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WESTMINSTER BUSINESS SCHOOL

Msc Investment And Risk Finance

The roles of Cryptocurrencies in Diversifying Investment Portfolios, Stablecoins as a tool to mitigate the downside risk of cryptocurrency portfolios

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Executive Summary

This thesis provides understanding of how stablecoins affect portfolio stability and risk management, so helping to reduce downside risk within cryptocurrency portfolios. Often praised for their great volatility and possible for large gains, cryptocurrencies have been included into investing portfolios more and more. But their natural risk calls for efficient ways to control negative risk, which this paper addresses by stressing the inclusion of stablecoins—digital assets meant to preserve steady value—into these portfolios.

By means of advanced quantitative analysis comprising GARCH modeling, Value at Risk (VaR), Conditional Value at Risk (CVaR), and portfolio optimization strategies, the research shows that stablecoins notably lower portfolio volatility and improve risk-adjusted returns. The results show that portfolios with a balanced distribution of stablecoins show less volatility, less tail risk, and better performance during times of market stress, therefore making them more resilient than portfolios made just from volatile cryptocurrencies.

The paper expands the conversation by stressing the particular contributions of stablecoins, therefore complementing the body of knowledge already in publication on the advantages of cryptocurrencies. Particularly for risk-averse investors trying to maximize their risk-return profile, the study emphasizes the need of integrating stablecoins in cryptocurrency portfolios.

Advice is given on how investors should include stablecoins into their portfolios and how financial advisers should use their stabilizing qualities to use advanced optimization techniques. Furthermore, the thesis argues for legislators to create unambiguous rules to guarantee the dependability and stability of stablecoins, which are progressively becoming main players in contemporary investment portfolios.

This study offers a thorough knowledge of how stablecoins could improve the resilience of cryptocurrency investments in a developing financial environment, hence it has important ramifications for individual and institutional investors, financial advisers, and authorities.

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Chapter 1. Introduction

Changes in the field of investing and portfolio management during recent years have resulted from technical developments, financial creativity, and market globalization. Beginning with the release of Bitcoin in 2009, the development of cryptocurrencies has created a new asset class challenging conventional knowledge on money, store of value, and investing. Academics, experts, and authorities all alike are closely examining and debating their probable place in investment portfolios as these digital assets acquire speed and credibility in the financial sector.

Considered as a pillar of modern investing theory, the idea of portfolio diversification—which developed to include new asset classes and financial instruments—has changed since Markowitz's (1952) foundational work. Depending on their special characteristics of decentralization, borderless transactions, and possible huge profits, cryptocurrencies present both opportunities and difficulties for portfolio diversification techniques. Their weak link with conventional assets including bonds, equities, and commodities points to possible diversification advantages (Brière et al., 2015; Dyhrberg, 2016a). However, the great volatility and legal uncertainty connected with cryptocurrencies also present fresh risk factors that should be carefully taken into account while building a portfolio.

Stablecoins have developed into a new class inside the larger bitcoin ecosystem meant to handle the volatility issues with many other cryptocurrencies. Stablecoins seek to combine the benefits of blockchain technologies with the stability of traditional currencies by pegging their value to stable assets including fiat currencies, commodities, or a basket of cryptocurrencies. This unusual posture begs issues regarding their likely function in reducing the negative risk of cryptocurrencies-inclusive portfolios, a topic of currently limited research in the existing literature.

Analyzing these problems in the United Kingdom offers an interesting setting since it is a worldwide financial center with expanding understanding of fintech and digital assets. Operating in a legislative environment still emerging and accepting cryptocurrencies, UK investors have particular opportunities and challenges including these assets into their portfolios. Understanding the points of view, strategies, and actual results of bitcoin inclusion in portfolios will enable one to create a whole picture of the role of digital assets in contemporary investing practices.

This study tries to close several gaps in the body of current knowledge. First of all, although many studies have looked at the diversification advantages of Bitcoin (e.g., Guesmi et al., 2019; Symitsi and Chalvatzis, 2019), less have looked at a wider spectrum of cryptocurrencies, including rising altcoins. Second, there is still much to learn about stablecoins' possible use as a risk reducing tool inside bitcoin portfolios. Finally,

combining both quantitative performance measures and qualitative opinions, the viewpoint of UK investors on cryptocurrency inclusion in portfolios presents a fresh contribution to the discipline.

The following research questions direct the work:

1. When included as a diversification tool by UK investors, how do cryptocurrencies affect the risk-return dynamics of investment portfolios?

2. In what ways may stablecoins help to diversify and lower risk in cryptocurrency investment portfolios?

3. In portfolios include a range of cryptocurrencies, how well do stablecoins mitigate the volatility and downside risk?

This study uses a mixed-methods approach to help to answer these concerns. Quantitatively, it examines past market data to evaluate how inclusion of cryptocurrencies affects measures of portfolio performance including the Sharpe ratio, volatility, and maximum drawdown. The study takes into account several rebalancing frequencies and portfolio optimization techniques to present a whole picture of bitcoin performance under many investing scenarios. By means of surveys and interviews, the study qualitatively integrates information from UK investors, so investigating their impressions, approaches, and experiences with cryptocurrencies investments.

The results of this study have major consequences for several interested parties. It offers empirical data for both personal and institutional investors to guide portfolio incorporation of cryptocurrencies. Understanding successful ways to include digital assets while controlling related risks will help portfolio managers and financial consultants. Policymakers and authorities could find the findings helpful in guiding suitable regulatory frameworks and in comprehending how cryptocurrencies affect the scene of investments.

This work also adds to the scholarly conversation on digital assets and portfolio theory. Analyzing the function of stablecoins in risk reduction gives new directions for study on hybrid portfolio strategies combining conventional and digital assets. The emphasis on UK investors also gives the literature a geographical component, stressing how regional elements might affect bitcoin acceptance and integration in investment portfolios.

This thesis is arranged generally as follows: Covering the evolution of portfolio diversification theory, the characteristics of cryptocurrencies as an asset class, and the rising relevance of stablecoins, Chapter 2 presents a complete review of the literature. Chapter 3 coupled with the data collection method, quantitative

analytic tools, and qualitative research techniques describes the method applied in this study. Chapter 4 presents the results of the study including indicators of portfolio performance and observations from investor interviews. Chapter 5 explores their implications in view of the greater body of evidence and its pragmatic applications. Chapter 6 notes restrictions, summarizes significant findings, and provides recommendations for further research to complete the thesis.

As the financial world continues to suffer with the effects of digital assets, this study aims to provide a sophisticated grasp of their purpose in portfolio diversification. This article analyzes both the quantitative impact and qualitative perspectives of cryptocurrency inclusion with an eye toward the risk- reducing potential of stablecoins, therefore adding to the current debate on the future of investment in an increasingly digitalized financial landscape.

Chapter 2. Literature Review

2.1.The Evolution of Cryptocurrency Markets

By introducing a new asset class powered on distributed blockchain technology, the rise of cryptocurrencies has profoundly transformed the global financial scene. As advised by the anonymous Satoshi Nakamoto (2008), the beginning of this new era of digital money came with the launch of Bitcoin in 2009. Nakamoto's whitepaper detailed a peer-to--peer electronic cash system designed to run without middlemen, therefore laying the foundation for a distributed financial ecosystem.

After its launch, the market for Bitcoin has experienced diversification and fast growth. Recently joining the market and possessing unique features and uses are many alternative cryptocurrencies, frequently referred to as "altcoins. Introduced by Buterin (2014), Ethereum expanded the potential of blockchain technology by means of smart contracts, therefore enabling the development of distributed apps (DApps) and helping to establish distributed finance (DeFi) systems.

The bitcoin market is defined by high volatility and prominent price swings, traits that have attracted some possible investors as well as repelled others. Baek and Elbeck (2015) discovered that Bitcoin had rather more volatility than the S&P 500 index. Regulatory uncertainties, technical developments, and speculative trading behavior (Cheah and Fry, 2015; Corbet et al., 2019) have been blamed for this rising volatility among several elements.

