CRYPTOCURRENCY

"THE PERFECT ALTERNATIVE SOLUTION TO HIGH-RISK/HIGH-RETURN INVESTMENTS"

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ABSTRACT

In recent years, there has been a notable increase in the number of financial institutions incorporating cryptocurrencies into their investment portfolios. Cryptocurrencies represent a groundbreaking addition to asset managers' repertoire, being the first purely digital assets to be embraced in this manner. While they share some similarities with traditional assets, cryptocurrencies possess unique characteristics that set them apart, making their behavior as an asset class a subject of ongoing exploration.

Given the evolving nature of cryptocurrency trading, it is crucial to consolidate existing research findings on the subject. This paper aims to provide a comprehensive overview of cryptocurrency trading research by synthesizing insights from 146 research papers. Topics covered include cryptocurrency trading systems, market bubbles, volatility and return predictions, portfolio construction, technical trading strategies, and more.

Through an analysis of datasets, research trends, and distribution among research topics and technologies, this paper sheds light on the current landscape of cryptocurrency trading research. It also identifies promising opportunities for further exploration in this dynamic and rapidly evolving field.

INTRODUCTION

Cryptocurrencies have rapidly gained widespread market acceptance and have experienced significant development since their inception. Hedge funds and asset managers are increasingly incorporating cryptocurrency-related assets into their portfolios and trading strategies. The academic community has also devoted substantial efforts to researching cryptocurrency trading. This paper aims to provide a comprehensive survey of the research on cryptocurrency trading, encompassing any study aimed at facilitating and developing strategies for trading cryptocurrencies.

As a burgeoning market and research field, cryptocurrencies and cryptocurrency trading have made significant strides and garnered increased interest and activity (Farell, 2015). Figure 1 illustrates that over 85% of papers on this topic have been published since 2018, underscoring the emergence of cryptocurrency trading as a novel area of research in financial trading. The survey covers the period from 2013 to June 2021.

The literature is categorized into six key aspects of cryptocurrency trading:

1. Cryptocurrency trading software systems (e.g., real-time trading systems, turtle trading systems, arbitrage trading systems);
2. Systematic trading, including technical analysis, pairs trading, and other systematic trading methods;
3. Emerging trading technologies, such as econometric methods, machine learning technology, and other innovative trading methods;
4. Portfolio and cryptocurrency assets, encompassing research on cryptocurrency co-movements and

crypto-asset portfolio analysis;

5. Market condition research, including studies on bubbles (Flood et al., 1986) or crash analysis and extreme market conditions;

6. Other miscellaneous cryptocurrency trading research.

This survey aims to compile the most pertinent research in these areas and extract descriptive indicators to gauge the level of maturity that research in this field has attained.

SITUATIONAL ANALYSIS

Cryptocurrency has emerged as a prominent topic in the financial realm in recent years. As a graduate student specializing in finance and economics, it is imperative to conduct a thorough situational analysis of this innovative form of currency to grasp its implications, advantages, and challenges. In this discourse, I aim to delve into the current landscape of cryptocurrency, its impact on the global economy, regulatory hurdles, potential risks, and future prospects.

Cryptocurrency, exemplified by Bitcoin and Ethereum, represents a digital or virtual currency that leverages cryptography for security. Operating independently of central banks and governments, it facilitates decentralized transactions. The popularity of cryptocurrency has surged since the inception of Bitcoin in 2009, with a growing number of investors and businesses embracing it as a legitimate payment method. The market capitalization of cryptocurrency has soared, surpassing $2 trillion in early 2021.

The influence of cryptocurrency on the global economy is profound, offering the potential to transform transactional processes, investments, and asset transfers. Cryptocurrency presents lower transaction costs, expedited settlement times, and enhanced privacy compared to traditional banking systems. Moreover, it extends financial services to the unbanked populace in developing nations. Nonetheless, its volatile nature and regulatory ambiguity raise concerns regarding stability and security.

