Trust Dynamics and Market Behavior in Cryptocurrency: A Comparative Study of Centralized and Decentralized Exchanges

Xintong Wu[†] Wanlin Deng[†] Yutong Quan[†] Luyao Zhang[†*]
[†]Duke Kunshan University, 8 Duke Ave., Suzhou, China, 215316

arXiv:2404.17227v1 [econ.GN] 26 Apr 2024

***Abstract*—In the evolving landscape of digital finance, the transition from centralized to decentralized trust mechanisms, primarily driven by blockchain technology, plays a critical role in shaping the cryptocurrency ecosystem. This paradigm shift raises questions about the traditional reliance on centralized trust and introduces a novel, decentralized trust framework built upon distributed networks. Our research delves into the consequences of this shift, particularly focusing on how incidents influence trust within cryptocurrency markets, thereby affecting trade behaviors in centralized (CEXs) and decentralized exchanges (DEXs). We conduct a comprehensive analysis of various events, assessing their effects on market dynamics, including token valuation and trading volumes in both CEXs and DEXs. Our findings highlight the pivotal role of trust in directing user preferences and the fluidity of trust transfer between centralized and decentralized platforms. Despite certain anomalies, the results largely align with our initial hypotheses, revealing the intricate nature of user trust in cryptocurrency markets. This study contributes significantly to interdisciplinary research, bridging distributed systems, behavioral finance, and Decentralized Finance (DeFi). It offers valuable insights for the distributed computing community, particularly in understanding and applying distributed trust mechanisms in digital economies, paving the way for future research that could further explore the socio-economic dimensions and leverage blockchain data in this dynamic domain.**

***Index Terms*—Centralized Exchange, Decentralized Exchange, Trust Mechanism, Incidents Impact, Decentralized Finance, Blockchain, Interdisciplinary Studies, Distributed Networks**

I. Introduction

Trust, integral to human prosperity, assumes a critical role in the digital economy, especially in the cryptocurrency domain driven by blockchain technology [62]. This technology marks a paradigm shift from centralized to decentralized trust systems, significantly expanding digital economic landscapes. However, the trustworthiness in these systems, whether decentralized or centralized, is contingent upon factors at varying scales [1, 22, 41, 55, 59, 60, 63]. Eventually, micro-level elements like financial literacy and macro-level aspects such as governmental regulations are pivotal in determining their efficacy and reliability [57]. Various studies indicate that trust plays a crucial role in influencing price fluctuations of digital assets, driving the development of the cryptocurrency market, and impacting investor behavior [2, 33, 38, 40, 42].

Cryptocurrency exchanges fall into two main categories: centralized exchanges (CEX) and decentralized exchanges (DEX). CEXs, operated by a central organization, require users to trust the exchange with their assets in a shared wallet. Transactions on CEXs happen off the blockchain, relying on the exchange to manage trades. Trust in CEXs is based on reputation, user base, or endorsement. However, events like the FTX collapse underscore trust issues caused by regulatory breaches [51]. DEXs use smart contracts or peer-to-peer networks for non-custodial trading. Two main DEX implementations are limit order books (e.g., EtherDelta) and automated market makers (e.g., PancakeSwap) [12]. DEXs eliminate the need for trust in a central entity, relying on predetermined and automated transaction rules. While this resolves traditional trust issues, challenges such as technical complexity, lack of regulation, and security threats introduce new trust considerations, including the potential for market manipulation [14].

In today's dynamic landscape of cryptocurrency trading, where users navigate through the myriad options of exchanges, the inherent challenge of establishing trust has become increasingly paramount. Drawing inspiration from profound insights proposed by Park et al., our research delves deep into the dynamics of the cryptocurrency market and user trust mechanisms [40]. We aim to explore how various events affect user trust in the cryptocurrency market through an interdisciplinary study, which can have a wide and deep impact on various aspects of the crypto economy. Through our analysis, we can better understand the trust mechanisms in crypto-asset markets and explore the possibilities of distributed trust mechanisms in facilitating the development of the digital economy and decentralized finance. Within the framework of these considerations, our primary research inquiries take center stage:

RQ 1: How do incidents affect prices across the crypto market by influencing trust?

RQ 2: How do incidents affect users' choices of CEX and

Acknowledgments. Prof. Luyao Zhang acknowledges the support from the National Science Foundation China (NSFC) under the project titled "Trust Mechanism Design on Blockchain: An Interdisciplinary Approach of Game Theory, Reinforcement Learning, and Human-AI Interactions" (Grant No. 12201266). Yutong Quan and Xintong Wu are grateful for the support from the pioneering Summer Research Scholar Program and Wang-Cai Biochemistry Lab Donation Fund at Duke Kunshan University; Additionally, Yutong Quan, Xintong Wu, and Wanlin Deng appreciate the support from the Center for Study of Contemporary China (CSCC) Undergraduate Research Grant, both with Prof. Luyao Zhang serving as the principal investigator.

[*] The corresponding author: Luyao Zhang (lz183@duke.edu), Data Science Research Center and Social Science Division, Duke Kunshan University.

DEX by influencing trust shift?

For RQ 1, we opted to assess the impact of incidents on cryptocurrency market trust by examining token price fluctuations. Rapid price changes often mirror users' emotional responses to incidents [29, 35]. Our hypothesis suggests that positive incidents bolster investor confidence, leading to improved trading conditions, heightened demand, and consequently, an increase in token prices. Conversely, negative events produce the opposite effect. For RQ 2, our focus was on studying the transfer of user trust by analyzing transaction flow between CEX and DEX. Fluctuations in transaction volume can signify shifts in trust [37, 44]. An increase in NetFlow may indicate heightened user trust in the exchange, while a decrease in transaction volume may suggest a reduction in trust. We leverage changes in NetFlow to analyze the transfer of user trust between CEX and DEX.

We formulated hypotheses through logical analysis. Ultimately, our conclusion suggests that, while acknowledging the potential existence of other confounding factors, the driving force of incidents affecting economic indicators through trust is very dominant.