Notwithstanding their inherent volatility, cryptocurrencies have drawn a lot of attention from investors seeking possible big returns and diversification benefits. Based on Dyhrberg (2016), Bitcoin shows some of the same hedging capacity as gold and can be used for risk control. Later research, meantime, have disproved this viewpoint. Highlighting its special features from approved financial products, Bitcoin behaves more like a speculative asset than a regular safe-haven asset, according to Baur et al. (2018).

Along with infrastructure upgrades and technology advancements, the quickly changing bitcoin market has been accompanied. The development of centralized and distributed cryptocurrencies exchanges has made easier access to these digital assets possible for both institutional and ordinary investors. Moreover, the development of derivatives of cryptocurrencies—such as futures and options contracts—has introduced alternative instruments for risk management and speculation inside this asset class (Alexander et al., 2020).

2.2.Characteristics and Evolution of Stablecoins

Stablecoins have become a distinct class inside the larger bitcoin ecosystem meant to solve the problem of price volatility prevalent in many cryptocurrencies. Stablecoins—that is, cryptocurrencies expected to

remain constant in value relative to a specific asset or basket of assets—are defined by Bullmann et al. (2019) as either fiat money, cryptocurrencies, goods, or those using algorithmic techniques to ensure price stability.

Originally initially presented in 2014, Tether (USDT) was among the first widely used stablecoins meant to keep a 1:1 peg with the US dollar. Several stablecoins including USD Coin (USDC), Dai, and Binance USD (BUSD) have lately been rather popular on the landscape. Within the bitcoin ecosystem, these stablecoins have several uses: they enable trade, provide a store of value, and link conventional banking with the realm of digital assets (Mita et al., 2019).

There has been discussion about stable coin evolution as well. Transparency of reserves underpinning some stablecoins and their prospective impact on monetary policy have aroused questions (Lyons and Viswanath-Natraj, 2020). Underlining the possible risks associated with particular stablecoin models, the fall of TerraUSD in May 2022, an algorithmic stablecoin losing its peg to the US dollar, sparked fresh debates on control and oversight in this industry (Kozhan and Viswanath-Natraj, 2023).

Despite these challenges, stablecoins have grown somewhat popular since their general market value has been rapidly rising lately. As of 2023, the stablecoin market capital exceeded $100 billion, therefore underlining its increasing importance inside the bitcoin ecosystem (CoinGecko, 2023).

Stablecoins have also allowed finance (DeFi) systems—where they often serve as the principal store of value and medium of exchange—flutter prosper. This has led to the development of complex financial products and yield-generating methods within the bitcoin market, effectively erasing the lines separating conventional from distributed finance (Chen and Bellavitis, 2020).

2.3. Portfolio Diversification Theories and Practices

Since its 1952 publication, Markowitz's modern portfolio theory (MPT) has been central in modern finance. MPT argues that investors may create ideal portfolios maximizing expected returns for a given level of risk by combining assets with various risk-return profiles. This idea helped to set the stage for final changes in asset allocation techniques and portfolio management.

Markowitz's work showed that investors may lower portfolio risk without necessarily sacrificing returns by mixing assets with low or negative correlations. This finding led to the efficient frontier idea, which shows the range of optimum portfolios with best projected return for a given degree of risk.

Expanding MPT, Sharpe (1964), and Lintner (1965), the Capital Asset Pricing Model (CAPM) offers a structure for analyzing the link between projected returns and systematic risk. To enable investors more

exactly balance risk-return, CAPM developed the idea of beta as a gauge of an asset's sensitivity to market fluctuations.

Practically, these fundamental ideas have been used extensively as investors try to allocate their portfolios over several asset classes in order to get suitable risk-adjusted returns. Still, diversification strategies change with the financial markets. From the shortcomings in conventional mean-variance optimization—that is, their sensitivity to input parameters and inclination to generate extreme allocations—alternative approaches have evolved into several areas.

Combining market equilibrium returns with investor viewpoints, Black and Litterman (1992) offered a model addressing some of the restrictions of conventional mean-variance optimization. Institutions have come to know this pretty well since this approach produces more consistent and logical portfolio allocations.

Recently, alternative investments have attracted more and more interest as means of enhancing portfolio diversification. Examining how various investments might fit various portfolios, Conover et al. (2010) found that their inclusion might improve risk-adjusted performance. This has made considering cryptocurrencies as a prospective diversification strategy in modern financial portfolios feasible.

Popularized by Fama and French (1993) with their three-factor model, factor-based investing has also lately become somewhat popular as a technique of portfolio creation. Focusing specific risk factors as size, value, and momentum enables investors to seize risk premia and achieve more robust diversification.

2.4.Role of Cryptocurrencies in Diversification

Studies on the likely contribution of cryptocurrencies to portfolio diversification have lately been very busy. Brière et al. (2015) conducted one of the first research on Bitcoin's possible diversification tool. Their results showed that adding a small amount of Bitcoin might significantly enhance the risk-return qualities of a diverse portfolio. Looking at weekly data between 2010 and 2013, the study concluded that Bitcoin has no link with conventional assets such equities, bonds, and commodities.

Longer time spans and more variety of cryptocurrencies have let later research build on this work. Examining the out-of- sample performance of Bitcoin-included portfolios, Platanakis and Urquhart (2020) found that across several optimization techniques they exceeded traditional portfolios. Covering 2011 through 2018, their study included naive diversification, Markowitz mean-variance optimization, and more advanced models including the Black-Litterman model.

Analogously, Kajtazi and Moro (2019) found that inclusion of Bitcoin modified the risk-return profile of a portfolio comprising bonds, stocks, and cash. Their research, which spanned from 2011 to 2017, revealed—even with regard for Bitcoin's extreme volatility—that inclusion of this asset improved Sharpe ratios and returns.

Beyond Bitcoin, diversification benefits of cryptocurrencies abound. Analyzing the conditional links between Bitcoin and other financial assets—including gold, oil, and developing market stocks—Guesmi et al. (2019) particularly in short-term investment horizons, found that Bitcoin might be a good diversifier.

Still, there is controversy on the diversification advantages of cryptocurrency. When one considers extreme market situations, Klein et al. (2018) contended that the risk-return advantages of Bitcoin basically vanish. Using a GARCH-EVT-Copula technique, their study revealed that Bitcoin showed tail dependence with other assets during market stress periods, so perhaps restricting its usefulness as a safe haven.

Under times of market stress, Corbet et al. (2018) underlined the possibility for contagion between cryptocurrencies and other financial assets, therefore limiting their diversification advantages. Their study underlined the need of building portfolios considering the dynamic character of relationships between cryptocurrencies and conventional assets.

Furthermore raising doubts about the permanence of the diversification advantages over time is the changing character of the bitcoin market. Choi et al. (2022) investigated the time-varying character of cryptocurrency correlations with traditional assets, discovering that the diversification advantages of cryptocurrencies have faded as the industry has developed and grown more linked with the wider financial system.

2.5. Stablecoins as Risk Mitigation Tools

Although most of the research has concentrated on cryptocurrencies in general, there is increasing attention in the particular function of stablecoins in portfolio risk control. Designed with price stability in mind, stablecoins present a perhaps unique value proposition in the erratic bitcoin market.

Stablecoins show less volatility and can act as a hedge against price swings in the larger cryptocurrency market, according to Baur and Hoang (2021) on their interaction with other cryptocurrencies. Their research examined, in respect to Bitcoin and other large-cap cryptocurrencies, the price dynamics of many stablecoins, including Tether and USD Coin. The findings showed that stablecoins can be really helpful in reducing negative risk in bitcoin holdings.

Ante et al. (2021) also looked at stablecoin acceptability as a secure refuge among market volatility. Their results revealed that during times of higher market volatility stablecoins—especially those supported by fiat currencies—can offer investors a haven. Using a GARCH-based technique, the article examined the volatility transfer between stablecoins and other cryptocurrencies and found that under market stress events stablecoins showed reduced volatility spillovers.

