

EverMarkets

A cheaper, fairer, and easier way to trade derivatives

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Abstract

EverMarkets proposes to offer a trading platform aimed at revolutionizing global derivatives markets. EverMarkets is developing the EverMarkets Exchange (EMX), based on this platform, which will offer futures contracts which give price exposure to underlying assets as varied as crude oil, gold, stock indices, or bitcoin. Our team consists of experienced quantitative traders, exchange officers, market makers, FCM employees, and engineers.

We will attempt to dramatically lower the cost of trading and, through the use of a batch auction model, help ensure an equitable market for all participants. Through the use of smart contracts on a public blockchain, collateral may be held securely and trades recorded immutably, decreasing the need for many intermediaries and streamlining commerce.

Liquidity provision is paramount for any new exchange. We have a detailed plan for building liquidity, notably by spinning off an independent liquidity provider to facilitate the creation of deep and liquid markets to enable our efficient auction model.

The platform will feature a mix of global futures contracts including futures contracts similar to ones traded on established exchanges including cryptocurrency derivatives.

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1. Introduction

EverMarkets is a platform aimed at reinventing the world's existing derivatives markets. We aim to revolutionize the entire trading experience by making it cheaper, easier, and fairer.

We intend to dramatically lower the cost of trading through the deployment of blockchain technologies. By leveraging smart contracts and a shared ledger, our platform will transform the traditional roles of the broker, the exchange, and the clearing house into a more streamlined process. Building a standardized and modern futures derivatives market should reduce the cost of managing risk and make the marking, clearing, and settlement processes more efficient and auditable.

Our market design also improves the price discovery process and minimizes market impact costs. By utilizing periodic pro-rata call auctions in lieu of continuous limit order trading, we de-emphasize the importance of speed and reassert competition based on price. The recent rise of alternative liquidity pools in equities has shown that there is significant demand for fresh ideas in execution and the sourcing of liquidity; we aim to translate many of these innovations to the derivatives arena.

Finally, a non-monopolized derivatives market will give unencumbered and democratized access to a wide variety of futures products. Traders will no longer need to access multiple exchanges for their commodity derivatives trading, as EverMarkets would list a very broad range of contracts on a single platform. Price discrimination by other exchanges amongst different types of market participants would not exist on EMX as traders would all be subject to the same fee structures and have access to the same data feeds. These attributes could also allow for the creation and marketing of new futures products, spurring innovation in the industry and giving market participants new tools for managing risk.

2. Derivatives trading fundamentals

2.a. What are derivatives? What are futures?

Derivatives are financial products whose value is derived from the price of an underlying asset – such as a barrel of oil, a bushel of wheat, a stock index, or a bitcoin.

Futures contracts are a standardized type of derivative that are traded in a centralized marketplace (an exchange) and cleared by a central counterparty (a clearing house). They are transactions between a buyer and a seller of a financial instrument at a predetermined price for delivery or cash settlement at a set time in the future.

For example, if you buy a futures contract for a barrel of oil expiring in December 2018 for \$50 in October 2018, then you are purchasing the December delivery of 1000 barrels of oil at that set price, regardless of oil's price movements from October until then. If the underlying price rises to \$60, the value of the futures contract will rise in value as well, and the holder of the long position in that futures contract can attempt to trade out of it for a profit before expiry. Of course, futures contracts can decline in value and there is a risk of loss in every futures contract.

There are other products which fall under the umbrella of a derivative, such as options on futures or contracts for differences (CFDs). Futures are arguably the simplest and most heavily traded derivative, as they are well defined and regulated around the world (CFDs are not legal in the United States unless they are traded subject to regulations as swaps and only between “eligible contract participants”), so we will focus on futures for now.

2.b. Who trades futures?

Futures contracts are used by a myriad of parties. Their original purpose was for businesses to create more dependable cash flows and to manage risk by hedging, or protecting, against future price movements. For example, an oil producer may sell futures contracts to lock in the price of future sales so they can have an assured sales price and still meet their operating and financial obligations (i.e., pay their workers) in the event of a collapse in the price of oil. Conversely, an airline company may buy futures contracts to lock in jet fuel prices on a forward basis in order to mitigate a rise in the price of fuel.

Market makers and speculators are also important participants in futures trading. Market makers will buy and sell with minimal directional inclination, and hope to profit from small differences between sell

and purchase prices. Speculators, on the other hand, will make bets on which way an underlying will move, and will carry significant risk in doing so. Market makers and speculators often assume the risk and provide the liquidity that commercial market participants and hedgers require.

2.c. How do futures trade?

Futures trade on regulated exchanges, which facilitate the matching of buyers and sellers, and ensure and regulate the integrity of the market. Participants place buy and sell orders at prices they'd be happy with, called limit orders. A buy limit order for \$50 would buy at any price at or below \$50. The collection of resting buy and sell limit orders are collectively referred to as a *central limit order book*. Participants are free to wait for incoming orders to match with — called trading passively — or cross with an existing order — called trading aggressively.

Once a trade is matched, it is intermediated by a clearing house. The clearing house guarantees the financial performance of what was agreed upon. In financial parlance, the clearing house takes on the counterparty credit risk of the trade.

In a traditional futures exchange, buyers and sellers interface with the exchange and clearing house through a broker, an entity which handles the routing of orders and the collateral to back the trades.

2.d. Leverage in the futures market

The futures market is often characterized by the use of leverage. Leverage, or trading on margin, means that participants can enter into positions by depositing enough collateral to meet *initial margin* requirements. Initial margin is the amount of collateral, or performance bond, that is required to deposit with a broker (or clearing house directly) to secure the financial obligations of the customer.

Purchasing a \$1 contract that moves 1% each day will have a 1 cent daily gain or loss, but purchasing it on 3:1 margin means that you would expect to gain or lose 3 cents on the same \$1 purchase instead. Your profit potential is much higher, but so is your risk.

Clearing houses establish minimum initial and *maintenance* margin requirements that apply to all market participants. Maintenance margin is the amount of collateral required to remain in a position. Once a losing trader's collateral falls below the maintenance margin minimum, the broker will issue a margin call to the trader asking for more funding. If the margin call is not satisfied, the broker can liquidate the position to prevent further losses, as the broker would be responsible if the trader becomes insolvent.