Regulatory challenges surrounding cryptocurrency pose a significant dilemma for governments and financial institutions. The anonymity and decentralized structure of cryptocurrency render monitoring and regulation arduous. Moreover, apprehensions persist regarding its exploitation in illicit activities like money laundering and tax evasion. Numerous nations have implemented regulations to govern cryptocurrency usage, while others have opted for outright bans. Policymakers face the critical task of striking a balance between fostering innovation and enforcing regulation to safeguard the integrity of the financial system.

LITERATURE REVIEW

Cryptocurrencies have revolutionized the financial industry, captivating investors and disrupting traditional systems. This literature review delves into the governance issues surrounding cryptocurrency, providing insight into this intricate landscape.

1. Rise of a new asset class Bitcoin, the pioneering cryptocurrency, emerged in 2009, sparking the explosive growth of the digital asset class. Understanding the fundamental principles of cryptocurrency is crucial. Works by Nakamoto (2008) on "Bitcoin: A Peer-to-Peer Electronic Cash System" and subsequent research by Friedman (2015) in "Bitcoin: A Decentralized Alternative to Central Banking" offer a foundational understanding of this new asset class characterized by decentralization, cryptography, and immutability.

2. Managerial challenges: Managing cryptocurrencies presents a myriad of unique challenges. One critical issue is volatility.

Yermack's study (2017) titled "Is Bitcoin a Real Currency?" analyzes cryptocurrency price fluctuations and highlights challenges for businesses considering its adoption. Scalability is another obstacle. Buterin (2014) in "Ethereum: Secure Decentralized General Purpose Transaction Ledger" explores potential solutions for platforms like Ethereum to handle increased transaction volumes.

3.   Security   and   regulation: Managing   uncertainties
Security breaches pose a constant threat in the cryptocurrency realm. The infamous hack on Mt. Gox in 2014, documented by Greenberg (2014) in "Bitcoin: A Digital Currency for Decentralized Transactions," underscores the necessity for robust security measures. Regulation also remains a pressing concern. Cong et al.'s work (2019) titled "Cryptocurrencies: A Survey from the Perspective of Operational Risk" delves into the regulatory landscape and highlights the challenges for businesses seeking to integrate cryptocurrencies into their operations.

4.   Beyond   the   Hype: Unveiling   the   Potential
Despite the complexities involved, cryptocurrencies hold tremendous potential.

RESEARCH OBJECTIVES

In researching cryptocurrency, one of the primary goals is to investigate its impact on traditional financial systems. Cryptocurrency has the potential to disrupt conventional banking by offering faster, cheaper, and more secure transactions. Researchers aim to understand how this disruption will unfold and its implications for financial institutions and government regulations.

Another critical objective is to explore cryptocurrency's role in promoting financial inclusion. By providing access to financial services for unbanked and underbanked populations, cryptocurrency could empower marginalized communities and enhance their financial well-being.

Additionally, researchers seek to study the technological innovations behind cryptocurrency, particularly blockchain technology. Blockchain, the decentralized ledger supporting cryptocurrencies like Bitcoin, is a focus for understanding its workings and potential applications beyond digital currencies.

Another important area of research is the analysis of cryptocurrency volatility and price dynamics. Given the high volatility of cryptocurrency prices, researchers are investigating the factors influencing these prices and developing models to predict and manage this volatility.

Expanding on these objectives, potential research goals related to cryptocurrency could include:

1. **Derived Research Questions**: For example, exploring how businesses can manage cryptocurrency price volatility while leveraging its benefits.
2. **Measurable Objectives**: Developing a risk management framework with quantifiable metrics to assess volatility and potential returns, analyzing historical data to identify predictive models for price fluctuations, and comparing investment strategies for mitigating volatility.
3. **Defined Standards**: Establishing specific targets for risk reduction, model accuracy, and investment strategy performance to guide research outcomes.
4. **Management Decision Support**: Providing managers with tools to integrate cryptocurrency into investment portfolios confidently, make informed decisions based on data-driven insights, and optimize returns while minimizing risks associated with price volatility.

