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Exploring Institutional Crypto Trading: The Rise of OTC Desks and the Future of Digital Asset Markets

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Executive Summary

In the rapidly evolving digital asset market, Over-the-Counter (OTC) desks and brokers have risen to prominence, addressing critical challenges faced by Centralised Exchanges (CEXes) associated with custody, clearing, and settlement processes. If CEXes have typically grown by centralising services and related risks, the emergence of OTC Desks and brokers, on the other hand, shaped the market toward a model based on the coexistence of specialised market participants (e.g. OTC desks, custodians, clearing houses, exchanges) similar to the traditional model that institutional investors are confident with.

This report examines the role and functionalities of OTC desks in comparison to CEXes and Decentralised Exchanges (DEXes). While CEXes are user-friendly and accessible, OTC desks cater to institutional clients seeking more advanced and customised solutions. Meanwhile, DEXes prioritise user control over assets but may pose different challenges related to price discovery and cybersecurity risks. Post-trade operations in OTC desks feature institutional custodians, ensuring secure asset storage and reducing counterparty risks, while also introducing tri-party agreements to mitigate counterparty risk. Furthermore, OTC desks offer a fast settlement availability, accommodating various client needs and capital management models. In contrast, CEXes often expose investors to considerable counterparty risks due to the commingling of funds and pre-funding needs.

In summary, OTC desks may play an indispensable role in aligning crypto-asset trading practices with institutional standards, particularly in the areas of price and capital efficiency, settlement and post-trade operations, while influencing the future trajectory of the Decentralised Finance (DeFi) sector.

Introduction

2022 was a **volatile year** for the digital asset industry. After reaching record-high prices in late November 2021, with crypto asset **market capitalization hitting $3 trillion**, the sector faced **significant downturns and bankruptcies**, leading to **a loss of confidence** among the general public in the crypto industry. The **collapse** of the **Terra-Luna ecosystem** in May 2022 brought attention to the need for **foresight on stablecoin arrangement and design** to ensure their reliability as a form of payment and settlement. Additionally, the infamous **bankruptcies** of the **FTX exchange** and crypto lenders like **BlockFi**, **Celsius Network**, and **Voyager Digital** emphasised the importance of investor **protection measures and overall regulation of centralised crypto-native entities**.

While these events pose a threat to investor confidence in the crypto-asset space, the broader realm of digital assets is witnessing a **period of growth** encountered by the increase in the significance of products and the emergence of new projects. **It is worth mentioning that the aforementioned events were not caused by the functioning of the blockchain technology itself, but instead from mismanagement and grey practices of centralised entities with limited oversight**.

2023 has been marked by an increasing interest by **financial institutions** on digital assets initiatives. Those have so far included the announcement of **digital asset custody solutions** by traditional financial institutions[1], **investment products**[2], **institutional exchanges**[3], **DLT based payment solutions** and **tokenized solutions** (Société Générale launched an Ethereum based euro stablecoin, JPMorgan launched the euro version of the JPM Coin, Swiss private bank, Cité Gestion, tokenized its own shares and Bank of China issued on Ethereum a tokenized security).

At the same time, regulatory bodies are deepening their effort in **regulating the market**. The **US market** experienced **significant regulatory scrutiny** and enforcement actions carried out by the Securities and Exchange Commission (SEC) in recent months which highlights the increasing focus of regulatory agencies in shaping the market of digital asset trading while **Hong Kong** and **Asia** are adopting a **friendly approach** to the crypto-asset market that could **facilitate further capital inflows**[4]. In January 2023, the SEC charged crypto lender Genesis and exchange Gemini with selling unregistered securities; in February, they ordered Kraken to halt its U.S.-based crypto staking business; in March, a Wells notice to Coinbase and to stablecoin issuer Paxos was issued while in June the SEC sued Coinbase for operating unregistered exchanges, broker-dealers, and clearing agencies; Binance was also sued for similar charges and the misrepresentation of trading controls and oversight and the offering unregistered sale of securities.

On a different note, the **European Union** in 2023 passed two possibly game changing regulations that aimed to foster a **positive environment** to attract players by defining the playing rules in the space. In June the EU published the Markets in **Crypto-Assets Regulation (MiCA)** the first cross-jurisdictional regulatory and supervisory framework for crypto-assets and from March 2023 the DLT Pilot Regime became applicable allowing market participants to experiment the benefit of market infrastructure based on Distributed Ledger Technologies (DLT). The **MiCA** regulation will become applicable in December 2024 and will harmonise requirements for **European Crypto Assets Service Providers (CASPs)**. The effect is expected to foster adoption and regulatory certainty over the industry which could develop further thanks to a **common and defined regulatory framework**.

1 Official announcements of digital asset developments by BNY Mellon, Crédit Agricole, Citi, Société Générale , Deutsche Bank. August 2023.
2 Official announcements of spot Bitcoin ETF applications by Fidelity, WisdomTree, VanEck, Invesco/Galaxy, ARK. August 2023.
3 Official announcement of EDX Markets baked by Citadel Securities, Fidelity and Schwab backed EDX Markets. August 2023.
4 PwC Global Crypto Regulation Report 2023.

Exchanges: The Building Blocks Of Crypto Capital Markets

Within the current crypto capital market structure **Centralised Exchanges (CEXes)** are playing a **central role**. Centralised Exchanges were created to serve as **digital marketplaces** where every interested party could buy and sell crypto-assets and they emerged as a response to the need for an efficient platform to facilitate the exchange of increasingly popular crypto-assets like Bitcoin.

These Exchanges are recognised as centralised because all transactions and operations are facilitated and **controlled by a central entity** which, typically, acts as an intermediary, managing the order matching and trade execution while custodying the users' funds.

The CEX model implies that users create accounts on the platform and deposit their funds into the CEX's wallets. They can then place buy or sell orders for different cryptocurrencies. The exchange matches the orders, executes the trades, and updates the users' account balances accordingly.

The crucial **differences with traditional finance** are centred around **market segmentation** and **role separation**. In traditional finance, custody, clearing and issuance, for example, are operations controlled by separate and independent companies from the one that rules the order books and matches orders; yet, in the CEXes' setting, those functions are usually administered by the same company or related ones, resulting in high counterparty risk towards the CEXes.

Centralised Exchanges: Brief History & Services Offered

Following the broadcast of the Bitcoin Genesis Block in January 2009, the primary method for acquiring Bitcoin, aside from mining, involved engaging in peer-to-peer (P2P) trades on public internet forums or chats, a procedure which required a significant level of trust in the counterparty's commitment to honour the transaction.