As a trader stays in a position, a daily *mark-to-market* mechanism enforces the exchange of daily profit-and-loss between the clearing house, each broker, and their customers. This process works to secure the stability of a clearing house by utilizing standardized settlement prices established daily by the exchange, so unrealized profit and loss does not build up in the system.

3. The current landscape – ripe for innovation

3.a. Difficult and expensive to access

The majority of futures trading volume is concentrated on a few large exchanges around the world, such as the Chicago Mercantile Exchange Group (CME), the Intercontinental Exchange (ICE), and the Eurex Exchange. These large entities are the result of dramatic consolidation in the sector.

CME Group, for example, includes the former Chicago Board of Trade (CBOT), the New York Mercantile Exchange (NYMEX), the Commodities Exchange (COMEX), and the Kansas City Board of Trade (KCBT); collectively CME Group trades everything from interest rate futures to hogs and gold futures contracts. The Economist describes it as “the biggest financial exchange you have never heard of”¹.

Intercontinental Exchange was created through the acquisition of the International Petroleum Exchange (IPE), New York Board of Trade (NYBOT), Winnipeg Commodity Exchange (WCE), Climate Exchange Group (CLE), NYSE EuroNext, EuroClear & operates 23 regulated exchanges or marketplaces and 6 clearing houses globally.

These large companies extract massive rent costs from their established markets. In the United States, futures exchanges are free to dictate where their products are cleared and may also own or control the clearing house. Market and network effects create a “winner take all” environment whereby participants have no choice but to migrate to the most liquid market. This often leads to a single dominant market for each type of futures contract.

Additionally, with only a handful of exceptions, the products for one exchange have no counterpart in any others. For example, S&P 500 futures are only readily traded on CME, while cocoa futures reside solely on ICE. Liquidity, licensing agreements and strong network effects erect high barriers to entry. On a product by product basis, exchanges wield global monopoly-like power.

This is a strong contrast to equity exchanges, in which liquidity is spread out and competition is rampant. To trade GM stock, you can source counterparties on NASDAQ, NYSE, or on any number of private dark pools maintained by banks or market makers. While these liquidity pools are required (in the United States) to protect investors from accidentally executing at worse prices through the establishment of the National Best Bid & Offer (NBBO) system, they are free to offer a variety of order types, pricing schemas, --and in the case of the upstart exchange IEX-- unique timing mechanisms to differentiate themselves.

¹ CME Group: The futures of capitalism, <http://www.economist.com/news/finance-and-economics/21577387-biggest-financial-exchange-you-have-never-heard-futures-capitalism>

The equities market has largely embraced this fragmentation.

Since futures liquidity is so concentrated yet global liquidity pools are distributed across various exchanges for different contracts around the world, it can be difficult for traders who wish to trade in multiple contract types to simply trade only on one platform -- and thus it is difficult to reap the potential benefits of cross-margining across contracts on a global basis. Whether you operate a global business - or simply speculate in world markets - you'll often need to source multiple brokers that will route your orders to multiple global exchanges. You'll need to trust each with housing your collateral safely, and you often give up the benefits of cross-margining that can come with keeping multiple positions with one broker.

3.b. Trading costs are high; fee schedules complex

With few exchange operators and strong barriers to entry, it is no surprise that futures exchanges are extremely profitable. In 2016, the CME had revenues of \$3.6B and a net profit margin of 43%². ICE enjoyed revenue of \$4.5B and a profit margin of 35% during the same year³. The overwhelming majority— eighty-five percent – of the CME's revenue originated from transaction and clearing fees, paid by both buyers and sellers on a per contract basis.

Exchange profits are directly correlated to volumes, and volumes have been growing⁴. Derivatives volumes in 2016 were the highest they have ever been, led by Asia at 36% of global volume. Looking at volumes over the last ten years, it is notable that futures volumes are not correlated to bull / bear periods in the markets; they've grown during the recession of 2008 as well as recent periods of growth. Global appetite for futures contracts has never been stronger.

Futures traders vary, from *high frequency trading* (HFT) firms who hold positions for seconds, to physical commodity traders who often use the exchanges for hedging purposes and who have holding periods of months or years. To maximize profit from these different segments, exchanges practice extreme price discrimination: participants can pay wildly different fees depending on their relationship (including membership status) with the exchange or the volumes that they trade. For trading the S&P 500 E-mini contract, one of the best barometers of the overall American large-cap equity market, exchange fees per contract can range from \$0.35 to \$1.18⁵. The lowest fees are reserved for "member firms", which require the purchase of high priced memberships. Volume discounts can lower these fees for member

² CME Group annual report, 2016, <http://investor.cmegroup.com/investor-relations/annuals.cfm>

³ Intercontinental Exchange annual report, 2016, <http://ir.theice.com/annual-and-quarterly-reports/annual-reports>

⁴ MarketVoice, 2016 Annual Volume Survey, <http://marketvoicemag.org/?q=content/2016-annual-volume-survey>

⁵ CME Fee Schedule as of April 17 2017, <http://www.cmegroup.com/company/files/cme-fee-schedule-2017-04-17.pdf>

firms or market makers to \$0.10 per contract. HFTs take full advantage of these discounts to make large volumes of low profit trades which other traders simply cannot afford to compete with. This lack of parity makes it difficult for traders to compete on a level playing field.

In addition to exchange fees, retail clients also pay a myriad of brokerage fees. Two popular brokers in the US, Interactive Brokers and TD Ameritrade, charge \$0.85 and \$2.25, respectively, to trade the same S&P 500 future. Therefore, the total cost (exchange, brokerage and clearing fees) for trading one S&P futures contract for a retail trader in the US can be anywhere from \$2.04 or \$3.44 using these brokers – many multiples of the \$0.10 exchange fee (plus brokerage) many HFTs pay⁶.

3.c. Structural challenges of traditional exchanges

The nature of today's derivatives exchanges creates problems which can't be overcome by additional competitors competing on speed or on access.

One problem is inherent to its architecture: since exchanges typically have a matching engine that processes orders in time-priority, traders are advantaged by being as physically proximate as possible. This has led to rampant *co-location*, or the practice of installing one's trading servers in the same building—or in some cases, even in the same networking equipment—as the exchange's matching engine, at significant cost. Trading firms also spend heavily for access to high-speed communication services, such as microwave lines, to funnel data from one matching engine to another as quickly as possible⁷.