These objectives reflect a range of potential research directions within cryptocurrency management, each tailored to address specific aspects of the field and its impact on financial systems and investment strategies.

RESEARCH DESIGN AND METHODOLOGY

Cryptocurrency has emerged as a prominent subject of inquiry due to its growing influence across industries. Studying the design and methodology of cryptocurrency is essential for comprehending its impact on finance and society. This essay delves into the research design and methodology employed in cryptocurrency studies, highlighting fundamental concepts and approaches.

A significant challenge in cryptocurrency research stems from its dynamic nature. The rapid development of new cryptocurrencies and updates to existing ones creates a shifting landscape, necessitating adaptable research methodologies to ensure the credibility and relevance of findings.

In terms of research design, many studies on cryptocurrency adopt a qualitative approach, leveraging interviews, surveys, and case studies to gather insights. This method enables researchers to explore individuals' experiences and perspectives within the cryptocurrency market deeply. Qualitative research is particularly effective in examining complex phenomena like cryptocurrency adoption across diverse contexts.

Quantitative analysis is another prevalent research design in cryptocurrency studies, involving statistical methods to analyze extensive datasets. This approach helps researchers uncover patterns and trends in cryptocurrency transactions, market dynamics, and user behavior. Quantitative research is instrumental in generating empirical evidence and testing hypotheses related to cryptocurrency adoption.

The integration of qualitative and quantitative methods, known as mixed-methods research, is also gaining traction in cryptocurrency studies. This combined approach enables researchers to triangulate data from various sources, providing a comprehensive understanding of the phenomenon under investigation. By leveraging multiple research methods, scholars can address the limitations of individual approaches and enhance the rigor of their findings.

In terms of methodology, network analysis is frequently employed to examine the interconnections within cryptocurrency transactions and user behavior. This analytical method allows researchers to visualize and scrutinize fund and information flows in the cryptocurrency ecosystem, identifying key actors and interaction patterns. Network analysis yields valuable insights into market dynamics and participant behavior within the cryptocurrency landscape.

RESEARCH DESIGN

Regarding research design, many cryptocurrency studies employ qualitative methods such as interviews, surveys, and case studies to gain insights. This qualitative approach enables researchers to deeply explore individuals' experiences and perspectives within the cryptocurrency market, particularly useful for understanding complex phenomena like cryptocurrency adoption in diverse contexts.

Quantitative analysis is another prevalent research approach in cryptocurrency studies, involving statistical techniques to analyze large datasets. This method assists researchers in identifying patterns and

trends in cryptocurrency transactions, market behavior, and user interactions, providing empirical evidence and testing hypotheses related to cryptocurrency adoption.

Mixed-methods research, which integrates qualitative and quantitative approaches, is also gaining popularity in cryptocurrency studies. This combined methodology allows researchers to triangulate data from various sources, offering a comprehensive understanding of the phenomenon being studied. By leveraging multiple research methods, scholars can overcome limitations associated with individual approaches and strengthen the rigor of their findings.

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FIELDWORK

Executing Fieldwork: Online Survey Implementation

Implementing the chosen method of self-administered online surveys involves electronically distributing the questionnaire using platforms like Google Forms, SurveyMonkey, or Qualtrics. The target audience is determined by the research question. For instance, if investigating cryptocurrency management practices among Fortune 500 companies in the United States, identify relevant professionals (e.g., CFOs, Investment Managers) within these firms through online directories or professional networking platforms. Distribute the survey electronically via email invitations and utilize professional networking platforms like LinkedIn to connect with target participants and request their participation.

Testing and Refinement: Pilot Study

Before full-scale deployment, conduct a pilot test with a small sample group (10-20 participants) representing the target audience. This pilot test identifies issues with the questionnaire, including clarity of instructions and questions, appropriateness of question types, flow and sequencing of questions, and functionality of the online survey platform. Refine the questionnaire based on pilot test feedback by revising unclear questions, adjusting answer choices for multiple-choice questions if necessary, and improving the flow and sequencing of questions for a better user experience.