Approximately a year later, in March 2010, bitcoinmarket.com (now defunct) was launched by an individual going under the pseudonym of "*dwdollar*" on the Bitcointalk forum[5]. It was the **first crypto exchange**, envisioning the creation of a genuine marketplace where individuals could engage in the buying and selling of bitcoins directly among themselves. The marketplace used various payment systems, including the widely-used PayPal which decided in 2011 to dismiss its support for the Bitcoin Market due to instances of fraudulent activities.

A key role in the development of modern exchanges was played by **Mt Gox**, one of the earliest and most prominent crypto-asset exchanges, launched in 2010 by Jed McCaleb. Initially, it was created as a platform for trading cards but, in 2011, it transitioned into a Bitcoin exchange.

Despite facing numerous issues and controversies throughout its existence, at its peak, Mt. Gox handled over 70% of bitcoin trading volumes worldwide.

5 Source: Bit2me Academy - History of Bitcoin exchanges and trading (2016)

In June 2011, Mt. Gox suffered a security breach that led to the theft of a substantial number of bitcoins from its users' accounts highlighting the crucial need for highly secure infrastructure to safely custody customers' funds. During the incident, 744.408 bitcoin were stolen from the exchange and an additional 100.000 bitcoin went missing — a total amounting to around $460 million at the time[6]. The Exchange recovered 200.000 bitcoin, but was forced to file for bankruptcy protection and, subsequently, liquidation.

Although Mt. Gox case is the most well-known and represents the first significant incident; numerous other instances of theft and security breach have occurred in the crypto space.

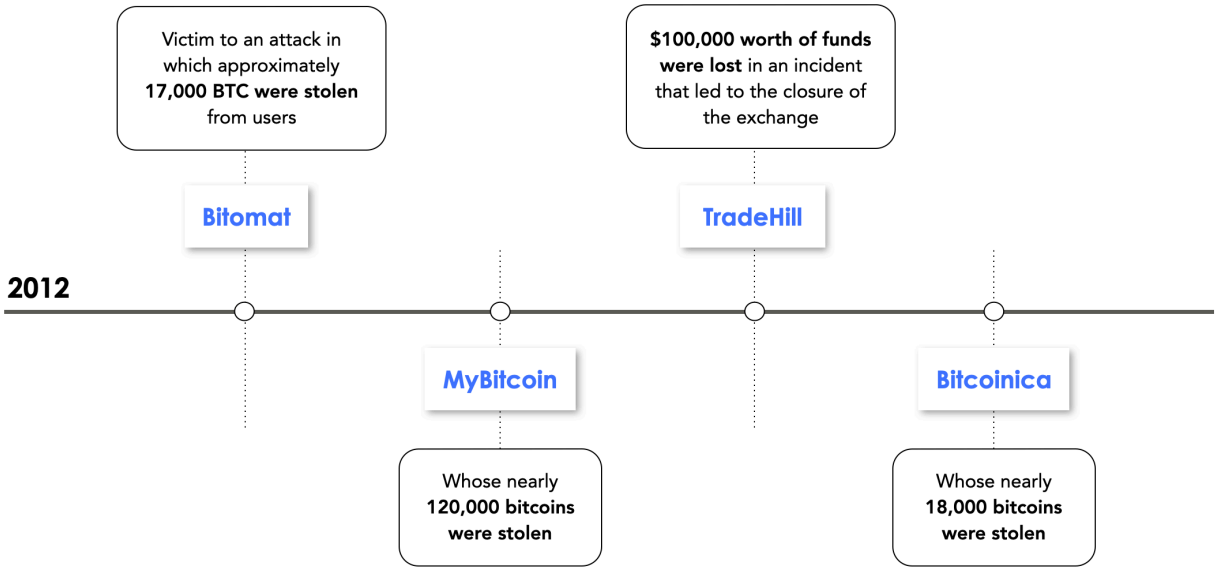


Fig. 1: Main exchanges hacked from 2012 to 2014

From 2014 onward and during the crypto-asset bull market of 2017-2018, many exchanges have sprung up around the world and they still rule today crypto markets, by volume and tokens held.

During the early stages of the digital asset industry, exchanges exhibited **limited initiative** in properly registering their businesses and adhering to **legal frameworks** such as **Know Your Customer (KYC)**, **Anti-Money Laundering (AML)** and **Counter-Terrorism Financing (CFT)** regulations; fostering the narrative that described Bitcoin as a medium for illicit activities and saw the crypto community with concerns and scepticism. However, the **landscape has evolved** and exchanges have demonstrated an **increasing level of cooperation with regulatory authorities**.

With the increasing interest in the world of digital assets, exchanges have expanded their range of services offered. In addition to providing a platform to easily buy and sell cryptocurrencies, several crypto exchanges are now offering **additional investment features**, such as margin trading and limit orders, but also yield earning services such as staking and borrowing/lending.

6 Journal of Law & Cyber Warfare - "A too convenient transaction: Bitcoin and its further regulation" (2020)

How Exchange Works: Matching, Custody And Settlement

Matching and Execution

The **core mechanism** underlying crypto-asset centralised exchanges is the usage of a **matching engine** integrated with a **live order book**. This order book constitutes a dynamic record of buy and sell orders placed by users, which directly influence the prevailing exchange rate of a particular crypto-asset. The interplay between supply and demand on the order book determines the price at which transactions will occur.

Due to the varying trading volumes and user bases across different exchanges, each one calculates crypto-assets prices based on its own market activity. Consequently, slight disparities in crypto-assets prices often emerge among different exchanges. Exchanges with larger user bases and higher trading volumes typically offer more market-relevant prices, reflecting the supply and demand dynamics within their specific ecosystems. Having a market with a large number of trading venues, each with its own pricing dynamics and size in terms of volume and clients, generates the so-called **fragmented liquidity**, as there are now more than 220 exchanges[7] each with its own order book and liquidity depth .

To understand the matching and execution process, it is important to introduce the concept of the **Central Limit Order Book (CLOB)**, a conventional order book that is controlled and operated by centralised exchanges. In this arrangement, all orders are gathered, matched, and executed in one central location under the supervision of the centralised entity. As a consequence, the order book is visible and available to all participants, ensuring transparency in the trading process.

So, based on this mechanism, there are two main type of orders that clients can place:

- **Maker orders:** enable users to set a specific price for their buy or sell orders and request the exchange to execute the trade only when the market meets or exceeds the designated price. However, a drawback of utilising maker orders is the absence of a guarantee for prompt trade execution.

