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BITCOIN AS DIGITAL GOLD: BETWEEN PROMISE AND REALITY

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ABSTRACT

This paper explores the growing perception of Bitcoin as "digital gold" by examining its economic characteristics, historical evolution, and role in modern investment strategies. While gold has long served as a safe-haven asset and store of value, Bitcoin, launched in 2009, is a relatively new and volatile digital asset. However, both share several core attributes: limited supply, difficulty of production, and their appeal in times of economic uncertainty.

The study conducts a comparative analysis of Bitcoin and gold, focusing on shared traits such as scarcity, production effort, and store-of-value properties, while also highlighting key differences in tangibility, regulatory environment, volatility, and energy consumption. Empirical research from recent years suggests a shift in how investors perceive Bitcoin, particularly after 2017. Studies such as Zwick & Syed (2019) identify a structural transformation in the correlation between Bitcoin and gold, with the two assets now increasingly moving in parallel, especially during periods of financial turmoil.

Despite these convergences, Bitcoin faces significant challenges. Its scalability limitations, legal uncertainties, high energy demands, and dependency on market-driven mining incentives raise questions about its long-term viability and security. Moreover, the fragmented regulatory landscape across jurisdictions hinders its adoption as a fully mature financial instrument. Yet, there are promising signs of market maturation, such as institutional adoption, improved financial infrastructure, and regulatory clarity in certain regions.

Ultimately, the paper concludes that Bitcoin has not yet fully attained the status of digital gold, but current trends suggest a gradual convergence in that direction. If it succeeds in stabilizing its volatility, reducing environmental impact, and achieving global regulatory coherence, Bitcoin could become a complementary store of value to gold, playing an integral role in the evolving architecture of the digital financial economy.

KEYWORDS: Blockchain, Financial Regulation, Bitcoin, Economy

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INTRODUCTION

Bitcoin has often been compared to gold due to its fundamental characteristics, such as limited supply, decentralization, and the absence of a central authority to regulate it. Like gold, Bitcoin is not issued by any government or central bank, which gives it a certain resilience to traditional economic policies. However, while gold has been used for centuries as a store of value and a safe haven during economic crises, Bitcoin is a relatively new asset, marked by significantly higher volatility (Weber, 2016). Despite these differences, a growing number of investors and economists are exploring the possibility that Bitcoin could become the "digital gold" of the modern era.

The economic and financial context that led to the emergence of Bitcoin is closely linked to the global financial crisis of 2008. Trust in the traditional banking system was severely shaken by the collapse of major financial institutions and the bailout policies adopted by governments to rescue struggling banks. These events highlighted the vulnerabilities of fiat currencies and fueled interest in decentralized alternatives. Against this backdrop, Bitcoin was introduced by Satoshi Nakamoto as an electronic payment system based on blockchain technology, eliminating the need for a trusted third party (Dyhrberg, 2015).

Another relevant economic factor contributing to the growing interest in Bitcoin is its perceived role as a hedge against inflation. While gold has traditionally served this function, Bitcoin has started to be viewed as a digital alternative, owing to its deflationary nature—its supply is capped at 21 million coins. Recent studies show that Bitcoin and gold share certain properties in terms of portfolio diversification and protection against economic risks, though Bitcoin has not yet demonstrated the same level of stability as gold in times of crisis (Klein et al., 2018).

The purpose of this article is to explore the extent to which Bitcoin can be considered "digital gold" by analyzing its economic characteristics, its relationship with gold, and its role in investment strategies and inflation hedging. We will examine the Bitcoin–gold correlation, Bitcoin's potential to act as a safe haven during crises, and its broader impact on the global financial market. Finally, we will assess Bitcoin's long-term prospects in comparison to traditional gold, weighing its advantages and risks as a digital store of value (Bouoiyour & Selmi, 2019).

1. Common Characteristics of Bitcoin and Gold

1.1 Scarcity and Limited Supply

One of the strongest arguments supporting the idea that Bitcoin could be considered "digital gold" is its scarcity. Both gold and Bitcoin are assets with a limited supply, which gives them long-term value.

