Project Summary Report

Cryptocurrency Exchanges: Structure and Risks

Said Nawaz ACCA

Capstone project
M.Sc Finance
Central European University
June 2018

Sponsored by: BrokerChooser.com
Supervised by: Peter Szilagyi

Introduction

This report summarizes findings from my capstone project Cryptocurrency Exchanges: Structure and Risks conducted and completed with fintech company Broker Chooser. The project was aimed to analyze and understand the underlying operational and regulatory structure of Cryptocurrency exchanges and what are the risks involved in trading on these exchanges. We have analyzed and drawn simplified models of stock exchange, FX exchange and Equity Brokers. Then we draw a simplified and representative model of a centralized cryptocurrency exchange by analyzing the structure of five largest cryptocurrency exchanges i.e. Binance, OKEx, Houbi, Bitfinix, GDAX and comparing it to above conventional exchanges. Thus, we were able not only to understand the current structure of centralized cryptocurrency exchanges but also to analyze the risks posed by these specific structures as compared to the highly developed and sophisticated structures of stock exchanges, FX exchanges and Broker-Dealers.

Conventional Exchanges and ATSs

How centralized cryptocurrency exchanges are organized? What is there underlying technical and legal structure? A natural approach is to understand these innovative infant exchanges by comparing them to highly developed and sophisticated conventional financial structures like Stock Exchanges, FX Exchanges Broker-Dealers and their related Alternative Trading Systems. Thus, we analyzed the structures and related ecosystems of stock exchanges, FX exchanges and Brokerage firms along with their internal ATSs. Furthermore, we studied the inbuilt investor protection mechanisms of these structures.

Stock Exchange

This is a centuries old financial structure built around its purposes and functions of economic developments, financial intermediation, information dissipation, provision of liquidity and investor/trader protection. In (figure:1) the grey box is the core system of a conventional stock exchanges for example NASDAQ. This is composed of sophisticated Order Matching Engine and a highly liquid Oder Book. Besides, it has a highly efficient Clearing House. Stock exchanges like NASDAQ, are operating through its approved and registered members i.e. Dealers or Market Makers and Brokers. Custodians/Security Servicing and Security Depositories are playing their crucial role in the process of the security settlement. The process of security trading (let’s say 100 shares of Apple) starts with an account opening by an individual trader with an exchange registered