Firms employing these strategies recoup their investments by being able to make a large number of marginally profitable trades with high certainty. For example, when latency-sensitive traders sense that a large, slow buy order is starting to execute, they will begin buying, incrementally pushing the price up. By the time the large order is nearing completion, the latency sensitive firm will be able to liquidate by selling to the large order at a higher price. Since a co-located firm is able to dart in and out of positions quickly, strategies like this can be very lucrative.

Firms which rely on speed will often have statistical models to predict when they should trade, but sometimes they have mechanical advantages as well. One publicized example is that the CME used to disseminate trade information to certain traders faster than it would broadcast it to the market as a

⁶ This does not include the brokerage fee that HFTs pay. Brokerage fees are privately negotiated and the authors don't have a way of determining what they pay

⁷ Time is money when it comes to microwaves, Financial Times, <https://www.ft.com/content/2bf37898-b775-11e2-841e-00144feabdc0>

whole⁸. Since liquidity for its contracts rests solely on the CME, this presents a huge advantage. As an example, if a trader has advance knowledge that the S&P 500 E-Mini is going to marginally tick up in price, they can send buy orders to purchase any related equity index on any number of other exchanges, risklessly profiting on the spread.

The notion of trading against a very aware counterparty is known as *toxicity*, and the cost of trading against these agents is known as *market impact*. Venues which show both sets of buy and sell orders publicly are known as *lit venues*, and are notorious as the most toxic places to trade, for all asset classes.

3.d. The rise of alternate liquidity venues in US equity trading

While futures traders are limited to lit exchanges, US equity markets have evolved into an entirely different model boasting an abundance of execution destinations. The fragmentation of liquidity in these venues is organized around the avoidance of toxicity: orders will generally be funneled into a pipeline which executes the least toxic orders first, and the most toxic orders last.

The initial destination for many orders is an over-the-counter market. Retail orders, for example, are matched relatively quickly by wholesale market makers like Citadel or Virtu (ex-Knight Capital), and often at better prices relative to lit exchanges. Since retail traders are the least toxic counterparties, market makers will even pay brokers to execute against them in an arrangement known as *payment-for-order-flow*⁹. Non-toxic institutional order flow will typically be matched over-the-counter as well on specialized dealer platforms.

Unmatched equity orders are next commonly routed to a specific form of off-exchange venue called a *dark pool*. Dark pools are owned by broker-dealers or market makers and behave very differently from lit exchanges as posted quotes are not publicly available. From an execution standpoint, the most important attribute of a dark pool is its ability to control its participants. More toxic traders are filtered out, ensuring that remaining orders are relatively benign. Dark pool traders are consequently more willing to execute large orders since there is less adverse selection, and market makers can be profitable quoting tighter spreads than they would otherwise. The net effect for all dark pool trades is that market impact is significantly lower than if they were executed on lit exchanges.

Off-exchange trading for equities is very popular, and continues to take market share away from lit exchanges. As of 2016, off-exchange trading in equities was nearly 40% of all volume in the United

⁸ CME Upgrade Soothes Critics Who Viewed Prior System as Unfair, Bloomberg, <https://www.bloomberg.com/news/articles/2016-05-23/cme-upgrade-soothes-critics-who-viewed-prior-system-as-unfair>

⁹ Payment for Order Flow, Bloomberg, <https://www.bloomberg.com/quicktake/payment-for-order-flow>

States¹⁰. Dark pools now account for 15% of total US equities trading¹¹. Researchers have even found that because dark pools concentrate informed traders, price discovery on the public exchanges is improved¹².

Last on the order flow pathway are lit exchanges. Despite differences in fee schedules and incentive structures, the market impact of trading on lit exchanges is generally much higher than that of an off-exchange venue.

Dark pools and other off-exchange venues are less common in futures trading. Many futures contracts on exchanges are thinly traded and can exhibit large price fluctuations when filling sizable orders. Block trades *are* permitted, subject to exchange rules and minimum order thresholds.

3.e. Cost savings from distributed ledger technology

There is significant complexity in the back-office processes which facilitate derivatives transactions. Payments, clearing, and settlement processes are currently intermediated by a whole host of systems, depositories, and counterparties which differ across borders and across products. A standardization of global trade reporting and governance could be a noteworthy driver of cost savings in simplifying these workflows and increasing overall productivity.

A recent paper from the US Federal Reserve has illustrated this possibility, and even foresees larger changes on the horizon:¹³

[Distributed ledger technology] has the potential to provide new ways to transfer and record the ownership of digital assets; immutably store information ... [potential use cases] could address operational and financial frictions around existing services.

Finally, as a recent innovation, [distributed ledger technology] has the potential to also drive change to the financial market structure in ways that take advantage of the new technology.

¹⁰ TABB Equities LiquidityMatrix June 2017, <http://tabbforum.com/liquidity-matrix>

¹¹ Increasing Transparency of Alternative Trading Systems, <https://corpgov.law.harvard.edu/2015/11/24/increasing-transparency-of-alternative-trading-systems/>

¹² Zhu, Haoxiang, Do Dark Pools Harm Price Discovery? (November 16, 2013). Forthcoming, Review of Financial Studies. SSRN: <https://ssrn.com/abstract=1712173>

¹³ Mills, David, Kathy Wang, Brendan Malone, Anjana Ravi, Jeff Marquardt, Clinton Chen, Anton Badev, Timothy Brezinski, Linda Fahy, Kimberley Liao, Vanessa Kargenian, Max Ellithorpe, Wendy Ng, and Maria Baird (2016). "Distributed ledger technology in payments, clearing, and settlement," Finance and Economics Discussion Series 2016-095. Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2016.095>

4. Trading on the EverMarkets Platform

Our proposed system works through the issuance of *the EverMarkets token (EMX)*, an Ethereum-based token. EMX is used for collateral, fees, and settlement of contracts on the EverMarkets platform. EMX holders may also choose to play the role of a *lender* and lend traders their tokens in return for a fee.