In recent years, cryptocurrency has emerged as a groundbreaking technology with the potential to transform the financial landscape. As a graduate student studying economics and finance, I have developed a keen interest in understanding the complexities of this new form of digital currency. Engaging in fieldwork, which involves conducting firsthand research and gathering data directly from cryptocurrency users, companies, and experts, offers valuable insights into this rapidly evolving field.

Fieldwork in cryptocurrency takes various forms, including interviews with industry professionals, observation of cryptocurrency transactions, and participation in blockchain conferences and events. By immersing myself in the cryptocurrency community, I aim to gain a deeper understanding of the technology behind digital currencies, the industry challenges, and potential innovation opportunities.

Fieldwork for Cryptocurrency Management Research (Focusing on Pretesting)

Pretesting and Improvement: Pilot Testing

Pilot testing involves administering the draft questionnaire to a small sample group (approximately 10-20 participants) representing the target audience. This preliminary step strengthens research by:

- **Identifying Clarity Issues**: The pilot test helps pinpoint any ambiguity in instructions or questions. For instance, a participant might struggle with technical terms, prompting revisions to ensure clarity and understanding.
- **Evaluating Question Appropriateness**: The pilot test assesses if chosen question types (e.g., multiple-choice, Likert scale, open-ended) effectively gather desired data. For example, inadequate answer options in a multiple-choice question may prompt refinement or a switch to a more suitable question type.
- **Improving Flow and Sequencing**: The pilot test reviews question flow and sequence. Is the order logical and participant-friendly? Does one question potentially bias the response to another? Adjustments based on pilot testing ensure a more coherent and user-friendly questionnaire.

Benefits for the Main Study:

By proactively addressing these issues through pilot testing, the quality of data collected in the main study is significantly improved:

- **Enhanced Data Reliability**: Clear questions lead to more accurate responses, enhancing data reliability in the main study.
- **Reduced Participant Confusion**: A user-friendly questionnaire minimizes confusion, resulting in higher completion rates during the main study.
- **More Focused Analysis**: Identifying appropriate question types ensures collected data directly addresses research objectives, facilitating more focused and insightful analysis.

QUESTIONNAIRE:

Part 1: Respondent Demographics
Industry: (Please select one)
Finance
Technology
Retail
Manufacturing
Other (Please specify): _____
Job Title: (Please specify)
Organization Size: (Please select one)
Fewer than 100 employees
100-499 employees
500-999 employees
1,000 employees or more
Part 2: Cryptocurrency Management Practices

Does your organization currently hold or invest in any cryptocurrency? (Yes/No)
If yes, which of the following cryptocurrencies does your organization hold or invest in? (Select all that apply)
Bitcoin (BTC)
Ethereum (ETH)
Litecoin (LTC)
Other (Please specify): _____
On a scale of 1 (Very Uncomfortable) to 5 (Very Comfortable), how comfortable are you with the level of volatility associated with cryptocurrency?
In your opinion, what are the primary reasons your organization chooses to (or not) integrate cryptocurrency into its financial strategies? (Please elaborate)
Does your organization have a formal risk management framework in place for cryptocurrency investments? (Yes/No)
If yes, please briefly describe the key elements of your organization's cryptocurrency risk management framework. (Please elaborate)
Part 3: Concluding Questions
Do you have any additional comments or feedback regarding cryptocurrency management in organizations? (Please elaborate)
Thank you for your participation!

DATA ANALYSIS AND INTERPRETATION

Data Preparation and Processing for Cryptocurrency Management Research

Upon data collection from surveys, here is a general outline of the data preparation and processing procedure:

- **Data Cleaning**:
- Address missing data entries by deciding on an imputation strategy based on the extent and pattern of missingness (e.g., mean imputation, listwise deletion).
- Identify and handle outliers by assessing whether they are genuine data points or errors. Extreme values may require winsorization or removal to prevent significant data skew.
- Ensure data consistency by standardizing currency entries into a single unit (e.g., USD).
- **Data Coding**:
- Convert categorical variables (e.g., Industry) into numerical values suitable for statistical analysis.
- **Data Transformation**:
- Apply transformations (e.g., log transformation) to skewed data to achieve normality as needed for specific statistical tests.