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Gold is a rare metal extracted through costly mining processes, and its reserves are finite. This makes it a highly desirable asset, historically used as a store of value and as protection against inflation (Weber, 2016).

Unlike traditional currencies issued by central banks, Bitcoin has a fixed supply of 21 million coins. This mechanism, embedded in its protocol, ensures that no more units can be created beyond this cap, giving it deflationary properties (Dyhrberg, 2015). As demand for Bitcoin increases and supply remains constant, its price tends to rise—much like gold retains its value over time due to its limited availability.

1.2 Production Difficulty

Both Bitcoin and gold require significant resources to be produced. In the case of gold, extraction involves physically intensive efforts, high equipment costs, and environmental impact. The mining process requires sophisticated machinery, specialized labor, and substantial energy consumption to extract the precious metal from the earth (Jareño et al., 2020).

Similarly, Bitcoin is generated through a process known as "mining," which involves using powerful computers to solve complex mathematical problems. This activity consumes large amounts of electricity and requires high-performance hardware. Studies have shown that Bitcoin mining can consume as much energy as some mid-sized countries (Klein et al., 2018). Although often criticized for its environmental impact, this characteristic reinforces the idea that Bitcoin, like gold, cannot be produced arbitrarily and requires substantial effort to obtain.

1.3 Store of Value

Gold is widely regarded as a safe-haven asset during times of economic uncertainty and inflation. Historically, investors have turned to gold to protect their wealth from the devaluation of fiat currencies and the instability of financial markets (Weber, 2016). As a tangible asset with intrinsic value, gold continues to serve as a strategic reserve for central banks and institutional investors.

Bitcoin is increasingly viewed in a similar light, with some economists and investors recognizing it as a new kind of safe-haven asset. Its decentralized nature and limited supply make it appealing during times of economic crises or geopolitical uncertainty (Bouoiyour & Selmi, 2019). During the COVID-19 pandemic and recent global conflicts, Bitcoin showed a tendency to rise in value, indicating growing investor interest in using it as protection against inflation and traditional market volatility (Jareño et al., 2020).

Despite these similarities, Bitcoin has not yet achieved the same level of stability as gold. Its high

volatility and susceptibility to speculative factors raise questions about its ability to function as a universal safe-haven asset. However, the market's evolution and the increasing adoption of Bitcoin by institutional investors suggest that it may gradually consolidate this role (Klein et al., 2018).

2. Key Differences Between Bitcoin and Gold

2.1 Tangible vs. Digital

One of the most evident differences between Bitcoin and gold lies in their fundamental nature. Gold is a physical asset, with a tangible existence that can be handled, stored, and used in various ways, including in jewelry, technology, and investments. Throughout history, gold has been used as currency and as a store of value, and it continues to be held by central banks and investors today as protection against inflation and economic risk (Weber, 2016).

In contrast, Bitcoin is a purely digital asset, existing solely as records on the blockchain. This means Bitcoin cannot be physically seen or touched, functioning instead as a decentralized, technology-based form of money. While this gives it certain advantages—such as enhanced security and protection from physical seizure—it also introduces risks related to cybersecurity, technological dependence, and the potential loss of funds if private keys are misplaced (Dyhrberg, 2015).

2.2 Portability and Divisibility

Portability is another major difference between Bitcoin and gold. Bitcoin can be transferred instantly to any part of the world without the need for complex logistics. Bitcoin transactions are recorded on the blockchain and do not require the involvement of financial institutions, allowing for fast and relatively inexpensive transfers compared to the physical transportation of gold (Bouoiyour & Selmi, 2019).

Gold, on the other hand, is difficult to transport in large quantities. Its storage and transfer require specialized infrastructure, including secure transportation, vault storage, and insurance. These logistics make it less efficient for frequent or international transactions, positioning gold more as a strategic reserve than as a practical medium of exchange (Jareño et al., 2020).