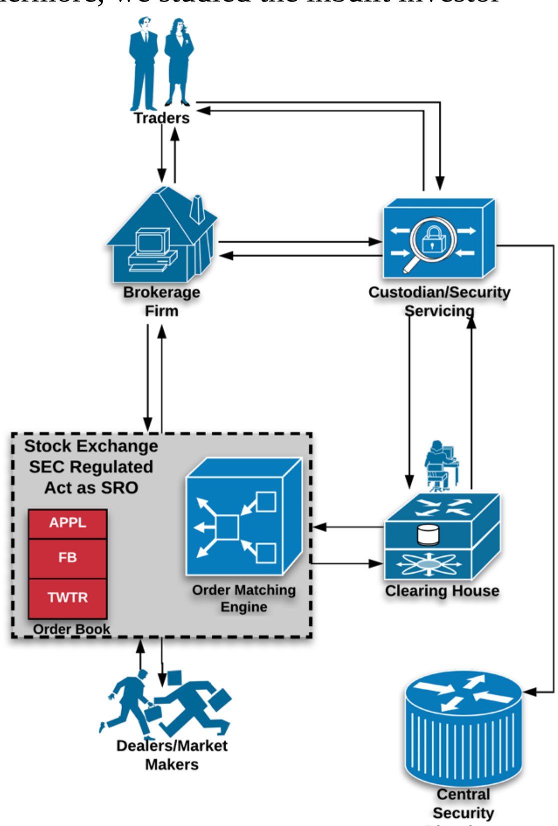

Figure: 1

brokerage firm. Afterwards, the trader deposits required funds in the brokerage account and instruct the broker to buy 100 Apple shares on his/her behalf. The brokerage role is to execute trader's order on the best possible price. The broker will forward the order to stock exchange where its matching engine will match the BUY order with the best SELL order. After matching the orders, stock exchange will update its order book according the trade price. Now stock exchange's clearing house will "step-in" the process and practically design the trade as it purchased 100 Apple shares from the selling party and sold it to the buying party. Thus, it plays its crucial role of mitigating any counterparty risks to traders from each other. Afterwards, the clearing house will settle the trade with brokerage firm by netting, matching, or transfer of cash and stock. Here comes the Custodian whose role is to keep safe and handy my shares and funds. The brokerage firm will arrange with clearing house to send my stock to my custodian firm and receive the funds form it. The custodian firm will update its books and keep the stock in my account safely. The custodian will report the transfer to the Central Security Depository to update their records according to the new ownership of Apple stocks. Through CSD, the registrar will update its records and thus I am Apple's new shareholder.

While trading on stock exchanges, trader/investors are taking market risks and they should not be exposed to other risks like counterparty, fraud, theft price manipulation and front-running risks. This structure has inbuilt mechanisms to mitigate all those risks. Through approval of market members, clearing house, custodian and security servicing and CSD, the structure makes sure to mitigate all irrelevant risks to trader/investor.

FX Exchange

FX exchange is actually an inter-bank exchange where dealers trade pairs of foreign currency. Until recently, when technology opened the market to retail traders, FX market was a closed and restricted trading venue. After the democratization of the market through technology and innovation, retail traders got access to the markets through FX Aggregators or FX brokerage firms. In (figure:2) the grey box represents the inter-dealer market where dealers trade with each other through either prime brokers or directly through their MBTs and SBTs.

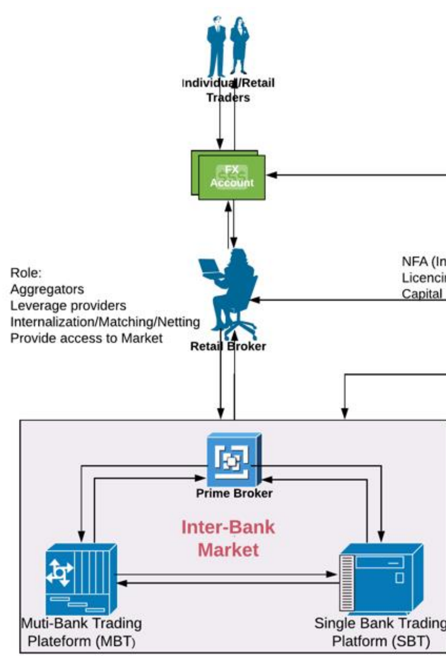

Figure: 2

A FX Aggregator or FX Brokerage firm aggregates orders from retail traders and then rout these orders to inter-dealer market. Recently, the market structure saw extreme internalizations where all the market members from big dealer banks to brokerage firms established their internal Alternative Trading Systems. When they receive an order from their customers, first they match and net to orders in their internal ATS. The unmatched orders are routed to inter-dealer market by utilizing their liquidity.

Recently, the market was a focus of comprehensive regulations. The retail brokers are highly regulated with requirements like licensing, reporting, capital reserve and cyber security. Thus, the risks like counterparty risks, theft, and price manipulation are mitigated by effective regulatory framework and traditionally restricted nature of the market.

Equity Brokerage Firm

(Figure: 3) shows what a brokerage account is and how an investor/trader is protected through the technical and regulatory structure of the trading system. The process of investing/trading through a modern equity brokerage firm like Interactive Brokers, starts with opening a brokerage account and deposit the required fund. These brokerage firms are equipped with modern sophisticated ATSs and Routing Systems. After placing a Buy/ Sell order with your broker, the broker's routing system first search its internal ATS for matching order. If the order can't be matched by internal ATS, the routing system will search all the connected exchanges and ATVs to find the best available price and rout your order there. Thus, as per their agency responsibility, they find the best available price and execute your order. As a broker, they are not allowed to trade against you or front-run your orders.