The usage of an EMX token as a trader or lender on the platform carries risk, so it is imperative to understand how the ecosystem works. An EMX token can only be used for one role at any given time.

4.a. Futures contracts

EverMarkets will include both traditional and cryptocurrency futures on the platform. Futures on the EverMarkets platform should function largely the same as they do on traditional futures exchanges, except for the auction-based matching model and the on-chain trade clearing and settlement process, which will be introduced below. Also, contract quantities traded may be fractional, while on traditional trading platforms, they are whole numbers.

Derivative contracts in our system depend on the price of an external asset at a set time in the future. The majority of our contracts will be highly correlated with existing products on other liquid exchanges. These external benchmarks will be internalized into our platform through the use of agents called *oracles*.

The mechanics behind order matching and settlement are described in section 5.

4.b. Margin syndicates

As set out in further detail in Section 6, a margin syndicate is a trader's entry point to the exchange. Traders apply to enter into a relationship with a margin syndicate and that syndicate is responsible for participating in the trader default waterfall, in effect helping to guaranty that trader's contractual obligations to the clearing house. The margin syndicate will have risk-control parameters (dollar value and total number of contracts) it can set, per-trader. This is similar to the functions of an FCM in traditional markets with one key difference - the margin syndicate will not have custody of trader funds or handle or accept trader orders. All trader collateral deposits will be held by the clearing house in a wallet specific to the trader - but the margin syndicate will be kept aware of deposits of collateral, the positions of the trader, and the minimum margin requirements required on the platform for the trader's position.

Another service provided by a margin syndicate is the *lending* of tokens to traders to provide additional leverage. The margin syndicate can perform this function through use of their own EMX tokens, or through tokens they have collected from individuals. The individuals that contribute their tokens to a margin syndicate to facilitate this service are called *lenders*.

Before making a transaction, traders may use their own tokens to post margin or they may choose to borrow tokens from their margin syndicate to fund that position. Part of the technology that EverMarkets has developed is a smart contract for each margin syndicate which registers lent collateral and takes fees according to the constraints set by its lender members.

Syndicates will vary by the lending fee they charge. Syndicates are paid by traders for the amount of time that their tokens are at use collateralizing a trade, and syndicates are free to choose how high or low to set the cost for the lending service they provide.

Section 6 discusses the margin syndicate in more detail.

4.c. Clearing

The clearing house is represented by smart contracts on the public Ethereum blockchain where collateral is stored and pre-programmed (yet, parameterized) risk control decisions are made. The on-chain clearing house will be responsible for enforcing proper margin levels across all trader positions.

The clearing house will also be responsible for maintaining and distributing funds from the *guaranty fund*. There will also be additional safeguards to protect customer funds that will be outlined in the exchange rulebook. Risk control parameters are set by EverMarkets and may be tuned, but the smart contract code ensures the proper operation of the clearing house - along with additional centralized risk control measures.

4.d. How the blockchain fits in

The Ethereum blockchain is our chosen platform for margin syndicates, the foundation for the EMX token, and the ledger of our trades and settlements. Ethereum is a strong candidate as it has significant adoption, ample development support, and a growing ecosystem of distributed applications like ours. We will be recording all trades on the public Ethereum blockchain once a cross occurs, and again on expiry to record gains and losses.

While collateral, positions, and settlement information are stored on-chain, orders and matching engines reside off-chain in a centralized backend system. EMX matching engine nodes run within EverMarkets' cloud systems. We frequently publish the order book and matching information and may record data to the Ethereum chain, as events and logs, where appropriate.

While we believe building on the Ethereum platform is currently the right choice for this platform, the EverMarkets engineering team will continue monitoring advancements in blockchain technology. In the future, there may be a platform that provides better scalability and development features and allows us to offer better services to market participants -- while still providing the stability and security that the platform requires.

4.e. Fees, summarized

We have not yet finalized the fee structure for trading, but can give indications based on the necessary participants involved.

Fees on the platform include:

- i. Fees paid to the margin syndicate in return for lended tokens. This is done by any trader who wishes to send an order backed by tokens on-loan from the margin syndicate, and will vary according to the amount of tokens (and thus, additional leverage) desired.
- ii. Fees paid to the platform. Contracts will have set per-contract trading fees that will be publically available on our website and transparent for all to view .

Other types of fee structures may be possible. It is our strong desire to maintain that the net fee to traders will be lower than existing costs on other futures exchanges.

5. Matching engine

5.a. Designing a fairer marketplace

As explained in section 3, slower traders are often disadvantaged when participating in today's competitive environment. An attempt in creating a more level playing field must then begin with redesigning the rules which heighten the importance of speed.

This is not a straightforward problem to solve as trading firms expend large amounts of capital and manpower on technology optimizations, cutting-edge equipment, and co-locating their servers near exchanges. Any solution needs to make sure that market data both arrives to every listener near-concurrently, and that every listener has an equal ability to respond.

Introducing a speed bump to outgoing orders, such as what IEX implements in the equities market, helps mitigate unfairness when trading across exchanges, but participants can still receive an advantage by having a closer connection to the IEX matching engine and receiving its data a little bit sooner. When you're trying to construct a globally fair marketplace – with participants across different continents – the solution needs to go a step further.

We've decided to take a more drastic measure and forego the traditional limit order book completely. We instead utilize a mechanism which we believe is much fairer method of trading, but one which still facilitates efficient price discovery: periodic batch call auctions.

These auctions are designed such that activity is disseminated periodically, rather than continuously. The recurrent loop of the matching engine – upon which orders are received from a trader, incorporated into the order book, and multicasted back to all listeners – happens on a batch schedule built to give all participants an adequate amount of time to receive and respond to every burst of market data at the same time.

Auction executions, called *crosses*, are spaced purposefully as well. These are the only times at which executions can occur. Their periodicity can vary by product, but may be separated by seconds or even minutes.

Rather than a stream of two-party transactions, our marketplace will have less frequent executions that will be stated in our contract terms and conditions, but ones in which many traders participate in determining the price, in a discrete batch. By de-emphasizing speed and creating a fairer marketplace, we aim to awaken competition based on price and execution.