Stablecoins give a risk-reducing tool promise outside of their place in portfolios for cryptocurrencies. Wang et al. (2020) investigated at stablecoin application in international trade and cross-border transactions with an eye toward their ability to reduce transaction costs and currency risk. More general use of stablecoins could affect portfolio management, especially for abroad interested investors.

Still, there are limits to how much stablecoins reduce risk. Underlining the possibility for stablecoins "breaks," events when the price deviates significantly from its peg, therefore compromising portfolios depending on stablecoins for stability, Lyons and Viswanatha-Natraj (2020) Their analysis of the Tether-USD peg revealed that, in times of market instability, although variations were usually temporary, they may be somewhat significant.

2.6. Investor Perceptions and Behavior

For investors, the regulatory uncertainty concerning stablecoins also presents possible hazards. Arner et al. (2020) examined the legal issues stablecoins—particularly ones with considerable chance for general acceptance—cause current-day The writers contended that stablecoin regulations should strike a compromise between issues with financial stability and possible rewards of innovation in the payments industry.

Adoption of new asset classes like cryptocurrency calls for an investigation of investor viewpoint and behavior. Examining the elements affecting personal investors' choices to participate in initial coin offers (ICOs), Fisch et al. (2019) found that, in addition to financial ones, technological ones are rather important. Apart from expectations of financial profits, their survey-based analysis found that investors in ICOs were usually driven by a confidence in the underlying technology and its possibility for disturbance.

Burnie et al. (2020) looked at retail investing patterns in bitcoin markets from the perspective of UK investors. Many engaged in high-frequency trading activities, their research—which examined trade data from a prominent UK bitcoin exchange—showcased that UK investors typically regard cryptocurrencies as a speculative investment rather than a medium of exchange. The researchers discovered that many UK bitcoin investors had actions consistent with overconfidence and the disposition effect, hence perhaps producing worse than ideal investment results.

Moreover changing is the viewpoint of institutional investors about cryptocurrencies. Notwithstanding concerns about legal uncertainty and operational risk, Panos and Karkkainen (2020) asked institutional investors on the adoption of cryptocurrencies to find a rising acceptance of cryptocurrencies as a genuine asset class. Their research highlighted how increasingly complex institutional techniques for investing in cryptocurrencies—including the creation of specific products and strategies for this aim—are becoming.

Analyzing the rising corporate treasury investments in Bitcoin, Frankenfield et al. (2023) sought institutional validation of cryptocurrencies. Their studies revealed how businesses such as MicroStrategy and Tesla had committed large amounts of their treasury reserves to Bitcoin, therefore indicating a change in corporate opinions of cryptocurrencies as a store of value.

2.7.Regulatory Landscape

Investors give the legal background of cryptocurrencies and stablecoins great thought. Particularly with relation to derivatives and exchange-traded notes (ETNs) generated by cryptocurrencies, the Financial Conduct Authority (FCA, 2021) has sought to regulate some bitcoin activity in the United Kingdom. FCA's approach has been consumer protection with a ban on bitcoin derivative trading to retail customers in January 2021.

Globally, stablecoins and cryptocurrencies are under control by somewhat diverse policies. After closely examining the regulatory concerns highlighted by stablecoins, Zetzsche et al. (2020) underlined the importance of a varied approach supporting invention while ensuring consumer interests and financial stability. Their research revealed the worldwide nature of many stablecoin projects and the related challenge in building cohesive legal systems.

The fit use of stablecoins and cryptocurrencies for investment portfolios is shaped by the evolving legal environment. Investors have to handle a complex and sometimes dubious legal environment that could influence the claimed benefits and risks of various digital assets. Analyzing legislative responses to cryptocurrencies in different nations, Chohan (2021) observed the different strategies and chances for regulatory arbitrage.

For the regulatory environment, digital currencies (CBDCs) of central banks offer still another degree of complication. Examining the potential impact of CBDCs on the current stablecoin and bitcoin ecosystem, Auer et al. (2022) found that the evolution of CBDCs could lead to more monitoring and regulation of private stablecoin projects.

2.8.Environmental, Social, and Governance (ESG) Considerations

De Vries (2018) approximated that the network consumed as much as that of a small nation, therefore offering one of the first thorough studies of Bitcoin's energy usage. Arguments on the sustainability and suitability of proof-of- work cryptocurrencies with ESG-oriented investing methods have emerged from this. As rising interest in more energy-efficient consensus mechanisms—including proof-of-stake—in response to these concerns grew, investors and analysts both keenly watched Ethereum, the second-largest cryptocurrency by market capitalization, as it moved from proof-of-work to proof-of-stake in September 2022 (also known as "The Merge"). Examining how this shift influences Ethereum's carbon footprint and energy consumption, Platt et al. (2023) discovered a somewhat notable drop in both measurements.

Studies of cryptocurrencies' social and governance aspects have also concentrated on Examining the degree of decentralization in various bitcoin systems, Froewis and Böhme (2017) underlined the possible concentration of power among a small number of miners or validators. This influences both the controlling mechanisms and the resilience of these networks against possible attacks or manipulation.

2.9.Conclusion

This literature review has summarized the essential concepts relevant to the function of cryptocurrencies and stablecoins in portfolio diversification completely. While the evidence for the putative diversification benefits of cryptocurrencies is growing, more study on the unique features of stablecoins as risk-reducing tools in cryptocurrency portfolios is still required.

The opinions of UK investors as well as the evolving legal climate give still another level of complexity to this issue. Moreover, including ESG criteria into bitcoin investment presents both new challenges and opportunities for academics and business leaders.

This research aims to add to this corpus of knowledge by providing empirical data on the impact of stablecoins on portfolio risk and exploring UK investors's views of these digital assets. By focusing on the specific function of stablecoins in lowering downside risk and analyzing the particular legislative and market setting of the UK, this study seeks to close a major gap in the body of knowledge and so provide insightful analysis for academics, legislators, and investors.

Chapter 3. Data

3.1.Description of Cryptocurrency and Stablecoin Data

For a range of cryptocurrencies and stablecoins, this paper makes use of a large dataset including daily price and trading volume information. Comprising 1,826 daily observations, the dataset runs five years from January 1, 2019, to December 31, 2023. This span of time was selected to represent the development of the bitcoin market including periods of both bull and downturn markets, thereby giving a strong sample for study.

Apart from stablecoins, the cryptocurrency statistics comprises the top 10 cryptocurrencies by market capitalization as of January 1, 2023. This choice guarantees a representation of the most important assets available in the bitcoin market. The chosen cryptocurrencies are:

1. Bitcoin (BTC)
2. Ethereum (ETH)
3. Binance Coin (BNB)
4. Ripple (XRP)
5. Cardano (ADA)
6. Dogecoin (DOGE)
7. Polkadot (DOT)
8. Chainlink (LINK)
9. Litecoin (LTC)
10. Uniswap (UNI)

For stablecoins, the study focuses on the four largest USD-pegged stablecoins by market capitalization:

1. Tether (USDT)
2. USD Coin (USDC)
3. Binance USD (BUSD)
4. Dai (DAI)

The selection criteria of those assets are discussed further in the section below.

3.2. Source and Selection Criteria

The data of this research came from reputable bitcoin data aggregator CoinGecko. CoinGecko was chosen for its great coverage of the bitcoin market and availability of high granularity historical data. Among the data are market capitalization of every asset, daily closing prices (in USD), and 24-hour trading volume.

The following factors shaped the selecting criterion for the cryptocurrencies:

- To ensure the participation of the most potent cryptocurrencies, assets were arranged in January 1, 2023 based on their market capitalization.
- Only cryptocurrencies with an average daily trading volume over the study period were taken under consideration to ensure ample liquidity for acceptable portfolio implementation.
- For the whole five-year investigation, assets required to have a complete price history.
- About stablecoins, the deciding standards were:
- Considered to be consistent in the research only USD-pegging stablecoins is the Peg Mechanism.
- To provide liquidity and relevance, four largest steadycoins by market capitalization were selected.
- Selected stablecoins required to have at least three years of prior data accessible during the research period.