The remainder of this paper is structured as follows: Figure 1 shows the structure of our research. Section II furnishes a detailed background on the incidences under examination, including their hypothesized impacts. Section III expounds upon the data utilized in this study and elucidates the methodologies employed. Section IV is dedicated to presenting the findings derived from our analysis. Section V summarizes the findings of this study with directions for urgent improvement in future research. Additionally, the comprehensive literature review and technical details are incorporated in Section VIfor further reference and in-depth understanding.

Data and Code Availablity Statement: The data is accessible on Harvard Dataverse [53], while the code is openly available on GitHub at: https://github.com/SciEcon/IncidentsAnalysis2023. This repository encompasses the datasets utilized for analysis along with the code scripts employed for data processing and statistical analysis.

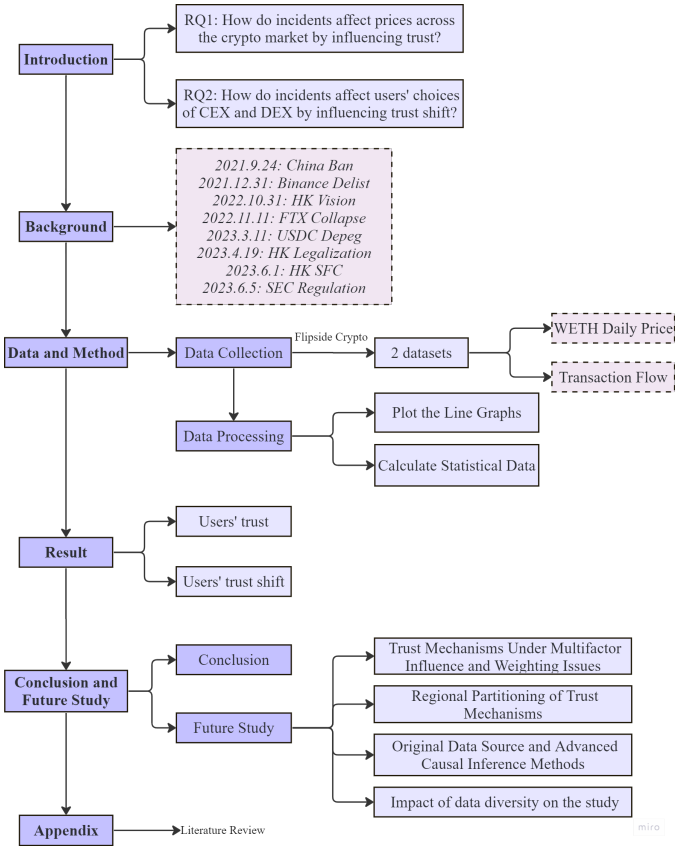

Fig. 1. The Whole Structure of the Paper: Created by Miro.

II. Background

In the dynamic landscape of cryptocurrency trading, the challenge of establishing trust is paramount. As users navigate through numerous exchanges, the selection process becomes crucial for ensuring the security and reliability of transactions. To explore the influence of different events on trust distribution within both CEX and DEX, we focus on eight recent representative events in both China and Western countries. These events can be broadly classified into two categories: regulatory incidents and risk incidents.

A. Government Regulatory Incidents

Overall, Eastern and Western countries initially adopted starkly different regulatory approaches to cryptocurrencies, but recent developments indicate a convergence: a coexistence of embracement and regulation.

a) China: In late September 2021, Chinese regulatory bodies, including the People's Bank of China, declared virtual currency-related activities as illicit financial endeavors. Foreign-based virtual currency exchanges serving Chinese residents were also classified as unauthorized financial activities [39]. This led to exchanges like BitMart and Huobi ceasing account registrations and Binance delisting the CNY trading zone by December 31, 2021 [13]. Hong Kong, as a financial center, showcased a gradually relaxed stance. In October 2022, the Hong Kong government expressed an open attitude towards virtual assets, issuing a 'Policy Manifesto.' On April 19, 2023, a Hong Kong court recognized cryptocurrencies as property, and on June 1, 2023, the Hong Kong Securities and Futures Commission (SFC) issued licenses to cryptocurrency exchanges [23, 24, 46].

b) Western Countries: Western countries initially embraced cryptocurrencies with minimal regulation. However, recent illegal incidents prompted regulatory adjustments. On June 5th, 2023, the U.S. Securities and Exchange Commission (SEC) initiated legal action against Binance and Coinbase. Allegations included unlawful misappropriation of user assets and breaches of securities regulations, classifying 19 types of tokens as "securities" [20, 21].

TABLE I

DIFFERENT INCIDENTS, THEIR CORRESPONDING IMPACTS AND HYPOTHETICAL IMPACT; $\mathcal{D} \rightarrow \mathcal{C}$ AND PINK COLOR REPRESENT TRUST SHIFTS FROM DEFI TO CEFI; $\mathcal{C} \rightarrow \mathcal{D}$ AND PURPLE COLOR REPRESENT TRUST SHIFTS FROM CEFI TO DEFI; PINK PURPLE COLOR REPRESENT UNCERTAIN IMPACT ON TRUST.

Time	Event	Risk/regulatory	Hypothetical impact
2021.9.24	China's ban of virtual currency-related activities(***China Ban***)[39]	regulatory	$\mathcal{C} \rightarrow \mathcal{D}$
2021.12.31	Binance delisted CNY trading zone(***Binance Delist***)[13]	regulatory	$\mathcal{C} \rightarrow \mathcal{D}$
2022.10.31	HongKong announced develop vision about virtual currency(***HK Vision***)[23]	regulatory	Uncertain
2022.11.11	FTX collapse(***FTX Collapse***)	risk	$\mathcal{C} \rightarrow \mathcal{D}$
2023.3.11	USDC Depeg(***USDC Depeg***)[18]	risk	Uncertain
2023.4.19	HongKong acknowledged the legitimacy of crypto currency(***HK Legalization***)[24]	regulatory	Uncertain
2023.6.1	Hong Kong SFC issued licenses to cryptocurrency exchanges(***HK SFC***)[46]	regulatory	$\mathcal{D} \rightarrow \mathcal{C}$
2023.6.5	SEC categorized 19 types of tokens as "securities."(***SEC Regulation***)[21]	regulatory	Uncertain

B. Risk Incidents

a) Cefi: FTX Collapse: On November 11, 2022, FTX Trading announced voluntary bankruptcy proceedings. This led to a swift decline in cryptocurrency values, with Bitcoin dropping by 12% to slightly below $16,000 by November 9, 2022 [17].

b) Defi: USDC Depeg: A depeg occurred when the value of $1 USDC fell below $1 on March 11th, 12th, and 13th, 2023, mainly due to the collapse of Silicon Valley Bank (SVB), affecting 8% of Circle's reserves funded with SVB. This triggered panic and a shift in stablecoin dominance [43, 45].