When it comes to divisibility, Bitcoin has a significant advantage. A single Bitcoin can be divided into 100 million satoshis, enabling transactions of any value. This feature makes Bitcoin highly flexible and suitable for use in digital payments and microtransactions (Klein et al., 2018).

Gold, by contrast, is much less practically divisible. While coins and bars of various sizes exist, cutting or breaking down gold for small-scale transactions is generally not feasible. This limitation makes it less practical for direct payments, reinforcing its role as a store of value rather than a means of

exchange (Weber, 2016).

2.3 Volatility and Regulation

Volatility is another key factor that sets Bitcoin apart from gold. Gold is known for its relatively low volatility compared to other financial assets, thanks to its stable demand and traditional role as a safe haven during economic crises. Over time, gold prices have exhibited moderate fluctuations influenced by global economic factors such as inflation, central bank policy, and industrial demand (Jareño et al., 2020).

Bitcoin, by contrast, is characterized by extreme volatility. Its price can experience significant swings within short timeframes, driven by speculation, governmental regulations, institutional adoption, and technological developments. For example, Bitcoin has witnessed dramatic price surges followed by sharp corrections, making it a risky asset for investors seeking stability (Klein et al., 2018).

Regulation is another crucial distinction. Gold operates within a well-regulated market, with clear mechanisms for trading, holding, and usage. Gold exchanges are overseen by financial authorities, and central banks hold substantial reserves of gold as part of their strategic assets. This regulatory framework contributes to the overall stability of the gold market and investor confidence (Weber, 2016).

Bitcoin, on the other hand, operates in a still uncertain regulatory environment. While some countries have begun implementing legislation to govern cryptocurrency transactions, regulation varies widely across the globe. In some jurisdictions, Bitcoin is recognized as a digital asset or means of payment, while in others, it is restricted or outright banned. This lack of regulatory consistency contributes to Bitcoin's volatility and raises uncertainty about its long-term role in the global financial ecosystem (Bouoiyour & Selmi, 2019).

3. Bitcoin as "Digital Gold" in the Modern Economy

3.1 The Rise of Institutional Interest in Bitcoin

In recent years, Bitcoin has attracted increasing attention from institutional investors, reinforcing its perception as a store of value. Companies such as MicroStrategy, Tesla, and Square have directed billions of dollars into Bitcoin, considering it a hedge against inflation and the devaluation of fiat currencies. This trend was followed by major investment firms such as BlackRock and Fidelity, which began including Bitcoin in their clients' portfolios or launched financial products based on cryptocurrencies (Weber, 2016).

The study conducted by Zwick and Syed (2019) offers additional insight, suggesting that this

institutional shift accelerated after 2017, when the Bitcoin–gold relationship fundamentally changed, and Bitcoin began to be perceived as a "safe haven" asset during times of crisis. This shift in perception coincides with a period during which institutional investors increasingly sought digital alternatives to traditional assets. Specifically, the authors emphasize that after October 2017, Bitcoin prices showed a positive correlation with gold, indicating a shift in how the market treats this cryptocurrency—from a speculative instrument to a strategic asset in risk-sensitive portfolios (Zwick & Syed, 2019).
This transformation was further supported by the development of financial infrastructure around cryptocurrencies, including regulated custody services, derivatives markets, and ETFs. All these developments suggest that Bitcoin has gradually earned a place in the institutional investment landscape and is increasingly evaluated using the same parameters as gold.

3.2 Bitcoin as a Hedge Against Inflation

One of the most discussed arguments in favor of Bitcoin is its potential to act as a hedge against inflation, much like gold. In today's global economic environment—marked by excessive monetary expansion and low interest rates, investors seek assets that can preserve value over time. Due to its deflationary nature, with a capped supply of 21 million units, Bitcoin presents an alternative to traditional hedging assets.

The study by Kyriazis (2020) shows that the perception of Bitcoin as a protective asset is supported by a substantial body of empirical research. However, the author distinguishes between using Bitcoin as a diversification tool and using it as a true inflation hedge. While some analyses (Dyhrberg, 2016; Selmi et al., 2019) suggest Bitcoin correlates with traditional assets during economic stress, its high volatility limits its ability to consistently act as a reliable haven.