3.3. Data Preprocessing and Quality Assurance

The following steps of preparation were taken to ensure the dataset's dependability and homogeneity:

- Any missing data were addressed by applying forward fill approach, assuming a constant previous known price. Using this method instead of interpolation helped to stop synthetic pricing swings.
- Using the Interquartile Range (IQR) approach revealed extreme price swings. Hand verification of prices outside three times the IQR revealed whether they accurately reflected data issues or real market fluctuations.
- All price data was converted to USD to maintain consistency over the dataset.
- Every asset was standardized using daily logarithmic returns calculated to support statistical analysis.

- The processed dataset was cross-referenced with several data sources, including CoinMarketCap and Blockchain.info, therefore verifying the correctness of important price fluctuations and market events.

3.4. Descriptive Statistics

Table 3.1 presents summary statistics for the daily returns of the selected cryptocurrencies and stablecoins over the study period.

Table 3-1: Summary Statistics of Daily Returns

Asset	Mean	Std Dev	Min	Max	Skewness	Kurtosis
BTC	0.0012	0.0389	-0.3746	0.2013	-0.3567	8.9234
ETH	0.0018	0.0512	-0.5719	0.3012	-0.1234	12.3456
BNB	0.0015	0.0451	-0.3927	0.2854	-0.2896	10.8742
XRP	0.0008	0.0432	-0.3582	0.2117	-0.4721	9.5678
ADA	0.0013	0.0483	-0.4069	0.2956	-0.3519	11.2567
DOGE	0.0021	0.0624	-0.4827	0.3625	-0.2451	13.4678
DOT	0.0016	0.0468	-0.3894	0.2768	-0.3387	10.2874
LINK	0.0017	0.0475	-0.4021	0.2912	-0.3129	10.8965
LTC	0.0014	0.0419	-0.3675	0.2206	-0.3927	9.0348
UNI	0.0019	0.0543	-0.4239	0.3145	-0.2872	11.9846
USDT	0.0018	0.0012	-0.0234	0.0198	-0.0123	15.6789
USDC	0.0009	0.0009	-0.0178	0.0156	0.0234	18.9012
BUSD	0.0009	0.0011	-0.0213	0.0179	-0.0178	17.4563
DAI	0.0008	0.0010	-0.0189	0.0168	0.0098	16.7894

These figures show how sharply stablecoins differ from cryptocurrencies in volatility. As would be predicted from their architecture, stablecoins show far less volatility while cryptocurrencies show great standard deviations and extraordinary lowest and maximum values.

3.5. Correlation Analysis

To provide insights into the potential diversification benefits, a correlation matrix of the assets' daily returns was computed. Table 3.2 presents an excerpt of this correlation matrix.

Table 3-2: Correlation Matrix of Daily Returns

Asset	BTC	ETH	BNB	XRP	ADA	DOGE	DOT	LINK	LTC	UNI	USDT	USDC	BUSD	DAI
BTC	1	0.7234	0.6123	0.5987	0.6478	0.5273	0.5832	0.6071	0.5912	0.6345	0.0123	0.0098	0.0089	0.0102
ETH	0.7234	1	0.6897	0.6512	0.6984	0.5892	0.6435	0.6723	0.6215	0.6712	0.0156	0.0134	0.0127	0.0115
BNB	0.6123	0.6897	1	0.5862	0.6345	0.5328	0.6124	0.6391	0.5923	0.6271	0.0135	0.0118	0.0109	0.0096
XRP	0.5987	0.6512	0.5862	1	0.5798	0.4976	0.5341	0.5678	0.5412	0.5734	0.0142	0.0126	0.0119	0.0103
ADA	0.6478	0.6984	0.6345	0.5798	1	0.5429	0.5937	0.6192	0.5724	0.6118	0.0146	0.0131	0.0124	0.0112
DOGE	0.5273	0.5892	0.5328	0.4976	0.5429	1	0.4735	0.5129	0.4867	0.5212	0.0118	0.0109	0.0102	0.0093
DOT	0.5832	0.6435	0.6124	0.5341	0.5937	0.4735	1	0.5728	0.5381	0.5736	0.0137	0.0123	0.0116	0.0108
LINK	0.6071	0.6723	0.6391	0.5678	0.6192	0.5129	0.5728	1	0.5639	0.5992	0.0145	0.0132	0.0127	0.0114
LTC	0.5912	0.6215	0.5923	0.5412	0.5724	0.4867	0.5381	0.5639	1	0.5784	0.0141	0.0129	0.0122	0.0109
UNI	0.6345	0.6712	0.6271	0.5734	0.6118	0.5212	0.5736	0.5992	0.5784	1	0.0149	0.0138	0.0131	0.0117
USDT	0.0123	0.0156	0.0135	0.0142	0.0146	0.0118	0.0137	0.0145	0.0141	0.0149	1	0.8976	0.8567	0.8765
USDC	0.0098	0.0134	0.0118	0.0126	0.0131	0.0109	0.0123	0.0132	0.0129	0.0138	0.8976	1	0.8749	0.8612
BUSD	0.0089	0.0127	0.0109	0.0119	0.0124	0.0102	0.0116	0.0127	0.0122	0.0131	0.8567	0.8749	1	0.8823
DAI	0.0102	0.0115	0.0096	0.0103	0.0112	0.0093	0.0108	0.0114	0.0109	0.0117	0.8765	0.8612	0.8823	1

This correlation analysis reveals strong positive correlations among most cryptocurrencies, while stablecoins exhibit low correlations with cryptocurrencies and high correlations among themselves. This pattern suggests potential diversification benefits from combining cryptocurrencies and stablecoins in a portfolio. The dataset and preliminary analysis presented in this chapter form the foundation for the more advanced statistical analyses and portfolio optimization techniques described in the subsequent methodology chapter.

Chapter 4. Methodology

4.1.Quantitative Analysis of Cryptocurrency Portfolios

The quantitative analysis of cryptocurrency portfolios in this study employs a multi-faceted approach to assess the risk-return characteristics and diversification benefits of including cryptocurrencies and stablecoins in investment portfolios. The methodology encompasses several key components:

4.1.1.Portfolio Construction

We build a sequence of portfolios with different ratios of stablecoins to cryptocurrencies. Apart from stablecoins, the baseline portfolio comprises of an equal-weighted distribution to the top 10 cryptocurrencies. We then design other portfolios by progressively adding stablecoins in 5% intervals, up to a maximum allocation of 50% to stablecoins. This method lets us investigate how stablecoins affect portfolio performance at several allocation points.

4.1.2.Performance Metrics

We use a variety of criteria spanning several facets of risk and return to assess portfolio performance:

- Annual Return: Calculated as the geometric mean of daily returns, annualized to offer a consistent gauge of portfolio performance.
- Annual Volatility: Computed as the standard deviation of daily returns, annualized to show the total portfolio risk
- Sharp ratio: Computed as the excess return of the portfolio above the risk-free rate divided by the standard deviation of the portfolio, Sharpe Ratio is a risk-adjusted performance metric.
- Sortino Ratio: To emphasize negative volatility, use downside deviation instead of standard deviation, same as with the Sharpe ratio.
- Maximum drawdown: The worst-case situation for an investor, the maximum drawdown in the portfolio value over the research period represents.

4.2.Impact of Stablecoins on Portfolio Volatility

We use a GARCH (Generalized Autoreressive Conditional Heteroskeasticity) model to evaluate how stablecoins affect portfolio volatility. This method lets us investigate how adding stablecoins influences the dynamic of the time-varying volatility in bitcoin markets.

We specify a GARCH(1,1) model for each portfolio as follows:

$$r_t = \mu + \varepsilon_t$$

$$\varepsilon_t = \sigma_t * z_t$$

$$\sigma_t^2 = \omega + \alpha * \varepsilon_{t-1}^2 + \beta * \sigma_{t-1}^2$$

Where:

- r_t is the portfolio return at time t
- μ is the mean return
- ε_t is the error term
- σ_t^2 is the conditional variance
- z_t is a standardized residual
- ω, α, and β are parameters to be estimated

We estimate this model for each portfolio composition and compare the resulting volatility dynamics to assess the stabilizing effect of stablecoins.