Editing Issues:

- Resolve inconsistent data formats (e.g., dates, currencies) through cleaning and standardization.
- Categorize or perform thematic analysis on open-ended responses to identify recurring themes.

Statistical Techniques: The selection of statistical methods depends on research questions and data types:

- **Descriptive Statistics**:
- Use frequency tables and percentages to summarize categorical data (e.g., industry distribution).
- Employ measures of central tendency (mean, median) and dispersion (standard deviation) to describe numerical data (e.g., comfort level with volatility).
- **Inferential Statistics**:
- Utilize chi-square tests to analyze relationships between categorical variables (e.g., industry and cryptocurrency adoption).
- Conduct correlation analysis to assess the strength and direction of relationships between numerical variables (e.g., comfort level with volatility and risk management framework usage).
- Consider regression analysis to model relationships between independent and dependent variables (e.g., impact of risk management practices on investment decisions).

Choosing Statistical Procedures:

- Select statistical methods based on data type (categorical vs. numerical) and research objectives (descriptive vs. inferential).
- Use appropriate methods aligned with the level of measurement of variables (nominal, ordinal, interval, or ratio).

Data Analysis and Interpretation:

- For example, if investigating the relationship between comfort level with cryptocurrency volatility and the use of risk management frameworks:
- Conduct a correlation analysis between comfort level (numerical) and the presence of a risk management framework (categorical).
- Interpretation of significant positive correlation would suggest that organizations with higher comfort levels towards volatility are more likely to adopt formal risk management frameworks, indicating a proactive risk management approach.

SECURITY OF CRYPTOCURRENCIES

The security of cryptocurrencies is crucial for their widespread adoption and future development, particularly when evaluating Bitcoin and its network. Key elements contributing to cryptocurrency security include blockchain technology and mining, consensus mechanisms, and effective key management.

Blockchain & Mining: The blockchain serves as a fundamental component of cryptocurrency security by recording the entire transaction history of the network in a public ledger. Attempts to alter information on the blockchain are rendered nearly impossible due to cryptographic hash values linking current and subsequent blocks. This inherent immutability ensures the integrity of the data stored on the blockchain, making it resistant to tampering by hackers.

Miners play a critical role in regulating the blockchain by validating transactions and creating new blocks through solving complex cryptographic puzzles. The Proof-of-Work (PoW) consensus algorithm, a

decentralized system, incentivizes miners to act fairly through the investment of significant financial and time resources. Cheating by miners is discouraged by the risk of being permanently banned from the Bitcoin network and losing their initial investment, thereby preserving the decentralized nature of the blockchain.

Consensus Mechanisms: The consensus protocol, exemplified by PoW, facilitates agreement on the state of the blockchain among distributed nodes. This consensus is achieved through solving complex mathematical puzzles to validate transactions and secure the network. PoW prevents any single user from exerting undue influence over the blockchain, ensuring decentralization and network integrity.

Key Management: Key management is essential for securing cryptocurrency ownership. Users control their funds through public and private keys, with the private key being critical for authorizing transactions. The offline storage of private keys significantly enhances security by making it exceedingly difficult for hackers to access and compromise them. Additionally, the use of hashed public keys provides user anonymity and further protects against system breaches.

Despite these robust security measures, the blockchain ecosystem remains vulnerable to attacks, as evidenced by past incidents and attempted breaches. Continuous efforts to enhance security protocols and address vulnerabilities are essential to safeguarding cryptocurrency networks against evolving threats.

In summary, cryptocurrency security relies on the immutability of blockchain technology, decentralized consensus mechanisms, and effective key management practices. These foundational elements collectively ensure the integrity, trustworthiness, and resilience of cryptocurrency networks, fostering greater confidence in their adoption and sustained growth.