Additionally, Zwick and Syed (2019) demonstrate that before 2017, the relationship between Bitcoin and gold was negative indicating that investors chose between them based on their risk appetite. After 2017, this relationship turned positive, which may be interpreted as a convergence of the two assets in their perceived role as protection against economic uncertainty. Thus, Bitcoin has begun to behave more like gold, attracting investors in times of macroeconomic volatility.

3.3 Acceptance of Bitcoin as a Reserve Asset by Companies and Governments *(updated)*

The adoption of Bitcoin as a reserve asset is no longer a theoretical concept, but a demonstrable reality in recent years. El Salvador's example, which in 2021 became the first country to adopt Bitcoin as legal tender, sparked both enthusiasm and criticism. The government's decision was driven by the desire to reduce reliance on the U.S. dollar and facilitate remittances from citizens living abroad. In parallel, companies such as MicroStrategy and Tesla added Bitcoin to their balance sheets, supporting the idea that it could serve as a strategic reserve against fiat currency devaluation (Weber, 2016).

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Against this backdrop, the study by Zwick and Syed (2019) is particularly revealing: the authors identify a structural shift in the Bitcoin–gold relationship beginning in October 2017. Before this date, the two assets appeared to be perceived as substitutes: investors would favor gold during uncertain times and Bitcoin in more speculative contexts. After October 2017, however, the relationship becomes positive and significant, suggesting that investors began treating Bitcoin similarly to gold—as a tool for protection against macroeconomic volatility. This shift supports the notion that Bitcoin is now seen as a complementary asset to gold in reserve and diversification strategies.

This new perception has also been strengthened by the emergence of financial products that facilitate Bitcoin's integration into institutional portfolios, such as cryptocurrency-based ETFs and regulated custody services. Moreover, the authors suggest that this recognition may expand in the future to include central banks and governments seeking digital alternatives to traditional reserve assets. In this sense, Bitcoin has evolved beyond being a technological experiment and is beginning to gain legitimacy as a reserve instrument in the digital global economy (Zwick & Syed, 2019).

3.4 Comparing Bitcoin's Performance with Gold in Recent Years

Comparing Bitcoin's performance with gold provides important insights into the cryptocurrency's potential to become a recognized safe-haven asset. Between 2017 and 2021, Bitcoin experienced spectacular growth, reaching all-time highs in December 2017 and again in 2020–2021. Its returns far exceeded those of gold, but this remarkable performance was accompanied by extreme volatility, with price drops of over 50% within a few months. In contrast, gold demonstrated more stable performance, with moderate and predictable fluctuations, reinforcing its reputation as a reliable asset during times of crisis (Klein et al., 2018).

The econometric study by Zwick and Syed (2019) provides an in-depth analysis of this relationship. Using a threshold regression model, the authors show that prior to October 2017, the correlation between gold and Bitcoin prices was negative, indicating that investors treated the two as alternative options. However, after this date, the relationship becomes positive and significant, suggesting that Bitcoin began to be viewed alongside gold as a safe-haven asset during times of global economic uncertainty.

This post-2017 positive correlation is significant because it marks a structural change in investor perception. According to the authors, Bitcoin evolved from a high-return speculative asset into a viable diversification tool for conservative portfolios, like gold. Furthermore, the statistical tests applied (including the CUSUM test and a two-regime nonlinear regression) confirm the existence of an inflection point in the relationship between the two assets, coinciding with the partial maturation of the cryptocurrency market.

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4. Challenges and the Future of Bitcoin as Digital Gold (updated)

4.1 Scalability and Adoption Issues

One of the most significant obstacles preventing Bitcoin from becoming a universally accepted "digital gold" is its limited scalability. In its current form, the Bitcoin network can process only about 7 transactions per second, compared to thousands in traditional payment networks like Visa. This technical limitation greatly reduces Bitcoin's practicality as a global medium of exchange and undermines confidence in its long-term viability.