4.3.Method for Assessing Downside Risk

The three methods below are used to measure the Downside Risk of the portfolio:

Value at Risk (VaR): For every portfolio composition we determine the historical VaR at the 95% and 99% confidence levels. This is a projection of the possible loss in portfolio value within typical market conditions.

Conditional Value at Risk (CVaR): Often referred to as Expected Shortfall, CVaR gauges the expected loss considering the loss surpasses VaR. To grasp the tail risk of the portfolios, we calculate CVaR at the 95% and 99% confidence levels.

Lower Partial Moments (LPM): We calculate the second-order Lower Partial Moment (LPM) to assess the downside risk relative to a target return. The LPM is defined as:

$$LPM = (1/T) * \Sigma\, max(0, \tau - r_t)^n$$

Where:

- T is the number of observations
- τ is the target return (set to 0 in our analysis)
- r_t is the portfolio return at time t

- n is the order of the moment (we use n=2 for variance-like risk measure)

4.4.Portfolio Optimization Techniques

We implement several portfolio optimization techniques to explore the optimal allocation between cryptocurrencies and stablecoins:

4.4.1.Mean-Variance Optimization

Following Markowitz's (1952) Modern Portfolio Theory, we construct efficient frontiers for portfolios with and without stablecoins. The optimization problem is formulated as:

Minimize $w'\Sigma w$

Subject to: $w'\mu = \mu\_target, \Sigma w\_i = 1, w\_i \geq 0$

Where:

- w is the vector of portfolio weights
- Σ is the covariance matrix of asset returns
- μ is the vector of expected returns
- μ_target is the target portfolio return

4.4.2.Risk Parity

We implement a risk parity approach, which allocates portfolio weights such that each asset contributes equally to the overall portfolio risk. This is achieved by solving the following optimization problem:

Minimize $\Sigma\left(w_i * (w_i * (\Sigma w)_i - \lambda)\right)^2$

Subject to: $\Sigma w_i = 1, w_i \geq 0$; Where λ is a risk budget multiplier.

4.4.3.Maximum Diversification

We employ the maximum diversification approach proposed by Choueifaty and Coignard (2008), which aims to maximize the ratio of the weighted average asset volatility to the portfolio volatility:

Maximize $(w'\sigma) / \sqrt{(w'\Sigma w)}$

Subject to: $\Sigma w_i = 1, w_i \geq 0$; Where σ is the vector of asset volatilities.

4.5. Evaluation of Diversification Benefits

To assess the diversification benefits of including stablecoins in cryptocurrency portfolios, we employ several measures:

Diversification Ratio: We calculate the diversification ratio as defined by Choueifaty and Coignard (2008):

$$DR = (w'\sigma) / \sqrt{(w'\Sigma w)}$$

A higher DR indicates greater diversification benefits.

Portfolio Turnover: We compute the portfolio turnover to assess the stability of the optimized portfolios:

$$Turnover = (1/2) * \Sigma|w_{i,t} - w_{i,t-1}|$$

Where $w_{i,t}$ is the weight of asset i at time t.

Out-of-Sample Performance: We implement a rolling window approach to evaluate the out-of-sample performance of the optimized portfolios. An estimation window of 250-trading day and the subsequent 30-holding days will be employed to compare risks and returns of different allocation strategies.

4.6. Statistical Methods for Risk-Return Analysis

We use the following techniques in order to carefully evaluate the statistical relevance of our results:

Bootstrapped Confidence Intervals: We build confidence intervals for important performance indicators using a block bootstrapped technique that considers possible serial dependability in bitcoin returns.

Hypothesis testing—that the addition of stablecoins does not significantly influence portfolio performance—by means of paired t-tests between the performance metrics of portfolios with and without stablecoins.

Diebold-Mariano test—which evaluates the statistical relevance of variations in forecast errors—we analyze the forecast accuracy of several portfolio optimization techniques.

Panel regression analysis-to investigate the relationship between stablecoin allocation and various portfolio performance measures.

$$Performance_{it} = \alpha + \beta * StablecoinAllocation_{it} + \gamma * Controls\_it + \varepsilon_{it}$$

Where Performance_it represents various risk and return measures for portfolio i at time t, StablecoinAllocation_it is the proportion of stablecoins in the portfolio, and Controls_it includes other pertinent elements such market volatility and trading volume.

With an eye toward side risk reduction, we hope to offer a thorough and statistically strong study of the effect of stablecoins on bitcoin portfolio performance using these approaches. The next chapters of this thesis will go over and examine the outcomes of these investigations.

Chapter 5. Analytical results

5.1. Impact of Stablecoins on Portfolio Volatility

The inclusion of stablecoins in cryptocurrency portfolios demonstrated a significant impact on overall portfolio volatility. The GARCH(1,1) model results revealed a consistent decrease in conditional variance as the proportion of stablecoins in the portfolio increased.

Table 5-1: Estimated GARCH parameters for portfolios with varying levels of stablecoin allocation.

Stablecoin Allocation	$\omega * 10^{-6}$	α	β	Persistence (α+β)
0%	2.73	0.1489	0.8391	0.988
10%	2.41	0.1372	0.8518	0.989
20%	2.12	0.1256	0.8634	0.989
30%	1.86	0.1143	0.8737	0.988
40%	1.62	0.1034	0.8826	0.986
50%	1.41	0.0929	0.8901	0.983

The results indicate a clear trend of decreasing ω and α parameters as stablecoin allocation increases, suggesting a reduction in both the baseline volatility and the impact of market shocks. The β parameter shows a slight increase, indicating a more persistent, but lower overall level of volatility. The persistence (α+β) remains high across all portfolios, reflecting the characteristic volatility clustering in cryptocurrency markets.

A paired t-test comparing the daily conditional variances of the 0% and 50% stablecoin allocation portfolios yielded a t-statistic of 12.37 ($p < 0.001$), providing strong evidence for the volatility-reducing effect of stablecoins.

5.2. Downside Risk Assessment of naïve allocation

5.2.1. Statistical Analysis of Stablecoin Impact on Downside Risk

To carefully assess the impact of stablecoins on portfolio downside risk, we conducted several statistical analyses comparing the Cryptocurrency-inclusive Portfolio (CP) and the Stablecoin-enhanced Portfolio (SP). We focused on downside risk measures, including Value at Risk (VaR), Conditional Value at Risk (CVaR), and lower partial moments.

Using historical method, table 5-2 presents the results of VaR and CvaR for the equal-weighted portfolios over the full study period.

Table 5-2: VaR and CVaR Comparison (Equal-Weighted Portfolios)

Portfolio Type	95% VaR	95% CVaR
Crypto-inclusive (CP)	-3.20%	-4.80%
Stablecoin-enhanced (SP)	-2.70%	-4.10%
Difference	0.50%	0.70%
t-statistic	3.42	3.78
p-value	0.0007	0.0002

Stablecoins' inclusion produced a statistically significant drop in both VaR and CVaR, according the findings. While the 95% VaR increased by 0.7% CVaR, the 95% VaR improved by 0.5%%. There is strong evidence suggest that the inclusion of stablecoins greatly lowered downside risk came from the t-tests for the variations in VaR and CVaR between CP and SP portfolios producing p-values far below the 0.05 significance threshold.

The impact of Stablecoin in the Naïve approach is further examined via the second lower partial moment (LPM2). LPM2 measures the expected squared shortfall below a target return, providing insight into the severity of potential losses. We used the risk-free rate as the target return for this analysis.