C. Assumption

In this paper, the concept of trust that we explore specifically pertains to the extent to which users of exchanges perceive their transactions as secure. Like the stock and bond markets, individuals are assumed to rely on historical events to anticipate the future when considering trading on exchanges. Building on the prevalent extrapolation model in behavioral finance, our hypothesis is as follows: Regarding regulatory events, individuals engage in speculation about the likelihood of a crisis occurring in exchanges based on government measures. This speculation leads to a shift in trust towards or away from CEX and DEX, subsequently influencing their trading behavior. If regulatory measures suggest the government's confidence in DEX, people's trust will shift towards DEX, increasing cryptocurrency prices, and vice versa. Concerning risk events, individuals evaluate the safety of CEX and DEX by extrapolating from recent risks, thus altering their trust. Specifically, risk events in DEXs will likely negatively impact user trust in the cryptocurrency market, potentially triggering a widespread sell-off of cryptocurrencies and causing a decline in currency prices. Detailed information is shown in Table I.

Assumptions in terms of currency price:

- Incidents will affect price increase: ***HK Legalization***, ***HK SFC***.
- Incidents will affect price decrease: ***China Ban***, ***Binance Delist***; ***FTX Collapse***; and ***SEC Regulation***.
- Incidents have an uncertain effect on the price of WETH: ***USDC Depeg***.

Assumptions in terms of trust shift:

- Incidents will shift trust from CEX to DEX: ***China Ban***; ***Binance Delist***; and ***FTX Collapse***.
- Incidents will shift trust from DEX to CEX: ***HK SFC***.
- Incidents have an uncertain effect on trust shift: ***USDC Depeg***; ***HK Vision***; ***HK Legalization***; ***SEC Regulation***.

However, it is also plausible that models such as sticky beliefs and overreaction may operate concurrently. To discern which trust factors play the primary roles and to what extent events influence people's trading behavior, we conducted the following research to test our assumptions.

III. DATA AND METHOD

In this section, we will articulate the rationale behind our selection of Ethereum transaction data and elucidate our data collection and processing methodology.

A. Data Selection

Ethereum transaction data has been applied to a lot of research, especially in the areas of Ethereum transaction network analysis and smart contract security. Chen et al. conducted a groundbreaking study by graphing three critical activities (money transfer, smart contract creation, and smart contract invocation) [15]. Bhargavi et al. analyzed Ethereum transaction space to infer behavioral features in both supervised and unsupervised settings [5]. In addition to static analyses, prior research explores micro-level network modeling and graph analysis to understand the dynamic evolution of Ethereum transactions [3, 30]. These studies collectively underscore the invaluable and reliable nature of Ethereum transaction data as a key resource for researchers seeking to enhance their insights into blockchain dynamics and transaction behaviors within the Ethereum network. Furthermore, compared with other public blockchain platforms, Ethereum demonstrates a

clear leadership position and advantage in smart contracts and decentralized applications (DApps). For instance, when compared to other public blockchains such as EOS, Ethereum boasts a larger and more diversified ecosystem for smart contracts, attracting developers and users globally. The quantity of DApps and user engagement on Ethereum surpasses that of other public blockchains by a significant margin, providing researchers with ample data and case studies for analysis and investigation [19]. Consequently, we will leverage Ethereum transaction data to perform our comprehensive data analysis in this study.

Due to the standardization of Ethereum smart contracts, native ETH cannot be directly traded with other tokens adhering to the ERC-20 standard. To overcome this limitation, many decentralized exchange (DEX) platforms have adopted Wrapped Ether (WETH) [9, 11]. WETH, an ERC-20 cryptocurrency based on the Ethereum protocol, is designed to enhance the liquidity and usability of Ether in transactions, particularly demonstrating significant advantages on DEX platforms such as Uniswap, SushiSwap, and Balancer [6]. Given its widespread adoption in the decentralized finance (DeFi) ecosystem, the price and transaction volume metrics of WETH serve as effective indicators reflecting market trends. WETH operates through two primary trading models. Firstly, it facilitates direct exchanges with other ERC-20 tokens. Secondly, it allows for exchanges with ETH to obtain dollars or other fiat currencies. Both trading models are functionally identical in CEX and DEX, so we can analyze the trading volume of WETH on both exchanges to study the trust transfer of users [7, 8]. Therefore, WETH has been widely used in the world and has a good representation, which can realistically reflect the changes in users' choices.

B. Data Collection

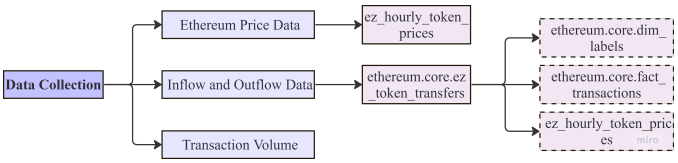

Fig. 2. Data Collection flowchart.Created by Miro.