- **Taker orders:** those orders are frequently utilised by traders who seek immediate trade execution. When placing a taker order, the trader requests to promptly buy or sell an asset, at the current market price, without specifying any price conditions.

Maker orders play a crucial role in the order book by providing liquidity at different price levels, starting from the best bid and ask prices. When a maker order is placed, it becomes a part of the order book, positioning liquidity at a specific price level.

Taker orders, on the other hand, differ from limit orders in that they consume liquidity from the order book. When a trader places a taker order, he is seeking immediate execution at the best available bid or ask price in the market, without specifying a particular price level.

7 Coinmarketcap - "List of exchanges" (2023)

The main steps of the order **execution process** on a CEX are expressed below:

1. A trader, who already has an account on the exchange and has performed all the KYC/AML process, chooses to place an order to buy or sell a specific crypto-asset in the platform.

2.a Taker order case: the trader simply chooses the amount of assets he intends to trade and the exchange's matching engine will match the request with the corresponding highest (in the case of a sale) or lowest (in the case of a purchase) price in its order book.

2.b Maker order case: the trader will have to set the quantity and the selling price, and the order will then be entered into the relative level of the order book, at which it will be resting until a corresponding market order is executed at that price level.

3. CEX executes the trade by updating, within its off-chain record keeping, the account balance of buyers and sellers. The speed and efficiency of order execution on a CEX can depend on factors such as orders volume and the exchange's technology infrastructure.

4. The trader will see the updated balance on his account without any on-chain transaction regarding the traded assets.

Overall, the process appears to be quite simple and straightforward, as it does not include any on-chain transactions for the actual movement of digital assets.

Custody & Settlement

Once the order has been executed, the customer can decide for himself whether to keep his assets in custody on the exchange wallet or decide to transfer them (on-chain settlement) to an external wallet (e.g. personal cold wallet).

Safekeeping of assets in the crypto-assets ecosystem is crucial, as any action on the blockchain is irreversible.

Regarding security measures, centralised exchanges employ various strategies to safeguard users' assets and personal data. These measures typically include the implementation of a password system, multi-factor authentication (MFA), withdrawal whitelisting and restrictions, alongside periodic security audits and robust processes involving the key ceremonies (e.g. private key generation).

However, it is important to note that CEXes leverage their own **custodial wallets**, which are managed in **omnibus** mode, meaning the assets of the clients are held within the same wallets, commingled, and recorded in the centralised database of the exchange.

This implies that when depositing funds, users are placing them into wallets controlled by the exchange. While users are granted login credentials to access their exchange account, they do not actually possess private keys controlling any wallets and they can never be certain the exchange is holding that precise asset, on the other hand the exchange has a liability towards the clients denominated in that precise asset.

This lack of ownership introduces a **potential risk**: the counterparty risk of the centralised entity which controls all the clients' funds.

For this reason, several clients decide to move assets they want to hold long-term into personal wallets so that they can have direct control over them (i.e. Not your keys, not your coins). On-chain settlement to move assets comes with a cost as exchanges ask withdrawal fees in addition to the blockchain network fee.

Accounting and risk management

While exchanges offer a convenient way to enter the world of digital assets, they bring with them several risks that need to be considered. The main exchange risks that should be managed by crypto-asset investors include:

- **Liquidity risk:** it is an inherent risk in trading, and it can impact the profitability and effectiveness of trades, especially for large orders. Investors should be aware of this risk and consider implementing risk management strategies, such as using limit orders, setting price ranges, or splitting large orders into smaller ones to minimise the impact of price slippage. The main manifestation of the liquidity risk in crypto-assets market have been the infamous flash crashes, which resulted in severe losses for traders and court trials for exchanges.

- **Counterparty Risks:** When using a CEX, users rely on the exchange as an intermediary for their transactions. This introduces counterparty risks, including the potential insolvency or default of the exchange, which could result in the loss of funds or inability to withdraw assets from the platform.

- **Custodial Risk:** CEXes typically require users to deposit their funds into the exchange's wallets, entrusting the exchange with the custody of their assets. This introduces the risk of potential mismanagement, theft, or loss of funds due to internal errors or malicious activities both from internal and external actors.

- **Technological risk:** Centralised exchanges can be vulnerable to security breaches, hacking attempts, and cyberattacks. If security measures are inadequate or if user accounts are compromised, that can result in the loss of funds or user personal information. Even the technology design could result in severe risks for clients.

The Evolution of Decentralised Finance (DeFi)

Decentralised Finance, often referred to as DeFi, has emerged as a **transformative force** in the world of finance. It is both a large-scale vision for a new way of conducting financial transactions—**free from intermediaries**, **central authorities**, and done exclusively in a **peer-to-peer manner**—as well as an umbrella term for scores of **non-custodial financial products and automated services** known as protocols or **decentralised applications (dApps)**.

Unlike traditional finance, which relies heavily on centralised institutions such as banks and brokers, DeFi applications operate on public blockchains, ensuring **transparency, immutability, and trustless interactions**.

One of the key components of DeFi is the use of **smart contracts**. These **self-executing contracts** are coded with **predefined rules and conditions**, allowing for the automation of various financial operations. Smart contracts eliminate the need for intermediaries and enable the development of dApps that can perform a wide range of functions, such as lending, borrowing, trading, asset management, and more.

The concept of DeFi has its roots in the early experiments and projects that emerged in the blockchain space, in particular on top of the **Ethereum blockchain**. It was the introduction of Ethereum overall and the development of smart contracts that laid the foundation for the evolution of DeFi as we know it today. In the years following Ethereum's launch, **decentralised exchanges** (DEXs), such as **Uniswap**, started to gain traction, allowing for peer-to-peer trading of digital assets without intermediaries, marking the first major milestone in the history of DeFi.

As the ecosystem matured, **lending and borrowing protocols** were introduced, providing individuals with access to financial services that were previously available only through traditional intermediaries. **Maker DAO** for example, is one of the most notable pioneers of DeFi in the crypto space. Launched in 2017, it is a lending protocol that allows users to borrow cryptocurrencies instantaneously, earn interest from lending out crypto tokens, and it also provides its own stablecoin[8]. Another important introduction in the space in 2017, contributing to a surge in popularity of the DeFi ecosystem overall, was the birth of **Initial**

8 Medium.com. "MakerDAO: A Comprehensive Overview." (2021)

Coin Offerings (ICOs). Acting as a textbook example of the goals of DeFi, ICOs allow non-institutional organisations and even individuals to participate in the funding of a new project. Later on, the year of 2020 witnessed the rise of **decentralised stablecoins** and the advent of **yield farming**, which incentivized users to provide liquidity to DeFi protocols in exchange for yield in the form of additional tokens distributed. These developments brought increased attention and mainstream adoption to the DeFi space.