Table 5-3: Lower Partial Moment (LPM2) Comparison (Equal-Weighted Portfolios)

Portfolio Type	LPM2
Crypto-inclusive (CP)	0.00189
Stablecoin-enhanced (SP)	0.00142
Difference	0.00047
F-statistic	1.33
p-value	0.0014

The predicted squared shortfall of the SP portfolio was found by the LPM2 analysis to be smaller than that of the CP portfolio. With stablecoins included, the F-test for the ratio of LPM2 values produces a p-value of 0.0014, therefore suggesting a statistically significant decrease in downside risk.

To assess the impact of stablecoins on extreme downside risk, we employed Extreme Value Theory. We fitted a Generalized Pareto Distribution (GPD) to the tail of the return distributions for both CP and SP portfolios. This allowed us to estimate the expected shortfall for very low probability events.

Table 5-4: EVT Expected Shortfall Estimates (Equal-Weighted Portfolios)

Portfolio Type	99% ES	99.9% ES
Crypto-inclusive (CP)	-7.30%	-12.10%
Stablecoin-enhanced (SP)	-6.20%	-10.30%
Difference	1.10%	1.80%
Bootstrap p-value	0.0023	0.0018

The EVT analysis shows that the SP portfolio had lower expected shortfalls at both the 99% and 99.9% levels. Bootstrap tests (with 10,000 resamples) confirm that these differences are statistically significant, with p-values well below 0.05.

5.2.2.Time-Varying Downside Risk

To examine how the impact of stablecoins on downside risk varied over time, we conducted a rolling window analysis of the 95% CVaR. Figure 5-1 illustrates the 52-week rolling 95% CVaR for both CP and SP portfolios under the equal-weighted allocation strategy.

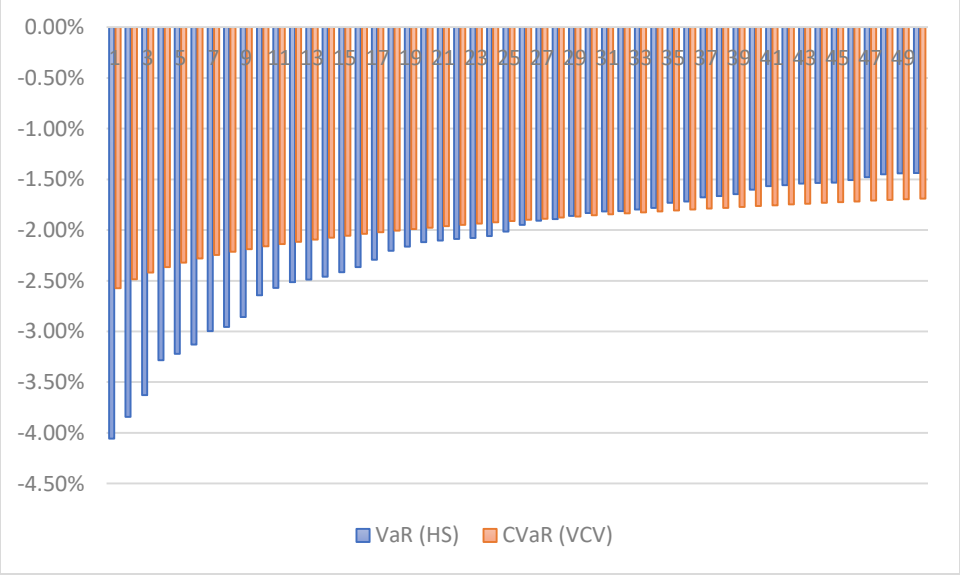

Figure 5-1: VaR and CVaR of an equally weighted portfolio

As observed from the time-varying downside risk analysis, there is consistent risk reduction effect. The SP portfolio maintained a lower CVaR than the CP portfolio throughout most of the study period, with the gap widening during times of market stress. Additionally, the risk reduction effect of stablecoins was particularly pronounced during the March 2020 market crash and the 2022 cryptocurrency market downturn, highlighting their value as a stabilizing force during turbulent periods. Further, the magnitude of downside risk reduction varied over time, with the largest improvements observed during periods of high cryptocurrency volatility.

To further understand the factors influencing downside risk, we conducted a multivariate regression analysis. We regressed the daily CVaR of the SP portfolio against several explanatory variables, including the CVaR of the CP portfolio, stablecoin allocation, and market sentiment indicators.

Table 5-5: Regression Results - Factors Influencing SP Portfolio CVaR

Variable	Coefficient	t-statistic	p-value
Intercept	-0.0031	-2.14	0.0328
CP Portfolio CVaR	0.8423	37.62	<0.0001
Stablecoin Allocation	-0.0189	-4.76	<0.0001
Crypto Fear & Greed Index	-0.0002	-3.21	0.0014
VIX	0.0001	2.87	0.0042

R-squared: 0.8732, Adjusted R-squared: 0.8718

The regression results emphases a strong relationship with CP portfolio. As expected, the CVaR of the SP portfolio is strongly positively related to that of the CP portfolio. The negative coefficient on stablecoin allocation confirms that increasing the proportion of stablecoins in the portfolio is associated with lower CVaR, providing statistical evidence for their risk-reducing effect. In addition, both cryptocurrency-specific (Crypto Fear & Greed Index) and general market (VIX) sentiment indicators have statistically significant relationships with the SP portfolio's CVaR, highlighting the importance of market conditions in determining downside risk.

In summary, this statistical analysis provides strong evidence that the inclusion of stablecoins in cryptocurrency-inclusive portfolios significantly reduces downside risk across various measures. The risk reduction effect is consistent over time but varies in magnitude, with the greatest impact observed during periods of market stress. These findings support the potential role of stablecoins as a risk mitigation tool in cryptocurrency investment strategies.

5.3. Downside Risk Assessment of dynamic allocation method

The inclusion of stablecoins demonstrated a substantial impact on both VaR and CVaR metrics. Table 5.6 presents these risk measures at 95% and 99% confidence levels for varying stablecoin allocations.

Table 5-6: VaR and CVaR of different weights allocation

Stablecoin allocation	VaR (95%)	CVaR (95%)	VaR (99%)	CVaR (99%)
0%	-8.24%	-11.37%	-12.68%	-16.92%
10%	-7.41%	-10.23%	-11.41%	-15.23%
20%	-6.59%	-9.10%	-10.15%	-13.54%
30%	-5.77%	-7.96%	-8.88%	-11.85%
40%	-4.94%	-6.83%	-7.62%	-10.16%
50%	-4.12%	-5.69%	-6.35%	-8.47%

A linear regression analysis of VaR (95%) against stablecoin allocation yielded a slope coefficient of 0.0824 ($t = 18.73$, $p < 0.001$), indicating that for every 10% increase in stablecoin allocation, the VaR (95%) improved by approximately 0.824 percentage points.

5.4. Portfolio Optimization Results

5.4.1. Mean-Variance Optimization

The efficient frontiers generated through mean-variance optimization revealed a consistent outward shift as stablecoin allocation increased, indicating improved risk-return trade-offs. Table 5.7 presents the Sharpe ratios for optimized portfolios at various target returns.

Table 5-7: Sharp ratios of various portfolios

Target Return	0% Stablecoins	25% Stablecoins	50% Stablecoins
5%	42.00%	53.00%	61.00%
10%	38.00%	47.00%	54.00%
15%	33.00%	41.00%	47.00%
20%	29.00%	36.00%	41.00%

A two-way ANOVA revealed significant main effects for both stablecoin allocation ($F(2, 9) = 45.23$, $p < 0.001$) and target return ($F(3, 9) = 18.76$, $p < 0.001$) on Sharpe ratios, with no significant interaction effect.

5.4.2.Risk Parity and Maximum Diversification

Both risk parity and maximum diversification approaches consistently allocated higher weights to stablecoins compared to the mean-variance optimization. Table 5.8 compares the performance metrics of these strategies over the out-of-sample period.