We utilized SQL queries on Flipsidecrypto (https://flipsidecrypto.xyz/) to extract daily price data for WETH, as well as transaction volumes and net flows between CEX and DEX. The extracted data spans from January 1, 2021, to July 1, 2023. The first dataset comprises daily average prices of WETH in USD, correlated with their respective dates. The second dataset includes dates, user traffic between DEX and CEX, net user traffic, amounts, and net amounts, all denominated in USD. The processed datasets offer a daily overview of WETH transactions during the specified time frame. We employed an efficient data acquisition and processing approach. By utilizing sophisticated SQL queries, we collected the desired category of data for specific cryptocurrencies within predetermined timeframes during the data collection phase. This methodology effectively integrated data preprocessing into the data collection process, facilitating a smoother research workflow. As a result, we obtained comprehensive datasets spanning crucial periods, providing unprecedented depth and detail into the dynamics of the cryptocurrency market. The flowchart of data collection is shown in Figure 2.

The raw data is sourced from the Ethereum blockchain, and data queries are performed on Flipsidecrypto. To validate data credibility, we selected recent dates in the first dataset and cross-verified the daily prices with Ethereum queries, confirming the reliability of the dataset. In the second dataset, we randomly selected five transaction addresses and verified their existence on Etherscan, establishing the dataset's trustworthiness. Notable centralized exchanges in the data include Coinbase, LCX, BitBee, OKX, and Binance, while decentralized exchanges include Uniswap, Sushiswap, Balancer, LuaSwap, SakeSwap, KyberSwap, 0x, ShibaSwap, Dydx, PancakeSwap, and Solidly.

C. Data Processing

1) Plot the Line Graphs: In the data processing phase, we utilized Matplotlib in Python to create eight small charts, each representing the token price and transaction volume (netflow) of WETH around specific event dates. The time window spanned one week before and after each event, marked by red dashed lines. We also added blue dashed lines to indicate zero transaction value, accommodating numerical variations. WETH's daily price is shown in Figure 3, and NetFlow is shown in Figure 4.

2) Calculate Statistical Data: To comprehensively compare the changes in price and NetFlow before and after the incidents, we conducted statistical metric calculations in the second stage of data processing. We extracted data subsets corresponding to one week before and after each incident date, calculating the daily average price and the average NetFlow of WETH. By assessing the differences in these average values, we aimed to evaluate the variation in user trust before and after the events. Finally, we organized the computed statistical information into a data frame, where each row represents a specific event, and each column corresponds to a particular statistical metric. WETH's daily price is shown in Table II, and NetFlow is shown in Table III.

IV. Result

In this section, we will show the results of the two research questions and explore the possible reason for the Observed phenomena.

A. Users' trust on cryptocurrency market

For the first research question, we examined the daily average price of WETH before and after specific events to gauge their impact on user trust in the crypto market.

The statistical analysis indicates that the average daily price of WETH tends to decrease after the ***China Ban***, ***Binance Delist***, ***FTX Collapse***, ***HK Legalization***, and ***SEC Regulation***.

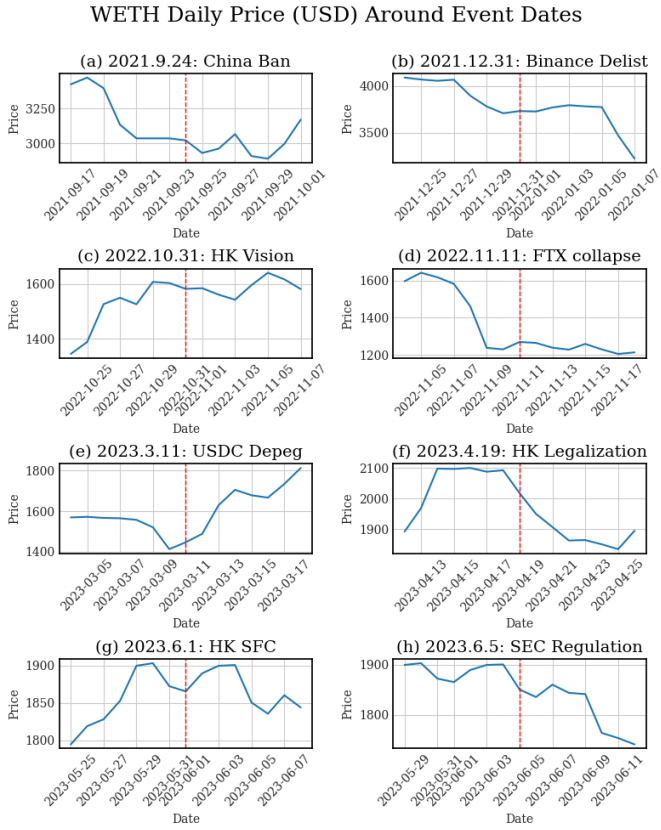

Fig. 3. WETH daily price (USD).

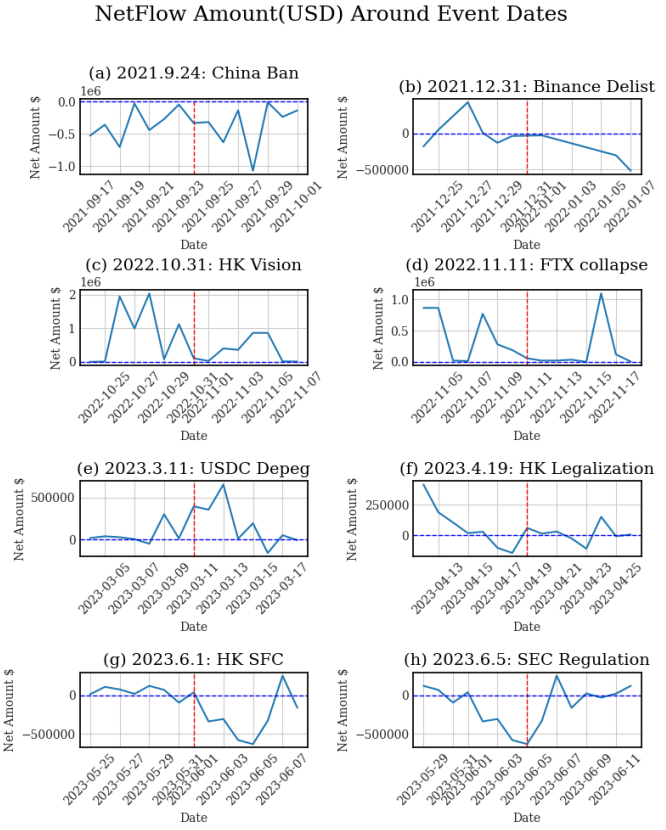

Fig. 4. NetFlow (DEX to CEX).