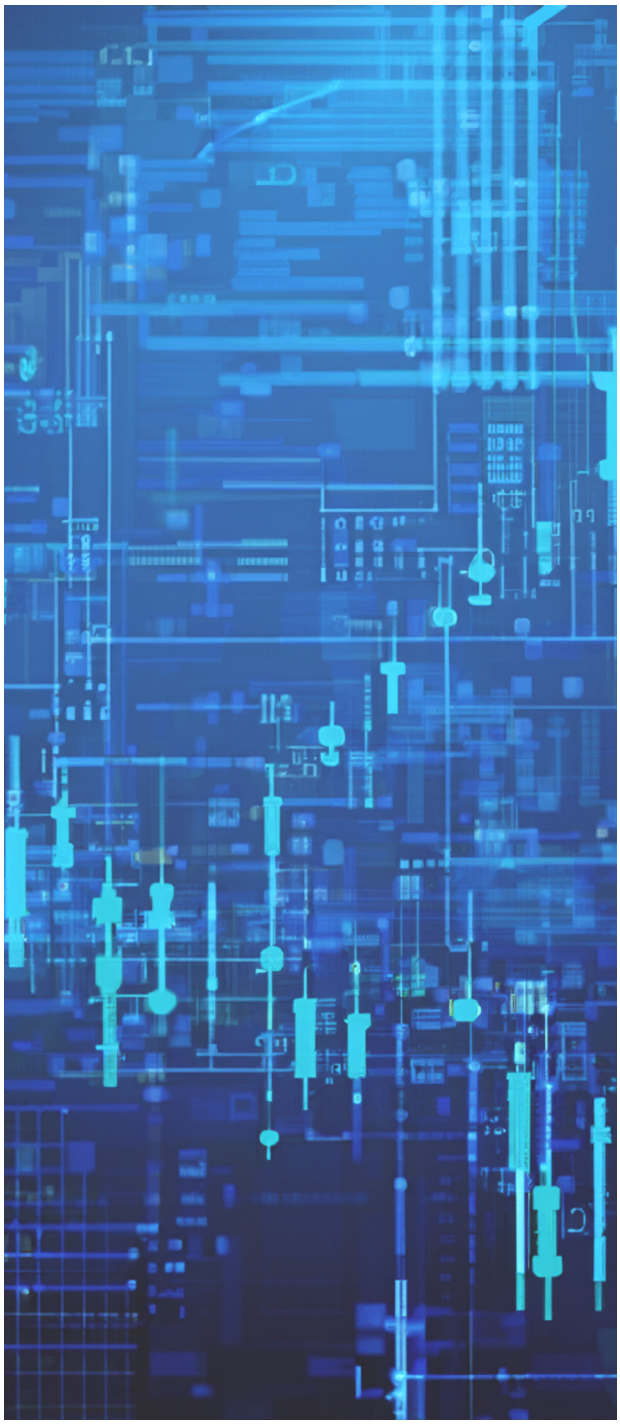
The next logical step to the **DeFi evolution**, in order to foster adoption by the masses, is the participation of traditional financial institutions, such as banks, asset managers, and hedge funds, in the DeFi ecosystem. The real potential of DeFi could be unlocked through **real-world-asset tokenization**, where the digital representation of such assets is tokenized and exchanged on-chain. Such concepts would leverage the technology to streamline transactions in foreign exchange, equities, bonds, and other real-world assets, creating **significant cost savings**, **mitigating risks**, and **fostering new business opportunities** for issuers and investors, as well as for financial institutions that can adapt their technology and business models.

The involvement of traditional financial players also paves the way for the integration of DeFi into the existing financial infrastructure, potentially **bridging the gap** between decentralised and centralised finance. In the current traditional financial infrastructure digital assets and other claims are stored in siloed, proprietary databases. By leveraging blockchain technology to tokenize assets, traditional separation of messaging, reconciliation and settlement is removed.

However, many DeFi protocols today are not designed for use in mainstream finance. **Regulatory** and **compliance considerations**, **scalability issues**, and the need for **robust security measures** remain important factors to address in order to ensure the long-term success and sustainability of DeFi in the institutional space.

This brings rise to the concept of **Institutional DeFi**, which, according to a joint report by the Oliver Wyman Forum, DBS, Onyx by J.P. Morgan, and SBI Digital Asset Holdings, is *a system that combines the power and efficiency of DeFi protocols with a level of safeguards to meet regulatory compliance and customer-safety requirements*[9].

Based on the scope of this report, we will centre the research focus around the DeFi developments specifically covering the trading & borrowing/lending aspects, that shall act as pillars for institutional DeFi to be built upon.



9 JP Morgan - " Institutional DeFi - The next Generation of Finance?" (2022)

Principal Use-Case Developments of DeFi

In the realm of DeFi, several pivotal concepts underpin the transformative nature of this financial ecosystem. **Trustless settlement** stands as one such cornerstone, rooted in the utilisation of smart contracts and blockchain technology. Trustless settlement means that participants in DeFi transactions do not need to place their trust in centralised intermediaries. Instead, they rely on smart contracts, which are self-executing and self-enforcing agreements, with terms written directly in code. This technology automates and secures transactions, fostering an environment of transparency and accountability on the blockchain.

A closely related concept to trustless settlement is the **absence of counterparty risk** in DeFi. Counterparty risk refers to the possibility of one party in a transaction failing to meet their obligations, potentially resulting in financial losses. In DeFi, the use of smart contracts plays a pivotal role in mitigating this risk. These contracts automatically execute and enforce the terms of an agreement.

Further, in addition to counterparty risk mitigation is the concept of **atomic settlement** that arises from trustless settlement, which plays a pivotal role in DeFi by guaranteeing that a series of actions within a smart contract occur as a single, indivisible unit. In essence, it ensures that all components of a transaction either succeed together or fail together. Atomic swaps, a common use case of atomic settlement, allow for trustless exchanges between different cryptocurrencies. This feature eliminates the risk of one party receiving one asset while failing to provide the other. Such transactional integrity and enhanced security provided by atomic settlement bolster the robustness and reliability of DeFi transactions.

In summary, the combination of trustless settlement and no counterparty risk forms the bedrock of DeFi's promise of decentralised, transparent, and secure financial interactions on the blockchain. These concepts empower users to transact without the need for traditional intermediaries while fostering a high level of automation, trust, and accountability.