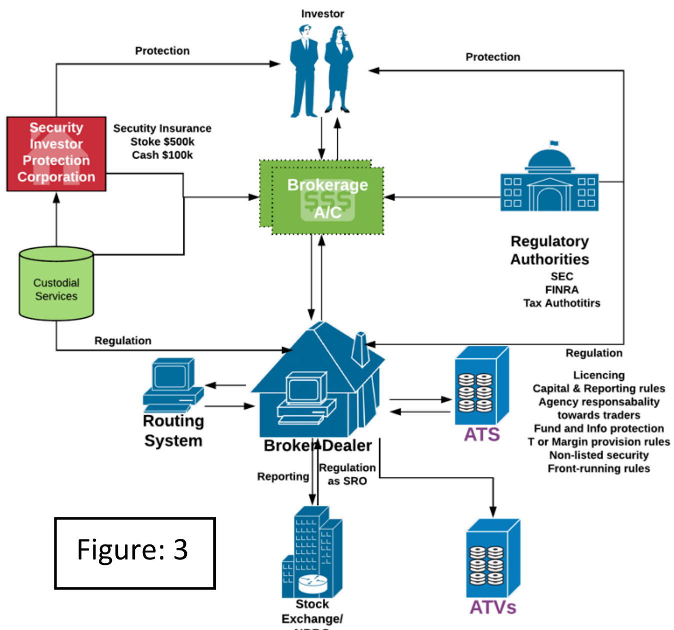

Figure: 3

A broker's main role is to execute buy/sell order on behalf of its customer at the best price available. When you deposit your funds in brokerage account, you are putting trust in and exposed to counterparty risk from the brokerage firm. In order to mitigate this risk, the brokerage firm uses a custodian to secure your equity and funds present at your brokerage account. Besides, you are protected by insurance against the counterparty risk from brokerage firm for example SIPC in US. The brokerage firm is also bound by a strict regulatory framework. It has to hold a license in order to operate. This means the firm has to keep appropriate reserves, report and audit its financial affairs, follow the rules on customer's fund and information protection, margin provision, trading in non-listed securities and front-running. Above this, the brokerage firm is a member of and regulated by a stock exchange. Thus, the technical and regulatory structure of an equity brokerage firm makes sure to protect investor/trader against irrelevant risks.

Cryptocurrency Exchange

After analyzing the operational and regulatory structures of conventional exchanges, let's have a look at the structure of a centralized cryptocurrency exchange and compare to conventional exchanges. (Figure:4) shows that a centralized cryptocurrency exchange is essentially a trading platform backed by an Order Matching System and account management function through legacy banks. It is also a combination of digital wallets. In order to be able to trade on the exchange, you have to deposit your digital assets and fiat funds directly with your exchange and thus putting absolute trust on the structure. You can observe an orderbook consist of all open orders on the exchange. Having deposited your funds and cryptos, you can trade on the exchange where the matching engine will match your order and the order book and your account will be updated. Notice from the figure, that essential components of decentralized broker, custodian, clearing house, market makers are messing as compared to conventional exchanges. Based on our study of five biggest exchanges I.e. Binance, OKEx, Houbi, Bitfinix and GDAX, these functions are somehow internalized and carry out by these exchanges internally. By comparing those to above analyzed conventional exchanges, it is evident that these cryptocurrency exchanges, at least at this early stage of their lifecycle, resemble an unregulated and centralized brokerage firm with an internal ATS. Any FX or equity brokerage firm equipped with an Order Matching System can easily be converted into a crypto trading platform. This is evident by the fact that many cryptocurrency exchanges came into being through a brokerage firm conversion. Few examples are LMAX, eToro, XM, FXTN, RoboForex, Capital.com, NordFX, IronFX.

