click the file → make a copy option. This will also reveal some comments that explain certain assumptions.

Risks

Currently, an investment in 0x is a bet on the need for a decentralized exchange *within the Ethereum ecosystem*. While the demand for decentralized exchanges exists beyond the confines of the Ethereum ecosystem, 0x only supports trades between ETH and ERC20 tokens. Thus, the potential market for 0x is limited to that of the Ethereum ecosystem. The 0x team has expressed intent to eventually make 0x a blockchain-agnostic system, but that opportunity is not in the foreseeable future. If other platforms emerge in the near future that develop a token economy that is competitive to or surpasses that of Ethereum, then 0x's market opportunity will be limited.

It is also important to recognize that while 0x solves a lot of the issues created by centralized exchanges, it is not a perfect solution. Several issues with 0x were pointed out in the ConsenSys Diligence security audit of 0x and in a Hacking Distributed article by a Cornell University team that studies blockchain technology.

Both of these reports highlighted the issue of miner front-running, in which a miner, relayer, or taker could game their way into an order before someone else to get a price advantage. This could take several forms.

- Miners, who ultimately decide on the order of transactions, could act as taker for any broadcast order they wish to fill, even if another taker already intended to fill the order.
- Miners could fill orders that the maker had tried to cancel by simply including the fill transaction before the cancel transaction.
- A taker could see that an order has already been filled and fill the same order, paying a higher gas cost to get their transaction processed first.

0x has offered a few different solutions to this issue. The protocol is designed to be general purpose, allowing different relayers to pursue different strategies. One strategy that relayers could offer is matching, in which makers automatically specify the relayer as the taker on their orders. Relayers then match orders internally and send them to the blockchain to execute in batches. Users still maintain complete control of their funds and order parameters. This also prevents front-running and allows for more real-time trading, as well as options like limit orders and asynchronous trading. Paradex is one relayer that has already announced its intention to use this strategy.

Another possible attack vector, called maker griefing, could occur if a maker created a broadcast order, sent it out, and then moved the tokens they had intended to trade to a different address. This order would be filled by a taker, sent to the blockchain, and then returned as a failed transaction. And the taker would still have to pay the gas cost associated with it. 0x has offered a solution whereby relayers can "prune" their order books, effectively removing invalid orders before they are filled. Relayers can monitor the Ethereum blockchain, looking for new transactions that would invalidate pending orders (if, for example, a maker moved coins that were up for trade in an order they had posted) and then remove those orders from their order book. Relayers also have the option to disincentivize griefing by requiring makers to place a small deposit before using their services. The deposit would be forfeited if the maker were caught griefing.

Ultimately, 0x's flexible general-purpose design allows for different relayers to employ many different strategies, some of which might require slight trade-offs to avoid some of the issues discussed above. With all relayers, however, users maintain complete control of their funds, which is by far the most important feature of a decentralized exchange.

By far the biggest risk to the 0x ecosystem is the lack of need for a proprietary token. Having users pay fees in ZRX does not offer any benefit to users directly, and the token's fee-payment functionality could be achieved using ETH instead. While decentralized governance is something that will be implemented in the future, the fact that the governance structure has not been outlined means that it does not yet add any utility to the system.

That being said, we don't think it is very likely that any ZRX-free forked version of 0x will emerge in the short term. The protocol is still in active development, and the relayers that have emerged are all

planning to charge fees in ZRX. Many are working directly with the 0x team directly . The possibility of a forked version is a long-term risk, but one that would be mitigated by the 0x team developing a robust governance feature. The 0x team has already demonstrated its ability to deliver, releasing a functioning product before the token sale and continuing to improve upon the software and push new updates. We are confident in their ability to deliver new features including decentralized governance and more.

0x, like all other projects built on Ethereum, faces risks specific to Ethereum. If Ethereum cannot scale transaction throughput, 0x trades could simply become too expensive. Even with off-chain order matching, on-chain execution of transactions could bloat the blockchain. Gas fees would become more expensive, and users might only use 0x for large transactions and settlements. If fees become too high and spreads become too large, users would likely revert to centralized exchanges, even with their security flaws. Ethereum's scalability roadmap, which includes Casper, Proof-of-Stake, Sharding, and eventually Plasma, is being actively developed and improved. We are confident that Ethereum will scale by several orders of magnitude in the next few years.

Competitors

0x has several competitors within the Ethereum ecosystem, as outlined in the table above. While each differs in its approach, we believe that 0x is the most likely to succeed.

AirSwap is an implementation of the Swap Protocol. It is similar to 0x in many ways, using *indexes* instead of relayers. The protocol itself does not require a token (in fact, the Swap white paper never even mentions a token). AirSwap is the first index that is built on top of the protocol, and it has integrated its own token, AST. AST isn't used to pay fees, but rather to post an intent to trade to the index. In 0x, makers broadcast orders with specific parameters, including price. With AirSwap, makers simply post to an index saying which token pairs they'd like to trade. Takers can see these posts, and the maker and taker can then negotiate price directly before filling the order on the blockchain.