As a result, several core use cases have emerged, such as trustless trading through Automated Market Makers, and automated borrowing/lending through DeFi protocols.

Trustless Trading through AMMs

Automated Market Makers (AMMs) are a **fundamental** building block of DeFi ecosystems, designed to provide asset pricing directly on-chain and bootstrap liquidity in the market of any given asset, without the need for traditional order book-based systems. AMMs have gained significant popularity due to their **user-friendly and permissionless nature**, allowing **anyone** to participate in trading and liquidity provision on DeFi platforms.

In essence, AMMs are decentralised protocols that enable users to trade crypto-assets and other digital assets directly against each other, **bypassing** the need for a centralised intermediary or an order book. They are designed to provide liquidity and **ensure token price discovery** in a **decentralised** and **automated manner**.

At the core of AMMs are **liquidity pools**, which are pools of tokens provided by users. These pools serve as the counterparties for trades, replacing the traditional order book and market makers quoting along the book's depth. **Liquidity providers (LPs)** - which can be seen as the equivalent of a market maker but in liquidity pools - deposit pairs of tokens into these pools, and in return, they receive liquidity provider tokens (LP tokens) that represent their share of the pool.

Depending on the specific pool in which they are providing liquidity to, they will receive the relative return in the form of the token they are providing and/or also the native token of the AMM to compensate them for their liquidity provision.

Further, the **LP tokens**, being fungible, can also be traded freely in the market or they could be leveraged as collateral in other protocols.

Whereas through this creation, the average retail trader is given the ability to be a passive market maker, they are exposed to **volatility risk** which in the case of liquidity pools results in **impermanent loss**[10].

It is the difference between holding tokens in the liquidity pool and simply holding them in a wallet, and occurs when the price of the tokens in the liquidity pool diverges from their initial value at the time of deposit.

On the other hand, there are the taker traders who interact with AMMs by swapping one token for another directly from the liquidity pool. They send a certain amount of one token to the AMM contract and receive the equivalent amount of the ot her token, based on the current price determined by the **constant function formula**. The AMM automatically adjusts the pool's token quantities after the trade. The **larger the trades** are, the higher the resulting **price slippage** gets, meaning that the executed price deviates more from the market price. This price impact encourages smaller trades and helps maintain stable prices for smaller transactions.

This sensitivity on price impact leads to another essential function of AMMs which is the encouragement of **arbitrage**. If the price of a token on an AMM deviates from the market price on other platforms, arbitrageurs step in to profit from the price difference. This arbitrage activity helps align the AMM's token prices with external markets, **ensuring price convergence**.

Finally, when it comes to explicit transaction costs, depending on the specific liquidity pool and blockchain, they may vary.

Part of the **transaction cost** is the transaction fee known as a **gas fee**, which is a network fee that depends on the underlying blockchain. Then, the **trading fee** is usually broken down into two components: The first one is the percentage fee that is distributed to the developers of the protocol as a reward for the creation and maintenance of the pool; the second is the percentage fee (usually 0.2%-0.3%) that is collected and distributed among the LPs based on their share of the liquidity pool, in order to incentivize users to provide liquidity.

10 Techopedia - "Impermanent Loss." (2023)

Automated Borrowing and Lending Protocols

Decentralised Finance (DeFi) **borrowing/lending protocols** are **innovative platforms** within the broader DeFi ecosystem that enable users to lend their digital assets and borrow cryptocurrencies, all **without the need for traditional intermediaries**. These protocols have gained significant traction due to their **permissionless nature**, **global accessibility**, and potential for users to **earn interest** or **access liquidity**.

In essence, DeFi borrowing and lending protocols aim to create an **open**, **peer-to-peer lending environment** that operates entirely on blockchain technology. Borrowers can obtain loans by providing collateral in the form of cryptocurrencies, which is locked into a smart contract.

Usually, the collateral provided must be worth more than the borrowed amount (**over-collateralized**), in order to safeguard lenders against the volatility of the underlying collateral and inefficiency of the **automated liquidation engine** in times of high market volatility.

During liquidation, a portion of the borrower's collateral is sold to repay the loan and any outstanding interest. Liquidators can earn a reward for facilitating this process, and this may happen via separate protocols to facilitate such participation and incentivization.

Lenders, on the other hand, supply their funds to the platform to earn interest from borrowers' repayments.

The **interest rates** are determined **algorithmically** based on the supply and demand for specific assets within the protocol. These rates can be highly dynamic and may vary over time.

To facilitate this type of trustless and **automated borrowing** and lending markets, smart contracts lie at the heart of these protocols.

They automatically execute lending and borrowing activities based on **predefined terms** and **conditions**. When a borrower requests a loan, a smart contract is created that locks their collateral. As the borrower repays the loan, the smart contract adjusts the collateral's status accordingly.

As a result, there is a wide array of use cases for this new innovation. There is the obvious enablement for lenders to earn **passive income** on their funds in an alternative market from that of traditional savings accounts and money market funds, and borrowers **accessing liquidity** by leveraging their existing crypto holdings as collateral, avoiding the need to sell assets for immediate funds. Further, more sophisticated traders may use borrowed funds to amplify their trading positions, exploit price differences between various platforms by borrowing on one platform and lending on another to capture the interest rate spread, use borrowed funds to hedge against potential losses in their portfolio, and even engage in yield farming, where they borrow and lend assets across multiple platforms to maximise their **yield potential**.

The Risks of DeFi

Although the introduction of DeFi, as outlined in the section above, gives rise to many operational improvements and risk mitigations relative to traditional financial systems, it is vital to acknowledge that it carries its own set of risks, such as:

Technological Risks

One important consideration when it comes to the underlying technology is the **vulnerability of smart contracts**. DeFi applications heavily rely on smart contracts, which may contain coding bugs or vulnerabilities, leading to potential exploitation by malicious actors and resulting in financial losses.

Furthermore, risks may arise from the blockchain network itself. DeFi platforms operate on blockchain networks that may suffer from scalability limitations, congestion, or security breaches, impacting transaction speeds, costs, and overall **system stability**.

Finally, the reliance of DeFi protocols on **oracles** (external data sources) in order to obtain external information may itself pose further risks. If these oracles are compromised or manipulated, or by nature their design is maliciously set up to reward bad incentives, it can lead to inaccurate data and subsequent financial losses.