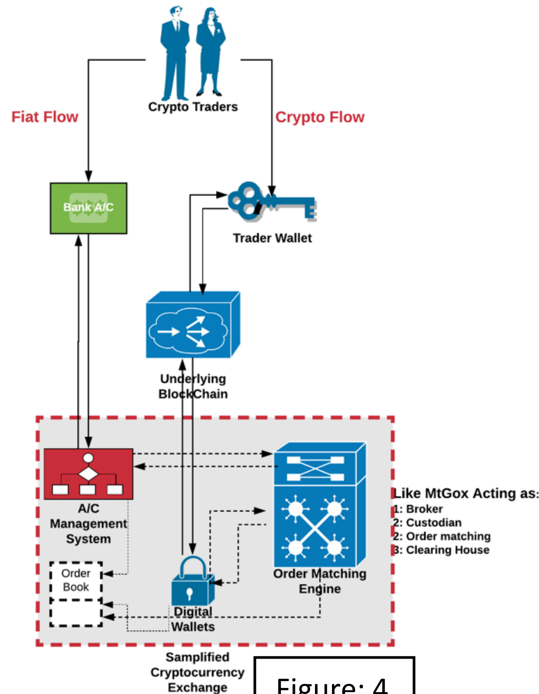

Figure: 4

Risks

The unregulated centralized structure of cryptocurrency exchanges generating a variety of risks and deficiencies. Although, these structures are at their infancy and evolving but in order to become mature, safe and liquid trading venues, they are in dire need of robust regulatory, technical and risk management mechanisms. Below are the most significant risks faced by traders dealing with cryptocurrency exchanges.

Lack of regulation

Being in their infancy, regulators around the world are struggling with understanding the underlying structure of these exchanges. Regulators are facing the following questions in order to be able to develop an effective legal framework. Should they be regarded as marketplaces like equity, FX and commodity exchanges and ATSs? What is the exact legal nature of the underlying cryptocurrencies? Are they securities, currencies or commodities? This lack of regulations poses investors to severe risk. In case of an exchange goes bust, a trader cannot have the support of regulatory bodies like SEC, FINRA, SIPC etc. There are no appropriate custodial services. There are no specific legal requirements regarding reporting, audit, cyber security, fair trading, insider trading, price manipulation etc.

Centralized Structure

These exchanges operate off-blockchain and the platform is totally based of exchange's servers. Besides, by depositing their funds and digital assets, traders are putting absolute trust into an unregulated enterprise operating in a high-risk zone. There is no middleman involved. No broker, no clearing house, no custodian, no insurance and no regulatory body. This particular situation results into significant counterparty, security and fraud risks.

Security

As we mentioned cryptocurrency exchanges operates off-blockchain. They store customer's digital assets on their servers. This behavior and structure make them a lucrative target for hackers. We have dozens of examples of high profile hacks happened in the last five years. From Mt. Gox in 2014 to the recent hack of Bithumb, traders lost millions of dollars' worth of cryptos with no hope of recovery.

Other risks

Price manipulation on these centralized cryptocurrency exchanges is a common allegation in the industry. Price manipulation by "Bitcoin Whales" through FUD, and techniques like spoofing, wash-trading and front-running are common place. Sylvain Ribes's investigations of four largest cryptocurrency exchanges revealed that volume on even largest exchanges are manipulated. Recently, Coinbase was in hot water when a criminal case was filed accusing it of tapping off some investors before the launch BCH on GDAX. Besides, cryptocurrency exchanges are still heavily dependent on legacy financial system. Traders need to deposit and withdraw funds through bank's wire and credit card payment systems. Many traders faced significant problems when major banks ban the use of their wire and credit card services from trading cryptocurrencies. Cryptocurrency exchanges are also queuing up at front of insurance companies to provide policies on trader accounts. Insurance companies were reluctant to offer policies to this new, unregulated and high-risk enterprises. Another source of risk is the weak information dissipation role of cryptocurrency exchanges. On a single minute, huge price discrepancies can be observed across different exchanges.

Conclusion

Centralized Cryptocurrency Exchanges are essentially structured as brokerage firms with an ATS. They are extremely centralized and necessary components like brokerage, custodial and clearing services are internalized. Their centralized nature, lack of regulation and the fact that they operate off-blockchain pose traders to significant risks. Counter party risk, lack of regulations, security, price manipulation, insider trading and lack of transparency are major risks faced by traders on these trading venues.

Blank Page

Blank Page

Blank Page