The study by Ciaian et al. (2021) adds a crucial dimension to this discussion, showing that Bitcoin's network security is directly dependent on mining rewards, which are in turn linked to Bitcoin's market price. In periods when Bitcoin's price drops significantly, the hash rate (computational power used to secure the network) can fall, increasing the risk of cyberattacks, including 51% attacks. This tight relationship between price, rewards, and security negatively affects the perception of Bitcoin as a stable and secure asset.

Moreover, the authors point out that the current mining infrastructure is geographically concentrated, making it vulnerable to regulatory shifts and political interventions. The massive relocation of mining operations from China in 2021 demonstrated the fragility of the network's global node distribution. At the same time, solutions such as the Lightning Network promise to address some of these shortcomings, but adoption remains low, limiting their overall impact on Bitcoin's scalability (Bouoiyour & Selmi, 2019).

Therefore, until these technological solutions are widely adopted and Bitcoin's security becomes less reliant on market dynamics, it will remain an asset with high potential but significant structural vulnerabilities.

4.2 Legal Risks and Government Regulations

Bitcoin operates within a fragmented and unpredictable legal landscape, which poses a major barrier to its widespread adoption. While some countries, like El Salvador, have recognized it as legal tender, others—such as China and Algeria—have imposed outright bans on its use and mining. This lack of regulatory harmony creates legal uncertainty and discourages both institutional investors and blockchain infrastructure developers.

Ciaian et al. (2021) emphasize that regulation directly impacts the security and functionality of the Bitcoin network, as it can influence both access to mining and demand on trading platforms. For example, China's mining ban led to a temporary drop in the global network's hash rate, weakening blockchain security. At the same time, the authors argue that clear and stable regulation could improve

investor confidence in Bitcoin, turning it into a legitimate asset within the international financial system.

Another major challenge is the enforcement of compliance requirements (KYC/AML). While these measures are essential for combating money laundering and terrorism financing, they conflict with the decentralization philosophy that underpins Bitcoin. Imposing strict regulations may compromise the network's pseudonymity and decentralization, potentially reducing its appeal to privacy-conscious users (Dyhrberg, 2015; Kyriazis, 2020).

Finally, concerns remain regarding the classification of Bitcoin as a derivative financial asset or foreign currency, depending on jurisdiction. Such classifications entail differing tax regimes and legal obligations. Thus, the absence of a global consensus on Bitcoin's legal status complicates its integration into a unified regulatory framework—unlike gold, which is uniformly accepted as a reserve asset internationally.

Until Bitcoin benefits from a more coherent global legal approach, its status as "digital gold" will remain subject to geopolitical shifts and the willingness of authorities to embrace blockchain technology.

4.3 Energy Consumption of Mining and Possible Solutions

Bitcoin mining is an energy-intensive process that draws continuous criticism regarding the network's environmental sustainability. The "Proof of Work" consensus mechanism requires miners to solve complex mathematical problems to validate transactions and secure the network. This method consumes vast amounts of electricity, comparable to the energy usage of entire countries such as Argentina or Finland, according to recent estimates.

Ciaian et al. (2021) provide a fundamental analysis of this phenomenon, showing that block rewards and Bitcoin prices are directly correlated with the network's energy security. The higher the rewards, the more miners participate, increasing total hash rate and, by extension, the security of the blockchain. However, this creates a dangerous feedback loop: during periods of price decline, many miners exit the network, weakening protection against cyber threats, including 51% attacks.

The authors also point out Bitcoin's relatively poor energy efficiency compared to other cryptocurrencies, such as Ethereum, which has already transitioned to a "Proof of Stake" (PoS) system. Although Bitcoin is considered more secure in terms of decentralization, that security comes at a significant ecological cost, which threatens its image as a responsible digital store of value.