Conversely, it increases following event B. Additionally, the average daily price of WETH decreases after event A and increases after the ***HK Vision***, ***USDC Depeg***, and ***HK SFC***. Notably, only the ***HK Legalization*** event does not align with our hypothesis, while the other events support our initial assumptions.

When addressing the impact of events on the overall cryptocurrency market prices through influencing trust, our statistical analysis has yielded generally positive results, with most events aligning with our expectations. Following incidents such as regulatory improvements in tokenized securities, there was an increase in the price of WETH tokens, reflecting a growth in market popularity and user trust. Conversely, negative regulatory events posed risks, leading to a decrease in WETH token prices and a diminished enthusiasm for user investment in the market. However, instances that deviate from predictions persist, and potential reasons for these anomalies are as follows.

The characterization of user trust is diverse, and different categories of incidents may yield varying effects on trust. The predominant influence of specific event categories remains uncertain. For instance, ***HK Legalization*** should have logically resulted in an appropriate increase in token prices.[26] However, the observed prices exhibited an anomalous decrease during this period. We speculated that, within the same timeframe, other adverse events contrary to user trust may have prevailed, taking precedence. We discovered that on April 13, 2023, the Yearn Finance smart contract system fell victim to a hacking attack, resulting in a loss exceeding $10 million. [4] This event undoubtedly led to a decrease in user trust in the cryptocurrency ecosystem, manifested in a significant token price decline. Hong Kong holds a relatively small share of the global cryptocurrency market, the incident on April 13, 2023, likely took precedence in influencing user trust over the relatively minor impact of the ***HK Legalization***.

B. Trust shift between CEX and DEX

For the second research question, we delved into the transaction flows between CEX and DEX, focusing on transactions from DEX to CEX (inflow) and from CEX to DEX (outflow). We meticulously calculated and compared the NetFlow, where a positive value indicates a heightened inflow of tokens to CEX, while a negative value suggests a greater influx to DEX.

The statistics show that NetFlow increased for the ***USDC depeg*** and ***SEC Regulation***, users' trust shifted to CEX; NetFlow decreased for the ***China Ban***, ***Binance Delisted***, ***HK Vision***, ***FTX collapse***, ***HK Trust***, and ***HK SFC***, users' trust shifts to DEX. The findings unveiled that only the ***China Ban***, ***Binance Delisted*** and ***FTX collapse*** are consistent with our hypothesis; only the ***HK SFC*** does not meet our hypothesis.

When addressing how incidents influence the shift of trust and impact users' choices of exchanges, our statistical anal-

TABLE II
STATISTICAL DATA OF DAILY PRICE (USD)

Incident	Mean_Pre	Mean_Next	Mean_Diff
China Ban	3.13 $\times 10^3$	3.22 $\times 10^3$	-1.54 $\times 10^2$
Binance Delist	4.06 $\times 10^3$	3.95 $\times 10^3$	-3.06 $\times 10^2$
HK Vision	1.53 $\times 10^3$	1.51 $\times 10^3$	5.69 $\times 10^1$
FTX Collapse	1.58 $\times 10^3$	1.48 $\times 10^3$	-3.47 $\times 10^2$
USDC Depeg	1.56 $\times 10^3$	1.54 $\times 10^3$	1.07 $\times 10^2$
HK Legalization	2.09 $\times 10^3$	2.05 $\times 10^3$	-2.14 $\times 10^2$
HK SFC	1.85 $\times 10^3$	1.85 $\times 10^3$	1.02 $\times 10^1$
SEC Regulation	1.90 $\times 10^3$	1.89 $\times 10^3$	-6.12 $\times 10^1$

TABLE III
STATISTICAL DATA OF NETFLOW TRANSACTIONS

Incident	Mean_Pre	Mean_Next	Mean_Diff
China Ban	-3.41×10^5	-3.60×10^5	-1.90×10^4
Binance Delist	2.47×10^4	-2.83×10^5	-3.08×10^5
HK Vision	8.85×10^5	3.32×10^5	-5.53×10^5
FTX Collapse	4.28×10^5	1.67×10^5	-2.60×10^5
USDC Depeg	5.19×10^4	1.88×10^5	1.36×10^5
HK Legalization	7.32×10^4	1.53×10^4	-5.79×10^4
HK SFC	4.46×10^4	-2.56×10^5	-3.00×10^5
SEC Regulation	-1.55×10^5	-9.12×10^4	6.36×10^4

ysis has yielded generally positive results, with most events aligning with our expectations. Following the occurrence of risk events related to CEX, there was a decrease in NetFlow, indicating a definite shift in user trust towards DEX. The impact of events on the transfer of user trust is undeniable; however, instances that deviate from predictions persist, and potential reasons for these anomalies are postulated.

The influence of trust on user choices is inherent, but its predominant role may vary across different events. We must acknowledge that user preferences between CEX and DEX are not a singular and static decision-making process. Factors influencing user choices are multifaceted. For instance, users may be influenced by dynamic market conditions, such as the introduction of new cryptocurrencies, enhancing market diversity, and providing investors with more choices that may trigger interest and decisions [10, 27]. Additionally, social factors may play a significant role in user adoption, where opinions and recommendations from friends, colleagues, trusted intermediaries, or social media can impact user behavior [47, 48, 54]. Beyond trust, other factors may also influence user choices, requiring an assessment of which factors take precedence.

While the impact of incidents on the shift of user trust is indisputable, the dominance of trust as a determinant in user decision-making varies. Acknowledging the dynamic and multifaceted nature of user preferences is essential to consider a spectrum of factors, including market dynamics, social influences, and factors beyond trust, to determine the predominant influence on user choices.