In order to post to the index, a maker must lock up a specific amount of AST, which entitles the user to a certain number of posts over some time period. AST token holders are also able to vote on the integration of price oracles in the platform. While this token model is interesting, it does have one major flaw. Because the token is index-specific, not broadly useful for the Swap protocol, a competitor could build an index on top of the Swap Protocol and undermine AirSwap in any number of ways—by replacing the token with ETH, by eliminating it entirely, or just by providing a better service with a token of their own. This presents a major risk to investors in AST. 0x also offers relayers the ability to offer identical services to Swap Protocol indexes, plus more. Relayers can mimic AirSwap index functionality with a strategy called "quote provider." Users connect in off-chain channels to signal

intent to trade and negotiate prices before submitting trades to be executed. It will likely be difficult for AirSwap or other indexes built on the Swap Protocol to compete with this flexibility.

Kyber Network is another decentralized exchange platform built on Ethereum, with an entirely different design. Kyber's major advantage is that it allows for trades to happen quickly. Users can submit a trade request and receive their new tokens in a single transaction. Kyber accomplishes this by having third parties that host reserves of different tokens. Users interact with the Kyber smart contract by requesting a specific trade. The smart contract scans the various reserves, choses the one offering the best price, and then performs an atomic swap of the tokens.

Kyber depends upon third parties who are willing to set up reserves— this requires a large allocation of up-front capital, which must then remain in the reserve to fill orders. Reserves earn profits on the spreads from orders they fill. This is not the most efficient use of capital, and profits earned may not be enough to motivate third parties to operate reserves. Kyber has said that public reserves could be created, where profits are shared among contributors, but again this would be hard to motivate without charging large spreads which would disincentivize users from actually using Kyber.

Kyber's token dynamics are also somewhat questionable. The native token, called KNC, is mostly used by reserves. Reserves are required to have a minimum KNC balance to participate in the protocol, and they also must pay a fee, denominated in KNC, for every trade they fill. Some of these fees are paid to other actors in the trade, like wallet operators, while the rest are burned. Users don't have to pay fees directly, but these costs will likely be passed through to them through wider spreads.

0x also allows relayers to function much like Kyber reserves. Relayers and large token holders can use the "reserve manager" strategy, which allows the relayer to provide its own liquidity. While Kyber and AirSwap are both interesting projects, 0x's extremely flexible functionality is competitive with both of these protocols, and also offers further benefits.

EtherDelta is a live decentralized exchange built on top of Ethereum that has been up and running for more than a year. EtherDelta is slow and clunky and can be difficult to use. EtherDelta, like 0x, uses an off-chain matching service with on-chain execution, but it only has a single interface. EtherDelta is a DApp, rather than a protocol, so it is much less flexible than 0x. Our early experience with the first relayers in beta has been much easier and more fluid than using EtherDelta.

Finally, OmiseGo is working on a decentralized exchange that will implement an on-chain orderbook. Although OmiseGo eventually plans to run as a series of independent plasma chains, OmiseGo will launch in the coming months on as a Cosmos zone. Cosmos offers orders of magnitude more throughput than Ethereum today; OmiseGo intends to use the increased throughput that Cosmos provides and Ethermint to enable trading ERC20 tokens in the near future. This is a very indirect

process, requiring multiple hops from Ethereum, to Ethermint, across the Cosmos network into the OmiseGo zone, and then back, in order to settle a trade. We are dubious that this complex system will work at all, or that even if it does, that it will offer an acceptable user experience.

The OmiseGo white paper also states that the OmiseGo DEX will not focus on high-volume, low-value trading, which is much harder to achieve on-chain. Their focus will be on larger transactions and settlements, leaving lots of room for 0x to carve out a majority market share. OmiseGo is trading at roughly 10x the valuation of 0x and so represents much lower risk adjusted returns.

CONCLUSION

Decentralized exchanges are a key piece of crypto infrastructure, and they will fundamentally improve the functionality of crypto economies. 0x is emerging as the leading DEX platform within the Ethereum ecosystem. Not only is the core protocol well-designed and fully functional, but 0x has also incentivized a whole ecosystem of third-party relayers whose services will make using 0x even easier than using a centralized exchange. DEXs built on 0x will have significantly lower fees and lower barriers to entry than their centralized counterparts. 0x's ability to integrate directly into various DApps will mean greater fluidity and interoperability among Ethereum-based applications. 0x represents a huge step forward for the Ethereum ecosystem.

0x's ZRX token will initially be used only to pay fees to relayers. This may lead to a short to medium-term increase in the network value of ZRX; we expect demand for ZRX to increase significantly as 0x captures a large share of the ETH and ERC20 exchange market. As more relayers emerge and prices become more competitive, ZRX-denominated fees will likely collapse. However, the 0x team's implementation of token-based decentralized governance will add additional utility value to the ZRX token. It is impossible to value this utility until the governance features have been implemented. It is likely that token-based governance would be most useful for relayers and DApps built on 0x, and these parties may end up hodling large ZRX balances strictly for voting purposes. This governance feature will also allow ZRX hodlers to actively participate in the evolution of the protocol. 0x is in its early stages and will continue to change and evolve as time goes on. DEXs are one of the most important developments in the crypto space, and 0x provides the best framework we've yet seen. We expect 0x to eventually become a blockchain-agnostic platform for cross-chain decentralized exchange, and we look forward to seeing further developments from 0x on all fronts.

Please email research@multicoin.capital with any comments or questions.