5.b. Determining the crossing time

Mechanically, we have chosen to make our auctions very similar to the London Stock Exchange's open and closing cross mechanism¹⁴: all orders on the auction order book are publicly disseminated, but the crossing time is uniformly random within some window of time. This works well with a blockchain approach because of its transparency, incentivizes a more even distribution of orders in time, and makes it more difficult to manipulate the market with dishonest orders.

With a continuous flow of orders, we also need to decide at what point orders will be rejected for being too late. Consistent timestamps are of paramount importance in an exchange - and our backend systems will deliver a consistent timestamp such that traders will always know whether an order is being considered for the current auction or next. This will also be crucial for allowing our Exchange Compliance team to ensure market integrity.

5.c. The crossing algorithm

Qualified orders will be matched in a way that maximizes executable volume, with market orders matching first and limit orders matching conditional adequately priced liquidity on the other side.

In another nod to the LSE crossing algorithm, auctions may have volume or price extensions in an effort to establish a stable price. For example, if the crossed volume is below a certain minimum or if the price is sufficiently far enough away from some previously established reference price, the auction will continue until those thresholds are satisfied for the better¹⁵.

Afterwards, all trade settlements are recorded on the public Ethereum chain.

As payment for facilitating the auction - and for the gas required for the Ethereum chain interaction - customers with executed positions are charged fees distributed to EverMarkets, as well as their margin syndicates if they have active token borrows.

¹⁴ London Stock Exchange market enhancements, <https://www.londonstockexchange.com/products-and-services/technical-library/technical-guidance-notes/technicalguidancenotesarchive/release.pdf>

¹⁵ Rules of the London Stock Exchange, <https://www.londonstockexchange.com/traders-and-brokers/rules-regulations/rules-lse.pdf>

5.d. Benefits of periodic call auctions

There have been numerous studies on the efficacy of periodic call auctions over that of continuous limit order book trading¹⁶¹⁷¹⁸. The main arguments in their favor are:

- i. **Frequent call auctions eliminate the speed advantage of the fastest liquidity taking traders.** By making liquidity providers less susceptible to order “sniping”, the cost of liquidity provision would decrease and potentially lead to lower spreads and enhanced liquidity.
- ii. **Call auctions are easier from an exchange implementation standpoint.** Matching engines will no longer be affected by the instability resulting from periods of surging market data.
- iii. **Regulators and market observers can better survey markets.** By reducing the number of tradable time points, data will be simpler to visualize. With fewer speed-sensitive traders, liquidity providers will also cancel orders less frequently, decreasing the size of market data feeds. All participants on the exchange will be anonymous, and all traders will have a unique identifier and time stamp associated with their account. Once orders are matched, they will be recorded on the blockchain through the use of smart contracts. As such, internal exchange compliance staff will have the ability to perform audits and trade surveillance on all transactions.
- iv. **Data dissemination will be fairer.** Market events which publicize earnings or economic reports will not cause as much volatility if participants are all given adequate time to digest them before the market resumes.
- v. **Market stability will improve.** Since orders in a periodic call auction model are not transacted immediately, (traders can place and cancel orders prior to the cross) liquidity providers will be given more time to fill supply-demand imbalances. “Flash crash” type scenarios will occur less frequently as a result, and the “market impact” of a large order will be decrease.

¹⁶ Elaine Wah, Dylan Hurd, Michael Wellman; Strategic Market Choice: Frequent Call Markets vs Continuous Double Auctions for Fast and Slow Traders. <http://financelawpolicy.umich.edu/wp-content/uploads/sites/26/2015/10/E.-Wah-Strategic-Market-Choice.pdf>

¹⁷ Eric Budish, Peter Cramton, John Shim; The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response . Q.J. Econ 2015; 130 (4): 1547-1621. doi: 10.1093/qje/qjv027

<https://academic.oup.com/qje/article/130/4/1547/1916146/The-High-Frequency-Trading-Arms-Race-Frequent>

¹⁸ Nicholas Economides and Robert A. Schwartz; Electronic Call Market Trading: Let competition increase efficiency. The Journal of Portfolio Management 1995; 21 (3): 10-18 http://www.stern.nyu.edu/networks/Economides_Schwartz_Electronic_Call_Market_Trading.pdf

Many traders have long enough time horizons that they do not want to pay a “cost” for immediacy. We believe that periodic call auctions would benefit these traders with fairer access based on price, greater liquidity, and improved execution.

5.e. Expiration and the use of oracles

Settlement procedures for contracts on the EMX platform will include definition of an *oracle* for each futures series. An oracle, in blockchain terms, is a method of transferring data (in this case, a settlement price) from an off-chain system to smart contracts running on a blockchain.

EverMarkets will be the assigned oracle for all contracts on the EMX platform. This means EverMarkets backend systems will be the holders of the only trusted accounts able to supply settlement prices at contract expiry.

5.f. Arbitration

There may be situations in which an incorrect final settlement price is disseminated¹⁹. Given the blockchain’s immutable nature, we’ll need to directly address this issue in our design. We will give traders the ability to challenge settlements directly to EverMarkets to resolve disputes.

We envision a process similar to the following: After the final settlement price is published, collateral remains untouched in the smart contracts for a certain specified amount of time. Traders have until the end of a predetermined challenge period to signal the need for an inquiry. If requests are received, the inquiry process will be initiated and an investigation into the settlement price will begin. Collateral transfers will be held up until this process is complete. This concept will be clearly illustrated in the exchange rulebook.

¹⁹ Nasdaq Stocks Show Wild Swings; Exchange Cites Third Parties; <https://www.bloomberg.com/news/articles/2017-07-04/nasdaq-stocks-show-exaggerated-movements-in-after-hours-trading>

6. Margin syndicate

Margin syndicates are required for participation on our exchange. A trader will form a relationship with a margin syndicate, much like they do with an FCM in traditional markets, however margin syndicates will not be required to be registered as FCMs because they will not hold customer funds and will not accept customer orders. Margin syndicates provide additional leverage to individual traders (through lending) and provide a token reserve to protect against shortfalls due to trader default. Syndicate members are required to stake their EMX tokens to ensure that there is capital backing the syndicate. This token reserve is part of the trader default waterfall.

6.a. Choosing a margin syndicate as a lender or trader

The clearing house will publish a margin schedule that will outline initial and minimum margin requirements. Margin syndicates compete for business from traders with token loan amounts, permissioning to trade certain contracts, and fees.