V. CONCLUSION AND FUTURE STUDY

In this section, We first give a comprehensive summary of our research, then suggest future improvements that could be made to the study's current limitations and research points that have not been explored in depth.

A. Conclusion

In our research, we conducted a comprehensive analysis of the overall token prices and trading volumes between CEX and DEX in the cryptocurrency market before and after specific events. By analyzing regulatory measures and risk events, we revealed the crucial role of trust in user choices and market dynamics, providing key insights into the impact of distributed systems in behavioral finance applications. Our interdisciplinary study offers robust support for fostering innovation and sustainable development in the DeFi. We demonstrated that events impact user trust, thereby influencing the entire cryptocurrency market transactions. We find that trust plays a crucial role in influencing user choices.

In our current experiments, the results of most incidents are consistent with our hypothesis, with trust having a dominant impact in influencing user transactions. However, at the same time, there are cases where the results are contrary to the hypothesis. Therefore our research still has some limitations. Our conclusions are valid when trust produces a dominant effect or is in the same direction as the effects of other factors while are not valid if the effects of trust and other factors are opposite and the other factors are dominant. How do trust and other factors interact? How do we determine which one dominates in influencing user choice? We recommend that future research comprehensively consider all possible influencing factors and conduct more in-depth studies of a wide variety of events to more fully understand how different events lead to changes in user trust in crypto markets and shifts in user trust between CEX and DEX.

B. Future Study

1) Trust Mechanisms Under Multifactor Influence and Weighting Issues: Our study primarily focuses on the impact of event factors on user choices between CEX and DEX. However, the complexity of the market may involve other unexplored factors. While we have identified some factors, such as regulatory events and market fluctuations, there may be other factors or combinations thereof that warrant further exploration. For example, analyzing the simultaneous occurrence of regulatory and risk events on daily price or trust changes could help discern which factors have a greater impact on user choices. Determining the primary influencing factor amidst concurrent events may pose challenges. Future research should employ more detailed classification methods and may involve developing models to better quantify trust levels. By modeling potential changes in user behavior resulting from different event categories, especially when combined with simultaneous events, researchers can gain deeper insights into which factors dominate during specific periods. We hope to separate the weights of different incident categories on user influence.

This study may inspire industry practitioners to conduct more comprehensive comparative data analysis to better understand the dynamics of cryptocurrency markets. In future research, we recommend a more detailed investigation into the potential influences on user choices, categorizing different countries and regions and different dominant event types, starting from single events and gradually expanding to dual or multiple events, thereby establishing a comprehensive framework for cryptocurrency trust mechanisms and further empowering the application of blockchain technology.

2) Regional Partitioning of Trust Mechanisms: Currently, the users in our selected dataset come from various parts of the world, but trust transitions among users vary across regions and countries. We consider the influence of cultural factors on user choices. For example, users in North America and the Asia-Pacific region may have different investment perspectives, which could affect their choice of exchanges [32]. We aim to partition users globally and explore the characteristics of trust transitions among users in different regions and countries. From this, we intend to deduce universal principles while also considering regional uniqueness. Additionally, for research convenience, we have chosen a single type of cryptocurrency with good representativeness for our study. However, different regions may have preferences for different currencies. Therefore, we hope to include more types of cryptocurrencies in future research to derive more universal patterns.

3) Original Data Source and Advanced Causal Inference Methods: In this study, we choose the *flipside.crypto* dataset due to its categorization of exchange types, eliminating the need for individual address checks and allowing for streamlined data acquisition. While the current dataset has undergone verification, its secondary nature may introduce potential biases and uncertainties. To enhance the credibility and scientific rigor of future research, we considered modifying the original data source. Utilizing firsthand data directly from the blockchain network would ensure real-time and comprehensive data. This approach eliminates reliance on third-party data providers, providing better control and verification of data sources, thereby enhancing the scientific validity and reliability of the research. Future research should employ advanced causal inference methods [31, 58, 59, 61] to rigorously assess the event's effects, considering potential confounders.

4) Impact of data diversity on the study: We acknowledge that decentralized infrastructure can overcome the shortcomings of centralized infrastructure, but at the same time, we are considering the impact of different DEX on research outcomes due to their varied nature [25]. In this dataset, the involved DEX include Uniswap, Sushiswap, Balancer, LuaSwap, SakeSwap, KyberSwap, 0x, ShibaSwap, Dydx, PancakeSwap, and Solidly. Notably, Uniswap, Sushiswap, and Balancer collectively constitute over 90% of the collected data. Therefore, our discussion will primarily focus on the individual characteristics and backgrounds of these three DEX, exploring whether the diversity of exchanges has influenced research outcomes.

- Uniswap:

Uniswap, created by Hayden Adams in 2018, became a crucial part of the decentralized finance (DeFi) ecosystem in 2020 [50]. It employs an automated market maker (AMM) model, allowing users to provide liquidity and earn fees by depositing assets into trading pairs [52]. Uniswap's trades do not rely on traditional order books but instead execute transactions based on fixed asset ratios. Uniswap has been instrumental in advancing decentralized finance, providing users with a more open and trustless trading environment. Due to its simplicity and high decentralization, Uniswap is often representative of decentralized exchanges in research [16].

- Sushiswap:

Sushiswap is a community-initiated fork of Uniswap, aiming to offer additional features and incentives [49]. Users can participate by providing liquidity and earning SUSHI tokens on the platform [36]. Sushiswap exemplifies the success of community-driven decentralized projects and attracts users through innovative incentive mechanisms [34].

- Balancer:

Launched in 2020, Balancer, created by individuals like Fernando Martinelli and Mike McDonald, allows users to create liquidity pools with multiple assets, offering greater flexibility [56]. The system automatically adjusts asset ratios through smart contracts to optimize liquidity. Balancer's multi-asset pools and smart rebalancing provide an ideal platform for researchers studying the liquidity and market impact of different asset combinations [28].