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Proposed solutions include transitioning mining operations to renewable energy sources. Some mining farms in Iceland, Canada, and the U.S. already use hydropower, geothermal, or solar energy. However, these initiatives are not yet widespread enough to significantly reduce Bitcoin's carbon footprint. Additionally, introducing energy optimization technologies or tax incentives for sustainable mining operations could help mitigate its environmental impact.

4.4 Market Evolution and Long-Term Prospects

The Bitcoin market has experienced remarkable growth over the past decade, evolving from a technological experiment into a digital asset with a market capitalization in the hundreds of billions of dollars. This transformation has been accompanied by a surge in institutional interest, the development of financial infrastructure (ETFs, derivatives, custody services), and growing recognition in the global economic space. Nonetheless, its long-term outlook remains shaped by significant technical and geopolitical uncertainties.

Ciaian et al. (2021) highlight that one of the greatest challenges to Bitcoin's sustainability is its reliance on market price and mining rewards to maintain blockchain security. If Bitcoin's value falls below a certain economic threshold, mining incentives diminish drastically, undermining network safety. In such a scenario, decentralized security could be compromised, casting doubt on Bitcoin's long-term viability as a stable asset.

On the other hand, Kyriazis (2020) notes that although Bitcoin shows promise as an alternative asset and diversification tool, it has yet to achieve the stability expected of a traditional financial haven. Its extreme volatility, lack of uniform regulation, and high energy impact place it in a transitional zone between speculation and long-term store of value. Furthermore, Bitcoin lacks the intrinsic value of gold—which has industrial and symbolic uses, making its valuation more dependent on socio-economic context.

However, signs of market maturity are emerging: a stronger correlation with gold during crises, a broader base of investors, clearer regulations in the U.S. and EU, and the development of technological solutions for scalability and energy efficiency. If these trends continue, Bitcoin could strengthen its position as a complementary asset to gold, with a clearly defined role in global financial architecture. Therefore, although Bitcoin's path to universal recognition as "digital gold" is not without obstacles, the market fundamentals are evolving in a direction that justifies sustained attention and ongoing evaluation of its long-term potential.

5. CONCLUSIONS

Since its launch in 2009, Bitcoin has evolved from a marginal technological project into a digital asset

with considerable influence over the global financial system. The comparative analysis with gold highlights both essential similarities—such as limited supply, production difficulty, and its role as a store of value—and key structural differences, including its digital nature, high volatility, and uncertain legal status. These characteristics place Bitcoin in a unique position: somewhere between a speculative asset and one with long-term store-of-value potential (Weber, 2016; Dyhrberg, 2015).

Recent research emphasizes a transformation in market perception of Bitcoin, especially after 2017. The study by Zwick and Syed (2019) demonstrates, through a threshold regression model, that after October 2017, the relationship between Bitcoin and gold became both positive and significant suggesting that investors began treating the two assets as complementary tools for protecting against economic uncertainty. This paradigm shift has been reinforced by increased institutional interest, official recognition by governments (e.g., El Salvador), and the integration of Bitcoin into diversified investment portfolios.

On the other hand, challenges remain substantial. As highlighted by Ciaian et al. (2021), the security of the Bitcoin network is directly tied to its market price and the rewards provided to miners. This creates a systemic vulnerability: during price downturns, network security can be compromised. Furthermore, high energy consumption and the geographic concentration of mining operations raise concerns about Bitcoin's environmental sustainability—issues that do not affect gold to the same extent.

Legally, globally divergent regulations and uncertainty regarding the tax and legal status of cryptocurrencies hinder Bitcoin's transition to a fully mature financial asset. Despite these limitations, Kyriazis (2020) argues that Bitcoin can still serve as a robust diversification tool within portfolios, particularly in combination with traditional assets like gold, especially during periods of macroeconomic uncertainty.

In conclusion, Bitcoin has not yet fully achieved the status of "digital gold," but all current trends point toward a gradual convergence in that direction. If Bitcoin succeeds in stabilizing its volatility, reducing its environmental impact, and aligning with a clear regulatory framework, it could become an essential component of the financial architecture of the digital economy—not by replacing gold, but by complementing it.

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