Requirements can be customized for different risk profiles. One syndicate may require a \$50K USD initial deposit for a trade of a certain notional, but will charge a flat annualized rate of 1% EMX. Another may require only a \$20K USD deposit for the same trade, but charges a higher 3% EMX for overnight risk and a lower 0.5% for intraday risk. The *minimum margin* requirements are set by the clearing house, but margin syndicates are free to charge additional margin on top of that. In both examples above, the customer posts the same amount of collateral to satisfy the clearing house initial margin requirements (through borrowed tokens if he or she chooses to extend leverage).

Traders are free to choose the margin syndicate which best serves their trading style. Traders who hold positions for large periods of time may need the buffer of a larger margin and will choose to deposit more EMX while paying less in fees. A trader who trades in and out but is usually flat at the end of the day may choose to deposit less margin and pay a higher fee since it's only in effect when a position is held. These discussions will happen independent of the Exchange and will be between margin syndicates and traders, and all traders will be responsible for adhering to the minimum margin requirements set forth by the clearing house.

Since selecting the right margin syndicate may be complex, we plan on spending a significant amount of effort designing and testing a GUI that makes it easy to deploy risk capital across a variety of contracts and margin syndicate requirements.

6.b. Trading against margin

Upon being notified by the clearing house that collateral has been deposited by a trader, a margin syndicate will allow that trader to make trades up to a certain dollar value and contract size (given margin requirements).

Before orders are accepted onto the orderbook and also during the crossing procedure, the exchange will query the clearing house to ensure that all traders have an adequate amount of collateral on deposit in their account. The exchange will also query the trader's margin syndicate to ensure that the trader is within the position limits and risk parameters defined for them.

To prevent traders from withdrawing collateral while their orders are working but not fully executed, there will be limitations on how quickly a trader can withdraw collateral from the clearing house. There will also be a protocol to synchronize margin use amongst contemporaneous trades for the same user across auctions for different contracts.

Margin syndicates and token lenders will have withdrawal limitations as well, to prevent a withdrawal of staked capital during times of volatility. These limitations are still being finalized, but will likely be a combination of having both withdrawals and margin payments take place gradually over time.

Margin lenders are smaller participants who want to join an existing margin syndicate. Payments to margin lenders are made in proportion to their participation in the pool or as the syndicate sees fit. For example, a token holder who stakes 80% of the syndicate's tokens may receive 80% of margin fees, but may also be responsible for backing 80% of the possible shortfall due to trader default for the pool.

6.c. Maintenance margin

Margin requirements are calculated by the clearing house on an ongoing manner. After posting an initial margin, traders will need to make sure their balance stays above a threshold called the maintenance margin. Dipping below this level would cause margin calls and ultimately if not addressed in a timely manner, liquidation of positions and collateral. Like initial margin, margin syndicates are free to set this level where appropriate, as long as they respect the minimums set by EverMarkets.

The main cause of margin calls would be a decline in the value of a purchased futures contract. Both margin syndicates *and* the EverMarkets clearing house monitor trader margin levels and may issue margin calls. Though, the final responsibility for monitoring margin levels and issuing margin calls lies with the clearing house.

6.d. Stake and collateral considerations

While the current plan is to use the EMX token as the basis for both depositing margin and lending (by margin syndicates), we are open to investigating and prepared to support additional forms of accepted collateral or substitutions.

There are a few reasons why we would implement a change:

i. The combined market cap of circulating EMX tokens is insufficient.

A small market cap in EMX tokens would significantly hamper trading and liquidity provision. If this is a problem, we would consider making available established token, such as ETH, to boost capital available for trading.

ii. The price volatility of EMX tokens (or ETH) on the secondary market is unsuitably high.

If price volatility is a factor, we would evaluate supporting tokens which are more stable in price. For example, there are initiatives to create coins backed by fiat²⁰ or precious metals like gold²¹. Central banks are also considering the issuance of their own coins²². We are keeping a close eye on these projects.

iii. Certain contracts may benefit from having an alternative collateral token.

While other tokens may be allowed to be posted as collateral, EMX remains an important part of the EverMarkets platform. We may require either a minimum amount of EMX staked to take a new position, or a minimum staked ratio of EMX against any other collateral token.

An important point to stress is that it is increasingly prudent to commit to adaptability rather than specialization. In the face of today's financial markets, when economic events are increasingly long tailed, the best laid plans are often those that are ready to change when necessary. The margin syndicate -- and the entire EverMarkets platform -- are built with these tenets in mind.