Uniswap adopts a simple AMM model, while Balancer provides a more complex system with multi-asset pools and smart rebalancing. These differences in liquidity models may lead to biases in understanding liquidity and price impact. Regarding community-driven influence, Sushiswap's community-driven nature may result in different user behavior and liquidity provision methods compared to the other two more centralized DEXs. In terms of token incentives, the token reward mechanisms of Sushiswap and Uniswap may influence user behavior, whereas Balancer relies on liquidity provision fees as rewards. Additionally, in governance structures, Sushiswap implements community governance, while the governance structures of Uniswap and Balancer may have different impacts on platform development.

Differences in market share, liquidity models, community-driven aspects, token incentives, and governance structures make these dexes significantly distinct in user behavior and platform operations. Therefore, for future research, we recommend thorough consideration of these factors to ensure the reliability and generalizability of results. A comprehensive analysis across multiple DEXs, while acknowledging the unique characteristics of each, is advised for a more holistic understanding of the impact of decentralized exchanges on research outcomes.

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VI. Appendix

A. Related Work

In this section, we will embark on a thorough exploration of the pivotal role trust plays within the realms of behavioral finance, cryptocurrency exchanges, and distributed systems. We will dissect existing literature, shedding light on the intricate interplay of trust dynamics in these domains. Then, we will demonstrate how our research contributes to the current landscape as interdisciplinary studies and industry applications of distributed systems.

B. Behavioral Finance and Trust

Trust is a widely discussed topic and significant concept across various disciplines, with diverse definitions existing in different fields. One common definition characterizes trust as "a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action" [18]. In the market, trust is considered an indispensable component of social transactions [18]. During exchanging, trust is both a prerequisite and outcome of transactions, as individuals who have not engaged in mutual transactions initially establish a trust to facilitate exchanges [18]. As transactions progress and trust is cultivated through repeated transactions, both exchange parties will benefit by reducing the risks associated with future transactions.

In the realm of financial markets, trust plays a crucial role in shaping trading and pricing dynamics. While there are multiple reasons for engaging in the trade of financial assets, such as addressing liquidity requirements, portfolio rebalancing, and tax optimization, the paramount motivating factor lies in investors' beliefs and trust concerning the prospective price movements of the asset [4]. The weakest form of efficient market hypothesis indicates that securities' values will fully reflect the history of all past market prices and information [16]. Despite finance research always assuming rational and complete information, in reality, people make decisions based on their perception, which may paint a depiction that could diverge significantly from the actual situation [16]. Furthermore, how people perceive risk is intricately connected to their trust in financial markets and specific products. It is not controversial that the history of all past market prices and information will influence people's risk perception and their trust, but the way how they influence is complicated and worth discussing.

Researchers have made a lot of effort to propose various psychological models to explain how trust and beliefs influence individuals' trading in financial markets. Among these, extrapolation and overconfidence stand out as two efficient models. Extrapolation refers to the tendency of individuals to estimate future trends based on recent past trends, encompassing returns, volatility, and crash risks [4]. However, if people's trust were solely influenced by simple extrapolation, everyone's trust decisions would be identical. Individuals consistently act with numerous disagreements. The overconfidence model suggests that people overestimate the accuracy of their judgments and engage in activities based on cognitive perceptions that deviate from factual evidence, often resulting in perplexing outcomes [4, 19]. Alternatively, individuals might exhibit delayed reactions to financial market news, a phenomenon referred to as "sticky beliefs" [4]. In addition, the heuristics hypothesis indicates that people will employ some general rules in some complicated situations, which usually will trigger bias because the ease of recalling the specific instances will make people easily overestimate the importance of the observed data [16]. Expert knowledge also plays an important role in people's perceptions. Usually, the more difficult for people to understand an activity, the more anxious or scared they will feel [16].

C. Crypto Currency Exchange Trust Mechanisms

Trust dynamics between CEX and DEX are influenced by numerous factors. For CEX, a pivotal factor eroding trust is the misconduct of centralized institutions. A recent illustration is the collapse of FTX due to the illicit misappropriation of user assets, triggering a user run [**?**]. The breakdown in governance and regulatory oversight within centralized institutions significantly undermines trust in CEX.

In contrast, trust-reducing elements for DEX encompass intricate technology, susceptibility to hacking attacks, and the absence of regulatory supervision. Given the intricate nature of blockchain technology and DEX, users grapple with a lack of comprehensive understanding regarding how their funds undergo transactions within DEX. The resulting opacity from technological complexities is likely to diminish user trust in DEX. Furthermore, the dearth of regulatory oversight introduces the potential for market manipulation. Victor and Weintraud have identified instances of suspicious wash trading behavior on DEX, a type of market manipulation that is universally banned due to its illegitimate nature [51]. The possibility of market manipulation arising from the lack of supervision is another factor likely to weaken user trust in DEX. Moreover, DEX operations hinge on code and protocols, exposing them to the risk of hacking attacks. One notable instance occurred on March 20, 2022, when hackers exploited a protocol vulnerability in the cross-chain DEX aggregator Li Finance. This security breach resulted in the loss of approx-

imately $600,000 in crypto assets. Financial losses emerge as a crucial factor undermining user trust in DEX. There are also money laundering transactions of non-homogenized tokens (NFTs) on the Ethereum blockchain, which also largely undermines the trust of users transacting on the blockchain [12].

D. Synergizing Distributed Systems with Blockchain: Transformative Applications in Trust Management

In today's era of information explosion on the internet, there is a growing need for efficient information systems to store, transport, and process data. Concurrently, various businesses are experiencing an increasing demand for collaboration. For instance, integrating vast amounts of information from diverse sources to provide customized solutions to customers, and swiftly synthesizing and applying information. Due to various limitations of traditional centralized systems, such as poor compatibility and inconvenient transportation, there is an increasingly urgent need to develop distributed systems to achieve the sharing of resources, information, risks, and responsibilities [13].