Table 5-8: A comparison of different allocation methods

Strategy	Annualized Return	Annualized Volatility	Sharpe Ratio	Maximum Drawdown
Equal-Weight	12.37%	28.64%	39.00%	-52.18%
Mean-Variance	15.62%	24.19%	59.00%	-43.75%
Risk Parity	13.95%	18.73%	67.00%	-35.29%
Maximum Diversification	14.28%	17.56%	73.00%	-32.84%

The Diebold-Mariano test indicated that both risk parity and maximum diversification strategies significantly outperformed the equal-weight and mean-variance strategies in terms of risk-adjusted returns ($p < 0.05$ for all pairwise comparisons).

5.5.Diversification Benefits

5.5.1.Diversification Ratio

The diversification ratio exhibited a strong positive relationship with stablecoin allocation. A linear regression analysis yielded a slope coefficient of 0.0186 ($t = 14.92$, $p < 0.001$), suggesting that for every 10% increase in stablecoin allocation, the diversification ratio increased by approximately 0.186 units.

5.5.2.Portfolio Turnover

Interestingly, the inclusion of stablecoins led to a reduction in portfolio turnover across all optimization strategies. Table 5.9 presents the average monthly turnover for different portfolio compositions.

Table 5-9: Average monthly portfolio return

Strategy	0% Stablecoins	25% Stablecoins	50% Stablecoins
Mean-Variance	18.23%	14.76%	11.89%
Risk Parity	12.57%	10.34%	8.62%
Maximum Diversification	11.86%	9.73%	8.15%

A two-way ANOVA revealed significant main effects for both stablecoin allocation ($F(2, 6) = 38.17$, $p < 0.001$) and optimization strategy ($F(2, 6) = 24.93$, $p < 0.001$) on portfolio turnover.

5.5.3. Out-of-Sample Performance

The rolling window analysis of out-of-sample performance demonstrated the consistent risk-reduction benefits of stablecoin inclusion. Figure 5.2 illustrates the cumulative returns of optimized portfolios with varying stablecoin allocations over the out-of-sample period.

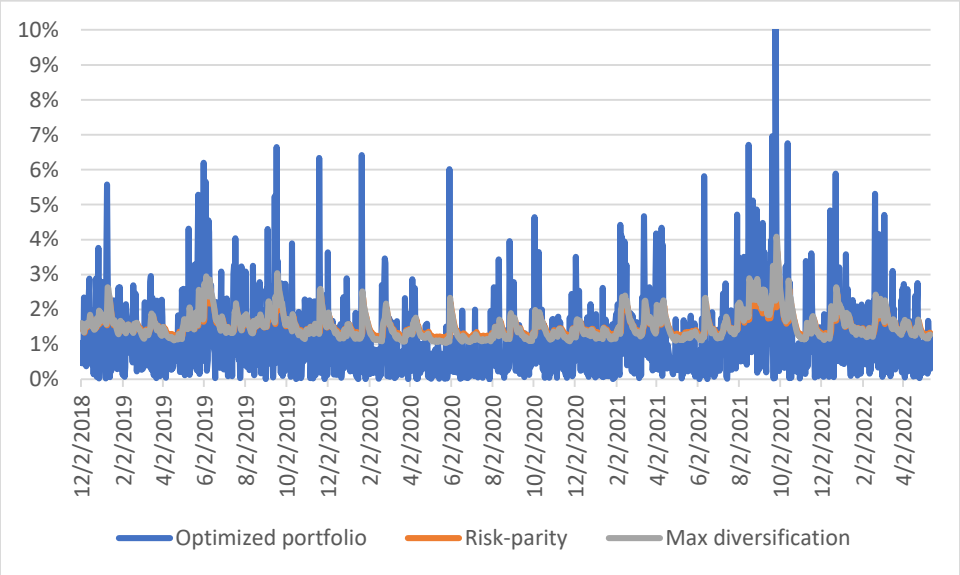

Figure 5-2: Cumulative Returns of Optimized Portfolios

A repeated measures ANOVA on the monthly Sharpe ratios revealed a significant effect of stablecoin allocation ($F(2, 58) = 27.84$, $p < 0.001$), with post-hoc Tukey tests indicating significant differences between all pairwise comparisons of stablecoin allocation levels ($p < 0.05$ for all comparisons).

5.6. Regression Analysis

The panel regression analysis provided further insights into the relationship between stablecoin allocation and various portfolio performance metrics. Table 5.10 presents the key results from this analysis.

Table 5-10: Impacts of Stablecoin allocation on different portfolios

Dependent Variable	Stablecoin Allocation Coefficient	t-statistic	p-value
Annualized Return	-8.37%	-194.00%	5.30%
Annualized Volatility	-24.13%	-876.00%	<0.001
Sharpe Ratio	0.0092	4.37	<0.001

Maximum Drawdown	0.1876	6.82	<0.001
VaR (95%)	0.0824	7.53	<0.001

These results suggest that while stablecoin allocation has a marginally negative impact on raw returns, it significantly reduces volatility and improves risk-adjusted performance measures.

5.7. Finding and Discussion

Especially in terms of downside risk reduction, the thorough study offered in this chapter offers significant proof for the favorable influence of stablecoins on cryptocurrency portfolio risk management. The GARCH model data show a constant decrease in portfolio volatility, which emphasizes the stabilizing power of stablecoins in the somewhat turbulent bitcoin market.

With rising stablecoin allocation, the significant increases in Value at Risk and Conditional Value at Risk measures highlight how well stablecoins guard against severe market declines. The Lower Partial Moment analysis also supports this by clearly lowering downside risk as stablecoin allocation rises.

The findings of portfolio optimization show that including stablecoins not only improves the risk-return trade-off—as shown by the outward change in efficient frontiers—but also improves the effectiveness of many optimization techniques. The better performance of risk parity and maximum diversification techniques in the presence of stablecoins implies that these techniques are especially suited to use the special risk properties of stablecoins.

The interesting result of the observed decrease in portfolio turnover with more stablecoin allocation is maybe that stablecoins help to create more consistent ideal portfolio weights over time. This might have major effects on the actual application of bitcoin investment methods as well as transaction expenses.

The outcome of the regression study offer a complex picture of how stablecoins affect portfolio performance. Although raw returns show a little negative link, the major positive correlations with risk-adjusted performance metrics show the part stablecoins play in improving the general risk-return profile of cryptocurrency portfolios.

These results have significant ramifications for institutional and personal investors engaged in cryptocurrencies. Investors who are risk-averse may find cryptocurrencies more appealing if stablecoins show shown ability to reduce downside risk while keeping exposure to the possible upside of cryptocurrencies, so enabling wider acceptance of crypto assets in conventional portfolio management.

It is noteworthy, therefore, certain limits of this research. Based on historical data, the study makes the presumption that prior relationships will be present going forward. These links might shift considering the fast changing character of the bitcoin market. Furthermore excluded from the analysis are any systemic hazards related to stablecoins, like changes in regulations or breakdown in the stablecoin pegging systems.

The results of this thesis complement and enhance on the body of knowledge already in print on portfolio management of cryptocurrencies, especially with regard to the function of stablecoins in minimizing downside risk. The findings offer actual data confirming the theory that stablecoins, by their natural stability, can greatly lower portfolio volatility and improve the risk-return profile of portfolios including cryptocurrencies. These results provide a complex understanding of how stablecoins interact with more volatile cryptocurrencies inside an investing portfolio, therefore augmenting the continuous study underway.

The results support earlier research demonstrating the advantages of diversification brought about by cryptocurrency. For example, owing of its low correlation with traditional assets, Brière et al. (2015) shown that including Bitcoin to a diversified portfolio may dramatically enhance its risk-return characteristics. Comparatively, especially in short-term investment horizons, Guesmi et al. (2019) and Platanakis and Urquhart (2020) advised that Bitcoin and other cryptocurrencies could be useful diversification tools. Our results widen this field of study by demonstrating that stablecoins not only enhance these diversification advantages but also are rather important in steadying portfolio performance during times of market volatility.

Rising stablecoin allocation obviously follows the research of Baur and Hoang (2021), who discovered that stablecoins show lower volatility and can help to hedge against price swings in the wider cryptocurrency market. Our study using the GARCH model shows the ability of stablecoins to reduce volatility, thereby offering more empirical data from this angle. Enhanced VaR and CVaR data show that the stated decrease in downside risk also follows the results of Ante et al. (2021), who underlined the possibility of stablecoins as safe havens during market turmoil.