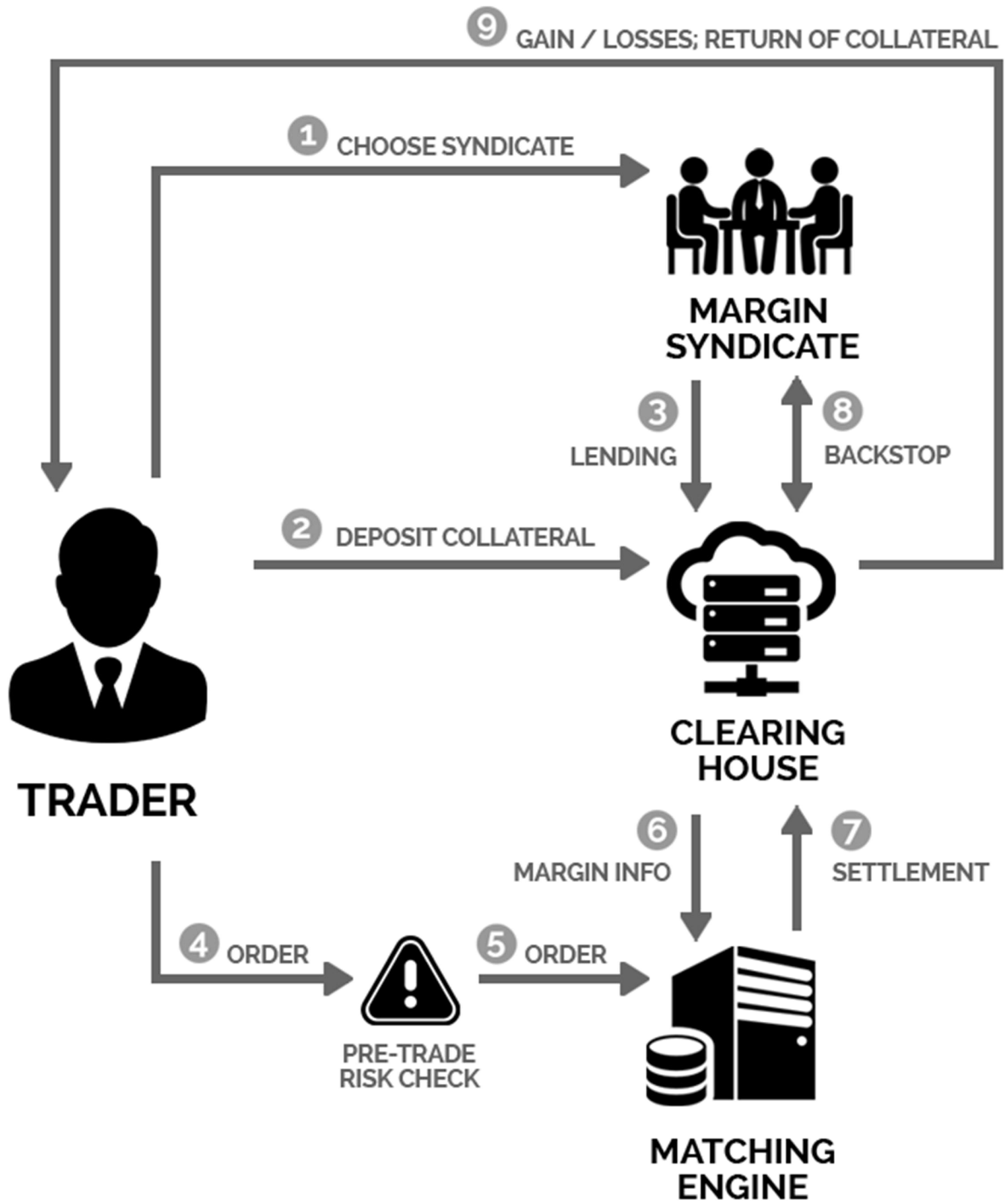
²⁰ Top 3 Stable Cryptocurrencies Based on USD Value, <https://themerkle.com/top-3-stable-cryptocurrencies-based-on-usd-value/>

²¹ OneGram & Dubai Trading Platform In \$500M 'Gold-Backed' Cryptocurrency Venture, <https://www.forbes.com/sites/rogeraitken/2017/05/02/dubai-trading-platform-onegram-in-500m-gold-backed-crypto-venture-sharia-compliant/#6223f393bf56>

²² IMF Explores ICOs and Central Bank Coins in New Blockchain Note, <https://www.coindesk.com/imf-explores-icos-central-bank-coins-new-blockchain-note/>

7. Illustrating the entire process

For further clarification, let's walk through the entire process with a graphical aid.



1. The trader chooses a margin syndicate. Margin syndicates operate a market for leverage, and the trader is free to choose which syndicate best fits his style of trading.
2. The trader deposits collateral with the clearing house's smart contract.
3. The chosen margin syndicate guarantees the trader's position at the clearing house. The clearing house makes sure that traders are always adequately capitalized.
4. The trader sends an order to the exchange. It passes through a pre-trade risk check which may inquire with the margin syndicate for risk limits.
5. The order hits the exchange matching engine.
6. Before adding the order to the order book, the exchange matching engine ensures that the order has adequate margin by inquiring with the clearing house.
7. If the order is marketable, an execution occurs and the trade is settled at the clearing house (to the blockchain).
8. If needed, the margin syndicate provides a backstop to the trader's losses. The margin syndicate receives a fee for this service.
9. After contract expiry or closing a position, gains/losses and collateral are automatically returned to the trader.

8. Sourcing liquidity

The biggest hurdle in establishing a new futures platform is liquidity. When contracts are illiquid, price discovery is more difficult, impact costs are higher, and the market is less attractive to all parties.

Over the past few months, we have spent a significant amount of time talking with prominent futures traders, exploring the weaknesses of existing platforms, and assembling a team with the technology and financial know-how capable of building an attractive alternative to today's exchanges. We believe we understand the challenges associated with generating on liquidity on our platform.

Among similar distributed applications (DApps), we believe we are unique in this commitment. Many DApps have devised amazing technology, but have failed to gain traction. Throughout our mission, we are devoting a considerable amount of our time, recruitment effort, and budget to making liquidity a prime objective.

We highlight a few of our key strategies for this below.

8.a. Construction of a dedicated liquidity provision spinoff

We aim to spinoff a committed *liquidity provision team* for futures contracts on our platform. This will be an independent entity utilizing capital and resources from EverMarkets parent company. Its aim will be to maximize crossed volumes (i.e. minimize auction imbalances) instead of profits.

Though this company will be staffed with bright minds from technology and machine learning backgrounds, it will operate and trade with the same market data, capabilities, and limitations of any other trader. In other words, it will operate entirely separate from the Exchange and will not be privy to any information that isn't publicly disclosed.

As liquidity provision inherently takes on positions which are less popular, this effort may take some time to get going. While research and production code for this entity will not be made public, monthly profit and volume performance will be displayed when possible.

A dedicated volume-first "market making" strategy like this is common in many large equity agency dark pools. These volume-oriented teams work to backstop many different metrics of execution quality, such as price improvement or fill percentage.

8.b. Heavy stress testing and rules for abnormal conditions

One of the keys to cultivating liquidity is having a system which is reliable during high volume and high volatility periods.

Financial markets are characterized by extreme “bursty-ness”. Though the majority of time is spent in relatively calm waters, the minority of volatile periods is several magnitudes higher in every metric—volume, variance, skew, etc. This is true at every time horizon, whether you are looking at markets on a minute-by-minute basis, or on a day-to-day scale.

Additionally, plotting the returns of any time horizon on a frequency basis (such as on a histogram), will show that markets have very long left-handed tails—also called negative skew. In other words, when markets rise, they tend to rise slowly over time; when they fall, they fall violently and quickly.