A distributed system comprises multiple computing nodes, with software or hardware components spread across various computers, and communication and coordination facilitated through network communication [2]. In a decentralized exchange cluster, nodes must exhibit high reliability, necessitating full trust among them and the exclusion of any malicious nodes within the cluster [2]. Usually, trust in distributed systems is explored through entities and nodes' collaborative machine learning through the lens of multiparty computation (MPC) and muti-agent systems. In MPC, multiple parties compute a function together based on muti-input with their inputs private [7]. Entities have to trust the protocol and other entities to ensure to carry out the computation and keep their information private. In multi-agent systems, people build trust based on their communication and the coordinate mechanism of the systems [23, 41].

Blockchain, a significant subset of distributed systems, holds substantial potential for mitigating trust issues among nodes. The application of blockchain technology in Distributed Trust and Reputation Management Systems (DTRMS) has attracted widespread attention. Nasir et al. investigated blockchain trust in agricultural supply chains, proposing solutions to optimize trust efficiency, underscoring the potential of blockchain in enhancing information security, privacy, and credibility [14]. Xiao et al. reviewed trust management systems in e-commerce and P2P networks, emphasizing the need for distributed trust and reputation management systems and highlighting blockchain technology as a potential solution [21]. Tang et al. proposed a self-stabilization-oriented decentralized real auction approach to adjust the monetary system to volatile markets[20]. These works collectively reveal innovative applications of blockchain in trust management across various domains. Furthermore, Samuel et al. introduced a system for cross-domain distributed, automated, and transparent data transactions, incorporating blockchain, smart contracts, trust, and reputation [17]. Wang et al. achieved secure management of blockchain networks through the establishment of a blockchain-based management platform using trusted computing technology. Chakka et al. address the distributed protocol problem by utilizing the Oracle network to provide information from off-chain to blockchain needs[9].

Distributed and decentralized computing and systems have demonstrated the importance of decentralization [8]. With the development of Web3 and decentralized autonomous organizations (DAOs), the emerging topic of decentralized science (DeSci) has gained popularity [8]. The DeSci seeks to reshape collaboration models, value systems, and incentive mechanisms, and fundamentally alter the structure and legacy norms of the existing scientific system [10]. However, despite widespread attention to blockchain and its applications, including Web3 and DeSci, the decentralized movement has not received extensive scientific attention from the academic community. While blockchain research flourishes in computer science, awareness of doppelgängers remains insufficient, highlighting a cognitive gap between emerging fields and traditional academia [**?**]. Simultaneously, the geopolitical issues triggered by Web3 also require urgent resolution [11]. Decentralized social technologies (DSTs), while innovating societal, economic, and political systems, present challenges in governance mechanisms [**?**]. In this realm, we need to clearly understand new governance challenges and be prepared for innovation. Our understanding of new governance challenges needs to be integrated innovatively with existing governance issues. Decentralization has garnered increasing attention in management, decision-making, governance, and economics. Therefore, an in-depth study of this field contributes to a better understanding and response to the ongoing social transformation. The utilization of blockchain technology in a novel distributed management with a trust mechanism, as explored in our paper, serves as a promising starting point for research in the area.

Our research focuses on trust issues in the cryptocurrency market, examining the impact of events on user trust between CEX and DEX. The literature review above encompasses studies on trust management applications of blockchain in different fields, some of which bear relevance to our research. For instance, Bellini et al.'s survey provides an in-depth understanding of trends and practices in blockchain-based distributed trust and reputation management systems, with our focus being on trust issues in the cryptocurrency market where distributed trust and reputation management systems are critical components [6]. Stodt et al.'s industrial network security research emphasizes the application of blockchain technology in assessing node trustworthiness to counter unauthorized access and data leaks, which aligns with our research focus on trust issues in the cryptocurrency market where security and trustworthiness are paramount [5]. Phansalkar et al.'s research on trust management in multi-agent systems uses blockchain to handle the dynamic behaviors of agents, improving system efficiency [15]. The previous researches about blockchain trust mechanisms provide insights for our research. These blockchain-related studies are primarily associated with

distributed systems, and the distributed nature of blockchain has prompted our exploration of trust. In this study, we will further investigate the application of blockchain technology in the cryptocurrency market, examining trust transfer and the impact of events on user trust.

E. Pioneering Interdisciplinary Exploration

Interdisciplinary research refers to a practice that transcends disciplinary boundaries, involving the collaboration of two or more academic disciplines. The value of interdisciplinary research lies in providing comprehensive and innovative perspectives for addressing complex problems [22]. Currently, interdisciplinary research is emerging as a significant trend in scientific inquiry, with many major scientific breakthroughs, knowledge innovations, and solutions to significant societal issues often closely associated with interdisciplinary approaches. IEEE has previously presented rich successful cases of interdisciplinary research. Such as Madamanchi et al.'s interdisciplinary education in life sciences and computational modeling [13], interdisciplinary courses in business and engineering by Banerjee et al.[3], and joint ventures in electrical engineering and biochemistry led by Al Natour et al. [1].

Our research employs empirical analysis methods and computer techniques to solve economic problems, highlighting the interdisciplinary nature of economics and computer science. Our research provides a unique perspective in the field of behavioral finance. Through the lens of distributed systems, we delve into the impact of user trust on cryptocurrency market choices, especially in the face of events such as the collapse of FTX. We bring a whole new dimension of analysis to the field of behavioral finance, allowing us to understand investor behavior and market dynamics more comprehensively. Most importantly, our research makes a substantial contribution to the application of DeFi on the blockchain. By analyzing risk events and regulatory measures, we reveal the critical role of trust in user choice and market dynamics, providing insights into the sustainable development of the DeFi industry. This lays the foundation for a future of more secure, transparent, and efficient financial services in the DeFi space.

Overall, our research not only highlights the importance of distributed systems in academia but also brings new insights and approaches to behavioral finance and DeFi on blockchain in real industry applications. The interdisciplinary research bridges the gap between advancing knowledge exchange and solving real-world challenges, providing strong support for sustainable development in both academia and industry.

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