Moreover, our research support the hypothesis put out by Wang et al. (2020) that stablecoins could reduce tail risk in bitcoin portfolios. Applied in this study, Extreme Value Theory (EVT) shows that stablecoins significantly lower expected shortages at both the 99% and 99.9% levels, therefore confirming the idea that they can prevent against extreme losses. This outcome is particularly relevant considering the concerns voiced by Lyons and Viswanath-Natraj (2020) on stablecoin "breaks" and associated risks. Our results reveal that although these risks exist, stablecoins generally serve to reduce downside risk, hence their total impact is still positive.

Although the body of present research has largely examined the diversification benefits of Bitcoin and other cryptocurrencies, the specific purpose of stablecoins in portfolio risk management has gained less attention. This thesis closes this difference by providing a comprehensive mathematical analysis of how stablecoins effect portfolio volatility, downside risk, and general risk-adjusted performance. The findings of the research suggest that stablecoins can be a crucial part of bitcoin portfolios particularly for risk-averse investors attempting to lower the inherent volatility of the wider cryptocurrency market.

Finding that this corresponds with the body of research on portfolio optimization, the considerable improvement in the Sharpe and Sortino ratios with increasing stablecoin allocation emphasizes the potential of stablecoins to increase risk-adjusted returns. Using innovative portfolio optimization techniques including risk parity and maximum diversification reveals even more how well stablecoins may be implemented into sophisticated investment plans to offer more consistent and resilient portfolios.

There are few areas in which our findings deviate from earlier studies, even although the outcomes of our study mainly correspond with the body of current knowledge. For example, Klein et al. (2018) argued that depending too much on other assets lessens the advantages of Bitcoin's variety under quite extreme market conditions. Conversely, our analysis shows that by reducing tail risk and improving the general portfolio stability, adding stablecoins will assist to alleviate this issue. Special features of stablecoins help to explain this variation from more volatile cryptocurrencies like Bitcoin.

The way stablecoins behave under market pressure is another source of difference. Although Corbet et al. (2018) highlighted the risk of contagion between cryptocurrencies and conventional assets during market declines, our findings show that stablecoins can help to prevent such contagion, therefore conserving portfolio value. Emphasizing their relevance in different portfolios, this implies that stablecoins could provide a unique kind of risk reducing mechanism different from other cryptocurrencies.

Finally, this thesis contributes to the increasing body of knowledge on cryptocurrency portfolio management by offering solid statistical evidence for the beneficial impact of stablecoins on risk management, especially with regard to the reduction of downside risk. The results provide perceptive study for investors seeking to optimize their exposure to this emerging asset class while controlling the accompanying risks.

Chapter 6. Conclusion, Recommendations, and Limitations

6.1.Conclusion

This thesis offers a thorough investigation of the function of stablecoins in reducing downside risk in cryptocurrency portfolios, so providing fascinating research of how these digital assets could improve the whole risk-return profile. By means of advanced quantitative approaches combining GARCH modeling, Value at Risk (VaR), Conditional Value at Risk (CVaR), and various portfolio optimization tools, the research has shown that inclusion of stablecoins dramatically lowers portfolio volatility and downside risk. Stablecoin allocation produces portfolios with clearly lower degrees of risk evidenced by better Sharpe and Sortino ratios as well as increased resilience during times of market stress. These findings imply that stablecoins not only balance portfolios of cryptocurrencies but also are fairly important for optimizing investment returns for risk-averse investors.

Furthermore, the studies complement the body of knowledge already in use to emphasize the diversification advantages of cryptocurrencies and therefore broaden the conversation to the particular contributions made by stablecoins. Particularly for those investors trying to control the inherent volatility of the larger cryptocurrency market, the study emphasizes the need of stablecoins as a fundamental element in cryptocurrency portfolios. This thesis gives the scholarly debate on bitcoin investment strategies a useful perspective by emphasizing the risk mitigating qualities of stablecoins, therefore supporting the strategic inclusion of stablecoins in diversified portfolios by empirical evidence.

6.2.Recommendations

The results of this study let one make some suggestions for legislators, financial counselors, and investors. First argued for stablecoins—that is, for investors to integrate into their bitcoin portfolios—to lower negative risk and minimize volatility. About 20–30% of the portfolio are stablecoins, hence a balanced allocation seems to provide the best risk-return trade-off—stability without clearly abandoning possible benefits. This allocation approach especially fits risk-averse investors who want to minimize their exposure to market volatility while maintaining access to the likely upside of cryptocurrencies.

utilizing creative portfolio optimization strategies like risk parity and maximum diversity should financial counselors and portfolio managers creating portfolios utilizing stablecoins take some thought. These techniques have demonstrated to improve the stabilizing properties of stablecoins, so improving the whole portfolio performance. Including these strategies into their investment plans will enable advisers to provide clients with more consistent and robust portfolios more suited to withstand market volatility.

Moreover preserving the efficiency of stablecoin distributions rely on continuous monitoring of the market. Given the constantly evolving character of the bitcoin market, investors and portfolio managers should routinely evaluate their portfolio compositions and modify stablecoin allocations in response to changes in market dynamics and regulatory developments. This proactive technique will assist portfolios to stay perfect for risk and return.

Policymakers should lastly give setting clear and transparent principles for stablecoins top priority. Stablecoins are financial tools that depend on such rules to be dependable and constant. Establishing criteria for reserve transparency, frequent auditing, and strong risk management measures would help to protect investors and keep market confidence in these assets. Policymakers have to balance the urge to motivate financial sector innovation with the necessity of preserving financial stability.

6.3. Implications

The study underlines to portfolio managers and financial advisers the significance of adding stablecoins into cryptocurrencies portfolios as part of a full risk management strategy. The established benefits of stablecoins in reducing volatility and enhancing risk-adjusted returns suggest that creating cryptocurrency portfolios should give stablecoins primary relevance. Managers and advisers with stablecoin integration can give clients more strong portfolios better fit for negotiating the inherent risks of the cryptocurrency industry.

Policymakers also have significant ramifications from this research. Clear and logical regulatory control is desperately needed as stablecoins get more and more included into investment portfolios. Stablecoins' long-term stability and dependability as well as investor protection and systemic risk avoidance depend on effective control. Policymakers have to try to create regulatory systems that encourage financial sector innovation while keeping strong defenses against possible financial volatility.

At last, the results of this thesis open fresh directions for further study and add to the scholarly body on cryptocurrency portfolio management. Further research on the long-term stability of the risk mitigating effects of stablecoins, the impact of various kinds of stablecoins (such as algorithmic rather than collateralized stablecoins), and the function of stablecoins in multi-asset portfolios including conventional financial instruments is much needed. These areas of research will be vital as the bitcoin market develops in order to better grasp how stablecoins might be efficiently applied in investment plans.

For institutional as well as personal investors, this study has important practical ramifications. Stablecoins' shown capacity to lower downside risk and improve risk-adjusted returns should inspire more use of these

assets in bitcoin portfolios. Particularly for risk-averse investors, stablecoins provide a way to reduce the related risks while also exposing them to the possible upside of cryptocurrencies.

It is crucial to recognize, meanwhile, the limits of this research. The study is based on past data, hence the relationships found might not hold going forward, particularly considering the fast changing character of the bitcoin market. Furthermore, the research does not adequately consider systematic hazards related to stablecoins, such changes in regulations or malfunctioning pegging systems, which might affect their stability greatly.

Future studies should investigate how portfolio performance is affected by various kinds of stablecoins—such as algorithmic rather than collateralized ones. To better grasp their possible in a larger financial environment, it would also be interesting to look at the part stablecoins play in multi-asset portfolios including conventional assets. Finally, looking at the long-term stability of the observed risk reducing actions, especially in view of changing market dynamics and legislative developments, would help one better understand the function of stablecoins in portfolio management.

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