Financial Risks

When it comes to financial risks, new concepts arise in DeFi that are not directly mirrored from traditional finance. For example, there is the risk of **Miner Extractable Value (MEV)**. The occurrence of (MEV), where miners or validators can manipulate transactions by ordering them to their advantage, can potentially lead to front-running, sandwich attacks, or other forms of exploitative behaviour[11]. MEV poses a challenge to the fairness, transparency, and security of DeFi protocols, requiring the development of mitigation strategies and improved transaction sequencing mechanisms.

Additionally, liquidity providers in decentralised exchanges face the **risk of impermanent loss**, a situation where the value of their deposited assets diverges from the market value, resulting in reduced returns compared to traditional investments.

Furthermore, whereas DeFi eliminates intermediaries, it also in turn removes the **safety net** provided by centralised institutions in traditional finance. Users are exposed to the risk of interacting with unknown or unreliable counterparties, potentially leading to fraud, theft, or defaults, as there is no specialised entity to screen such counterparties and act on behalf of the end user (such as a bank performing credit screening for example).

Other inefficiencies due to the independence of the smart contracts may also arise. For example, there is the inefficiency of liquidation engines in DeFi that can lead to **suboptimal liquidation** processes during times of market volatility. Inadequate or delayed liquidations can result in increased losses for borrowers, reduced capital efficiency, and potential systemic risks within the DeFi ecosystem.

11 101 Blockchains - "Sandwich Attacks in DeFi" (2023)

Finally, a core financial risk of the DeFi space and of the broader underlying asset class is that of **market volatility**. DeFi products are often exposed to volatile cryptocurrencies and token markets. Sudden price fluctuations can result in significant losses for investors, especially in leveraged or margin trading scenarios. There is also the risk of **market manipulation** as well as high slippage to be faced, due to the relatively low liquidity as a result of a still nascent market.

Regulatory Risks

The regulatory landscape surrounding DeFi is evolving and varies across jurisdictions. Unclear or inconsistent regulations may lead to unexpected legal actions, restrictions, or compliance challenges for DeFi platforms and participants. As governments and regulatory bodies grapple with how to address DeFi, it is crucial for DeFi projects to proactively engage with regulators, enhance transparency, and establish compliance measures to navigate the evolving regulatory landscape. Balancing innovation with compliance will be essential for the **long-term sustainability** and **legitimacy** of the DeFi ecosystem. This however also implies that additional costs and burdens must be undertaken by such system participants.

Operational Risks

A key operational risk that may arise in DeFi stems from **governance structures**. Many DeFi platforms employ decentralised **governance models**, allowing token holders to vote on protocol changes. However, governance processes may be vulnerable to collusion, centralization of power, or voter apathy, potentially leading to unfair decision-making or mismanagement.

Further, DeFi relies on individuals managing their own wallets and private keys, increasing the likelihood of **user errors**, such as misplacing keys or falling victim to phishing attacks. Such errors can result in irreversible loss of funds. This is unparalleled to traditional finance, where instead, insurances and other procedures are in place for investor protection.

Finally, DeFi faces challenges related to **scalability**, **high gas fees**, and **complex user interfaces**. These factors can hinder mainstream adoption and negatively impact user experience, limiting the growth potential of DeFi applications.

A New Digital Asset Market Infrastructure

The establishment of **OTC (Over-the-Counter) desks** can be attributed to the early development of Bitcoin and the subsequent growth of the digital asset market. While specific dates may vary, OTC desks gained prominence around 2013-2014, coinciding with the increasing demand for alternative trading solutions.

During the nascent stages of the crypto-asset market, centralised exchanges served as the primary platforms for trading digital assets. However, these exchanges encountered several challenges such as the emergence of a very large number of trading venues with limited liquidity and pricing that can differ from each other by large amounts (market fragmentation).

Moreover, the escalating market capitalization and **rising institutional interest** in this field have necessitated the **resolution of liquidity challenges** commonly encountered in exchanges. OTC desks strive to effectively tackle this issue by providing secure intermediation platforms that facilitate **bilateral transactions** between users.

The development of OTC desks can reflect the **maturation** of the crypto-asset market as a whole. As the industry evolved, market participants sought **professional** and **regulated platforms** that could offer **reliable** and **compliant trading services**. OTC desks emerged as intermediaries **bridging the gap** between the traditional financial world and the crypto market and providing a **regulated and secure environment for trading**.

OTC desks are now a **crucial** component of the digital asset ecosystem as they became one of the the preferred choice for Institutional investors (e.g. Hedge funds, Corporates, etc.) due to their capacity to **accommodate large-scale trades** and **deliver tailored solutions**. They provide customised and efficient services like **instant trade execution** with **delayed settlement**, **round-the-clock phone lines**, **margin services for leveraged positions**, **competitive prices**, more **transparency** and **flexible settlement.**

To ensure the proper execution of OTC (Over-the-Counter) trading, the establishment of a dedicated "desk" is necessary. This desk acts as an intermediary between buyers and/or sellers of crypto-assets. Specifically, OTC desks can be categorised into two types:

Principal desks are entities that use their own funds to purchase the crypto-assets requested by a client. This means that the principal desk assumes the risk associated with the trading process on behalf of the client.

The typical process of a crypto-asset trade through a principal desk involves several steps. First, an investor expresses their desire to purchase a specific quantity of crypto-assets through an OTC platform (Request For Quotation). The broker then responds to the investor's request by providing a price for the purchase based on current market conditions. If the client accepts, the principal desk takes on the "**principal risk**" by acquiring the requested quantity of crypto-assets and bearing the potential price fluctuations until the purchase is finalised. The desk is bound by a legal agreement signed during the client onboarding phase, ensuring compliance with the agreed terms. Once the client transfers the agreed-upon value, the principal desk proceeds to send the crypto-assets to the client (on-chain settlement), or credit the client's relative balance with the desk.

The profitability objective of a principal desk is to acquire the agreed-upon sum of crypto-assets at a slightly lower average price than the selling price agreed with the client, thus generating a profit. This profit model is commonly known as **spread-based**.

On the other hand, the principal desk assumes the risk associated with price changes of the crypto-asset, and there is usually a defined maximum tolerance margin beyond which the agreed-upon order would be automatically cancelled. The dealer however may manage this market risk faced by hedging with futures contracts or options. It is a strategic move to offset potential losses caused by unexpected market fluctuations.

Agency desks, in contrast, do not conduct transactions using their own funds and do not assume market risks. Instead, they act as intermediaries

on behalf of their clients which pay a commission to the desk to facilitate the overall execution and settlement phases. The commissions usually come in the form of **fixed percentage fees**, with ranges based on the volume profile & relation that the client has with the desk. Alternatively, the commission can still come in the form of a markup applied on the initial spread that is streamed to the broker by the liquidity provider.