What this all means is that our system needs to be able to operate well during tail events. While many individual traders may switch to our platform because of the appeal of lower transaction fees alone, established players will know that fortunes are made or lost during times of extreme market dislocation.

We intend to attack this problem with a multi-pronged approach:

- i. Regular stress tests. We will simulate the order profiles of volatile periods in the past and measure our system throughput and performance during those times.
- ii. Maximum price movements from one auction period to the next. Contracts will have built-in stop conditions similar to that of existing exchanges, which impose maximum limitations on price fluctuations against some reference price.

8.c. Achieving legitimacy

An important part of this endeavor is establishing a legal method of trading futures on a blockchain. As we expound upon in Section 9, our intention is to create a regulated, legal approach for all parties on the platform -- our company, EMX holders, traders, and lenders.

We believe that there are clear exemptions which permit the type of trading we want to do, but nevertheless expect an uphill battle from entrenched parties. We will need considerable legal counsel for markets worldwide, and a large part of our budget is devoted to this.

Regulators are an important part of building public trust and safeguarding markets, and we intend on

building strong relationships with them. We believe that bringing down cost and complexity barriers can be done without sacrificing market stability, and that our proposed platform will not just “do no harm” but will improve and innovate. In fact, judging by recent statements, we believe we see eye-to-eye with regulators like the CFTC in a shared mission of fostering “open, transparent, competitive, and financially sound” markets²³.

8.d. Marketing efforts

Another significant differentiator of our platform is that we are investing a considerable amount of resources into enticing professional traders, institutional investors, and external liquidity providers onto our platform. This endeavor is not one we can solve with developers alone: we will need business development professionals, salespeople, marketers, and lawyers.

While our liquidity provision team will certainly help at the start, for our platform to succeed in the long term, we will need to entice institutional and professional order flow to participate. Some members of our team have had experience starting equity dark pools, and believe that building the platform, in many ways, is the easy part: obtaining reliable flow and keeping it is the lion’s share of the challenge.

Enticing order flow from established traders is still very much a relationships game. Our plan is to hire mid- to senior- level sales talent from established dark pools and exchanges to help us build and retain these relationships.

The cultivation of these relationships is actually made easier by the fact that we plan on launching a dedicated liquidity provision spinoff. Our sales people may work together with this market maker to guarantee certain levels of execution quality. This cooperation will make it easier for our salespeople to entice institutions to trade on our nascent platform.

8.e. External liquidity provider program

We also keep a large percentage of our tokens in reserve for the purpose of fostering our *external liquidity provider program*. This is a program to incentivize external liquidity providers to quote on our platform, and will be done in conjunction with our sales and marketing efforts.

²³ CFTC Mission Statement, <http://www.cftc.gov/About/MissionResponsibilities/index.htm>

The liquidity provider program will loan reserve tokens to select and qualified providers with the requirement that these tokens are used to fulfill late-stage auction imbalances. Our hope is that this program will encourage liquidity providers to trade during the platform's early days while minimizing their risk and initial cash outlay.

8.f. Ability to hedge cryptocurrency risk

One common reservation for many potential traders we've spoken with is that crypto-currencies can be too volatile to hold. Given the price variance of BTC and ETH in recent years, it is very possible that any potential futures trade priced in a crypto-token, particularly one with a longer-term and directional focus, will be dominated by the token's price change rather than anything else.

To address this, we have decided that even though trades will be settled in EMX, they will be initiated and tracked in fiat currencies.

How does this work? Let's say that on March 01 a trader enters into a single buy contract for a bushel of soybean with expiration on March 31 for \$9.50 USD. EMX/USD is trading at 2.00 at the time, meaning that you can exchange 1 EMX for 2 USD. On March 31, the contract's price settles at \$9.60. EMX/USD is now trading at 1.60. Though EMX has fallen in value against the dollar, this is unrelated to the trader's P&L. The difference in soybean price in USD is the only profit that the trader will book, or \$0.10. He will receive the equivalent amount of 0.0625 EMX upon delivery based on current exchange rates.

9. Legality

We are well aware of the legal issues involved in an endeavor of this nature. Our team is working diligently with experienced legal professionals to ensure that our platform is within complete compliance of all applicable regulatory and licensing requirements where we operate. We have no desire to conduct or condone unlawful activities, nor subject token purchasers or holders to prosecution.

Despite building our platform on Ethereum, a decentralized network, it is our intention to create an ecosystem which facilitates trading in a fair, orderly, and controlled way. Our primary motivation is a reduction in cost and complexity for the benefit of all traders—without jeopardizing market integrity.

10. Disclaimers

This document is intended to introduce EverMarkets to the world, and is for informational purposes only. This document does not constitute an offer or a solicitation to sell shares or securities in any company. It is not a prospectus for investment.

This document has not been written towards the laws or regulations of any particular jurisdiction. While this document -- specifically Section 9-- may have references to or interpretations of laws in the United States, these interpretations are not legal advice and should not be used to make any legal or financial decisions. The general public should conduct their own “due diligence” regarding any statements or conclusions made, explicitly or implied.

This document does not constitute a promise of any kind. This project is constantly evolving and any information in this document is subject to change. Our project is an ambitious one, and though we believe that we are uniquely suited for the challenge, we cannot offer an assurance or a guaranty of success in any fashion.

If any statements in this document are forward looking, they constitute our best attempts at preparing for the future, but may not be accurate. Actual outcomes may deviate from our projections due to any number of risks.

10.a. Value of EMX token

The EverMarkets token is a tool to be used in trading on or administering the EverMarkets platform. The usage of these tokens in these roles carry risk. The EverMarkets token should not be expected to gain value or have value outside of these two roles. A token is only used at the behest of the token owner, and any time it is used, there is a possibility that the token will lose value or be lost.

The EverMarkets token is not an investment in any way, shape, or form. Possessing the token does not grant the owner a share of any profits outside of any made through his own endeavors in the stated roles above. Passively holding the token has no expectation of profit or value.

The EverMarkets token is not a security. Possessing the token does not grant the owner any ownership, right, or interest in any company, enterprise, or undertaking.

If exchanged for or compared against any other asset, the value of the EverMarkets token may be volatile. EverMarkets makes no assurances regarding the value of an EMX token, and any fluctuations in its value are outside of our control.