The process of a crypto-asset exchange through an agency desk follows a different approach. When an investor intends to purchase a specific amount of crypto-assets, they first need to fund an account on the OTC platform and communicate a price range they are willing to pay. The agency desk then purchases the agreed-upon amount of crypto-assets using the **client's own funds**, trying to execute at the best price possible. In this scenario, the client assumes the risk related to price volatility, and if the price exceeds the agreed range, the order is typically cancelled.

Advantages of Crypto-Asset OTC Desks

Best Price Execution

A primary attribute provided by numerous OTC brokers and trading desks is that of "**Best Execution**".

It is both an **ethical guideline** and a **legal obligation** in traditional markets, that calls on brokers to look for the best options to fulfil their clients' orders in the current market scenario and to execute the client's trade with the most favourable terms and at the best price available, hence acting as a significant layer of investor protection. Whereas in the United States it falls under FINRA Rule 5310, and the brokerage firms' best execution practices are overseen and audited by the SEC and FINRA, the crypto market has yet to face such regulatory obligations. However, as digital asset brokers are eager to **capture the institutional flow** coming in from traditional finance, the result is that they end up **competing** on the premise of such **best practices**, and so the OTC market is turning more familiar and beneficial as the market matures for such institutional traders, relative to CEXes.

Along those lines, there exist several drivers of implementation that can significantly enhance the platform's performance in terms of both service level and profitability. The key **competitive drivers** associated with this are as follows:

- **Integration** with a multitude of trading venues (e.g. CEX, DEX, other OTC platforms, etc): The integration with a diverse array of exchanges empowers the OTC platform to leverage SOR (Smart Order Routing) systems to optimise the trade execution and achieve the best price. This is achieved by routing the orders to the market with the best overall price (considering fees and slippage as well) or fragmenting the orders across various markets, thereby hitting a larger pool of liquidity around the mid price and mitigating the market impact / slippage of the trade. This, in turn, results in a better execution price for the overall trade relative to executing it in a single orderbook.

- **Execution Fees:** The advantage of OTC dealing desks is that the clients execute at the price they see, since there are no additive fees/commissions as the profit of the dealer is priced in the spread they capture between the price they quote to the client and the price they can execute at themselves. This can be advantageous to clients' of such desks as there is no further complexity when accounting for the transaction costs of the trades they make.

- **Execution latency:** Though measured in fractions of a second, in an exceedingly swift and volatile market, increments in time of execution can lead to substantial price variations, which in turn might impact substantially-sized orders. Latency is a key component of transaction costs under methods such as implementation shortfall, and hence its optimization leads to cost optimization & risk optimization for the end client. Furthermore, with the rise of hedge funds practising HFT (high frequency trading), every millisecond matters when it comes to trade execution. As a result, with digital asset OTC desks seeking to capture the more sophisticated institutional flow coming from traditional markets, their infrastructure seeks to optimise on execution latency by creating efficient IT architecture in which even the code logic itself is of low space and time complexity. Further, certain OTC desks may even offer more premium services such as Co-Location, giving the chance to their sophisticated clients to house their computers as close to the desks' servers as possible, in order to mitigate the latency between the trading system and the clients' algorithms.

Price Impact Mitigation & Confidentiality

The OTC trading market is organised by groups of **dealers & LPs** in a market without a central location. The trading takes place without the mediation of an exchange and, in contrast to CEXes, there are usually no open Central Limit Order Books (CLOB) backing the trading engine. Instead, crypto-asset OTC desks have their own **internal aggregated order books** that combine the CLOBs of the exchanges, inter-dealer liquidity, as well as the orders of their own customers that they can use to internalise a trade.

The result is that with such liquidity aggregation that happens off-exchange (where top CEXes are usually the source of pricing), large trades can be made through OTC desks **without impacting** the market, and hence **mitigating slippage** as mentioned above, in contrast to trading on a CEX.

OTC desks can additionally provide a '**lock-in price**' for a certain period of time (10-60 seconds on average), in which the client can decide to fill or kill the order at the fixed price quoted.

Further, whereas it can be argued that a large trade can be placed through the form of a limit order on a CEX in order to not run the book, there can be subsequent delays in that order getting filled, and there is also the risk of being front-run by other market participants. Such issues are **not** present when trading with an OTC desk due to the **additional layer of privacy** created by trading **off-exchange** through bilateral agreements that other market participants cannot see.

Clearing & Settlement

Clearing and **settlement** of trades are two key components of the post-trade phase of the trade lifecycle, found both in traditional markets but also in the digital asset space.

Trade clearing is the process of recording transactions, posting enough margin, netting brokers' gross transactions, and validating those transactions, that takes place within T+1 (trade date + 1 business day) after a trade is executed. In traditional finance, the broker, the custodian bank, the depository bank, and the clearing house (central counterparty) work together to complete this step on a middle and back-office level.

Trade settlement usually occurs on T+2, and represents the final stage of the transaction where the actual transfer of assets and funds takes place. The assets are titled to the buyer and the funds are transferred to the seller. When both transactions are done almost simultaneously, it is referred to as **Delivery versus Payment (DvP)**. In traditional markets, the settlement process is facilitated by the clearing house and the custodians. Most securities markets have resulted in trading on transaction day + 2 business days, taking into consideration the whole post-trade process that occurs in the back-office until final settlement is confirmed.

Post Trade in CEXes

Investor transparency is **sacrificed** in CEXes since post-trade operations are conducted by internal exchange systems that reconcile the accounting ledger. Furthermore, settlement happens right away once a trade is executed, and matching is handled as deposits are made ex ante. The counterparty and operational risks are significantly increased by this practice. Additionally, one could argue that settlement cannot be deemed complete until the investor transfers money from the CEX to their own bank accounts. It is also crucial to mention that the settlement of fiat within, between, or from centralised exchanges is not as frictionless as one might think. This is partly because of the aftermath of events such as the FTX collapse, that has led to many banks not being ready to work with exchanges, especially with those that are headquartered in 'lightly' regulated jurisdictions.

Be it a fiat-crypto or crypto-crypto trade, the trade settlement takes place **internally** on the CEX's ledger because the assets are stored by the centralised exchange and the balances of each client account only needs to be changed post-transaction. The settlement between the client's wallet address and the exchange's wallet address takes place on the blockchain whenever a client wants to deposit or withdraw a crypto asset. Fiat settlement is made possible through centralised networks that connect the relevant banks. Additionally, the settlement period varies depending on the **withdrawal type**: fiat currency processing takes two to five business days (though it might be instantaneous if the appropriate institutions have it accessible), whereas crypto assets operate around-the-clock.

Due to the requirement that investors settle the payment before the exchange credits the account, the existing settlement arrangement in CeFi exposes them to **considerable counterparty risks**. Additionally, funds are usually kept in an omnibus wallet or an omnibus fiat account, causing them to be **commingled** between clients, as well as the exchange's own funds. Last but not least, because client funds are not segregated, clients are treated equally with other creditors in the event that the exchange fails or experiences financial difficulties. As a result, investors are responsible for a large counterparty risk associated with any **misconduct** by the company in charge of running the centralised exchange.

Post Trade in OTC desks

When it comes to OTC desk post trade operations, there have been various **advancements** made in the digital asset space to maintain core efficiencies of traditional finance, while resolving mis efficiencies introduced by CEXes, all bundled together to leverage blockchain technology advantages to their fullest.

A key feature brought from traditional finance into the crypto OTC market is that of **institutional custodians**. Such actors play a pivotal role in ensuring the secure custody of assets during the post-trade process. After the trade is cleared, the assets involved (such as cryptocurrencies) may be transferred to a custodian's **secure storage solution**. Custodians provide a high level of security, protecting assets from cyber threats and physical theft. Further, the client does not need to trust the OTC desk with the custody of their assets, leaving it to a **specialise**d entity with whom the agreement structure is different, and there is no commingling of funds. Instead, the OTC desk is left to specialise in its **distinct function**, and counterparty risk is **highly decreased**.

Another feature present in the OTC market to increase the level of trust, is that of **tri-party agreements**. Such agreements might be utilised in cases where an **additional level of security** and verification is desired. A third-party entity, often an **escrow service**, acts as an intermediary. The escrow service holds the assets until all conditions of the trade are met, reducing the risk of default by either party. Upon verification, the assets are released to the appropriate party.

The point of **faster settlement availability** with OTC desks can also be made. Due to the huge volume of trades and the requirement for blockchain confirmations, exchanges may have lengthy settlement periods. OTC desks on the other hand may settle trades far more quickly. As a result, investors can get access to their money more quickly and decide on investments more swiftly.

Due to the nature of **customization** around their services, OTC desks may also cater the settlement time for specific clients, for example facilitate **instantaneous settlement** for Payment Service Providers, or net obligations and settle on a periodic basis for proprietary traders, that may want to **mitigate transaction costs** and not require the assets immediately for some other purpose other than trading. Such customization on the post-trade phase may be **highly attractive** to clients, and means that such desks can capture a wider array of client types.

Finally, similar to traditional markets, crypto-asset OTC desks bring higher **efficiency in capital management** for the client through the trade settlement process. In order to execute a client's order, the OTC desk service can adopt two distinct models. The first model is that of '**Pre-Funding**', where the client initially finances the trade operation they are willing to perform by deploying the full amount of capital they are willing to trade to the OTC desk. The second model is known as '**Post Trade Settlement**' or '**Delayed Settlement**'. It refers to the process of settling trades between two parties after they have been executed. In this case, the broker can put up the majority of capital for the trade while allowing the client to trade on margin with certain collateral. In this way, the client has higher capital efficiency as they can net obligations of multiple trades before settling, as well as leverage that saved capital for other trading operations in the meantime.

A Comparison Between CEX, DEX and OTC Desk

	CUSTODY	USABILITY	LIQUIDITY	FEES MODEL
CEX	▪ Centralized Control on Assets and keys ▪ Mismanagement, theft and hacking risks ▪ Counterparty Risk ▪ Transaction management optimization	▪ Accessible to anyone ▪ Ideal for newcomers ▪ User-Friendly application	▪ Liquidity fragmentation ▪ Price slippage risk ▪ Insider trading risk ▪ CLOB structure	▪ Commissions based on volume ▪ Withdrawal fees ▪ Funding and borrowing fees for derivatives trading
OTC	▪ Temporary asset holding ▪ Limited Counterparty Risk ▪ Tri-party agreements	▪ Accessed via dealer network ▪ Optimal execution and sophisticated trading order types ▪ Institutional Investors friendly	▪ Deep liquidity offered ▪ Great All-In execution prices and RFQ	▪ No commissions model for Principal OTC desks margin on spread prices ▪ Withdrawal fees (sometimes) ▪ Transaction fees for Agency OTC Desk
DEX	▪ Full user control of private keys and assets ▪ No third party involved	▪ Open to anyone with Internet access and wallet ▪ Requires blockchain knowledge ▪ Limited features availability	▪ Thin liquidity and high slippage ▪ Based on decentralized Liquidity Pools and Automated Market Makers	▪ Network (gas) fee ▪ Transaction fee for liquidity provider and protocol compensation

Fig. 2: Comparison between Cex, Dex and OTC Desk

Conclusion: Principal Takeaways

The role of otc desks and more generally of intermediaries in the crypto market is **gaining momentum** in the ecosystem, the number of players with best execution and management system solutions is growing steadily thanks to an expanding and **more institutionalised market**.

These types of players are positioning themselves in the market by offering different products and most importantly, offering **different advantages** to clients who seek to enter this market while trying to **minimise risks**.

Some of the **main advantages** and competitive drivers that differentiate this OTC Desks from the rest of market participants are highlighted below:

Fig. 3: OTC Desk - main competitive drivers

The progression of the digital asset market has evolved through multiple phases, moving from an initial state of significant chaos and a lack of established operational procedures and controls, to a more organised, but still fragmented and uncertain market environment.

The market has been **expanding** more and more in recent years with a **multi-trillion-dollar market capitalization**. This evolution, coupled with the **increasing** participation of institutional players, points out the paramount importance of providing traders and investors with platforms and tools in line with their **established best practices**. For this reason, although centralised exchanges have historically dominated the trading landscape, the emergence of **Over-the-Counter (OTC) desks** and **brokers** represents an important **turning point**. Their role is crucial in providing clients, especially institutional clients, with **easy access to digital asset markets**, **ensuring competitive pricing**, **robust risk mitigation**, and an **operational approach** with several **similarities** to conventional financial ones.

As the crypto market's maturation persists, a parallel trajectory is anticipated for the DeFi sector. The insights gleaned from the ascent of OTC desks and brokers are poised to **guide the evolution** of DeFi protocols and platforms, addressing the broader audience's requirements and further bridging the gap between traditional financial norms and the realm of digital assets.

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