

AN EVALUATION OF THE MACROECONOMIC EFFECTS OF CRYPTOCURRENCY IN MODERN ECONOMY: A LITERATURE REVIEW

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Abstract

The macroeconomic consequences of cryptocurrency have been on top of the minds of policymakers (domestic and international), non-governmental organizations, multilateral development banks, and financial services providers. This paper reviewed the previous literature to evaluate the range of macroeconomic implications of the introduction of cryptocurrency in a modern economy. The review showed that cryptocurrency may extend financial accessibility in a modern economy by relying on more effective distribution models that could advance financial deepening and inclusion. The paper also found that cryptocurrency serves as a hedge, diversifier, and safe haven for a range of foreign currencies, and given the absence of regulations, there are no protections to ensure the successful launching of the cryptocurrency market. The paper concludes that public-private partnerships are imperative to help central banks and financial regulators of modern economies keep up with the fast-moving pace of cryptocurrency developments and applications.

Keywords: Macroeconomics, Cryptocurrency, Modern Economy, PPP

1. Introduction

Our modern economy relies heavily on digital means of payment. Trade in the form of e-commerce for example necessitates the usage of digital tokens. In a digital currency system, the means of payment is simply a string of bits. However, one of the newest financial instruments that has generated a lot of discussion and public interest is cryptocurrency. Though the name of this financial instrument should indicate that it is a new kind of money, experts cannot agree on how to classify cryptocurrencies. Divergent viewpoints exist about the cryptocurrency (Carrick, 2016; Luther,

2019). Some argue that it can be categorized as a currency and eventually replace fiat money; others liken it to commodities; still others think it is purely speculative and has no real potential (Bariviera et al., 2017; Paule-Vianez et al., 2020).

Crypto currencies promise to bring about huge economic advantages—they may even replace volatile national currencies by bringing about lower transaction costs and increased financial transaction efficiency. Nevertheless, cryptocurrencies have been termed financial jokes due to the numerous risks they provide (James, 2018; Turner and Irwin 2018). The rapid rise of cryptocurrencies raises fundamental

concerns over the availability of assets that bear resemblance to personal currency and the potential for financial instability (Potter, 2018). It would contradict the premise that the modern economy should have a money limit of some kind, even though it is not always easy to assess, to preserve macroeconomic stability (Friedman, 1960).

Too little is known about the economics guiding our understanding and study of cryptocurrencies. As a result, it is impossible to forecast how cryptocurrencies would affect the macroeconomy, which makes it problematic for policymakers to decide if imposing strict rules will benefit the macro economy the most overall (International Monetary Fund, 2000). These unknowns have raised concerns about financial and monetary stability, as well as the effects of dollarization and substitution (White et al., 2022).

The rapid development of cryptocurrencies, particularly Bitcoin, has been well documented (White, 2015; Vigna and Casey, 2015). However, there hasn't been much discussion of how cryptocurrencies will affect money (Ali, 2014; Fernández-Villaverde, 2017). To evaluate the monetary effect, one might take into account the role of dollarization or currency substitution, the predominance of private money, and the risks to macroeconomic stability (IMF, 2017; Vacaflores, 2012).

Moreover, as additional cryptocurrencies emerge, the question of whether we can make cryptocurrency work within the development sector will transfer to how we will make them work within these systems. A new type of economy is emerging and we should be careful to ensure its productive use for everyone. To provide a comprehensive overview of the opportunities of cryptocurrencies, it is necessary to understand the general advantages and disadvantages cryptocurrencies provide for users and to discuss their underlying macroeconomic effects in a modern economy.

The remainder of the paper is arranged as follows: Section 2 reviews the relevant literature. Section 3 systematizes the debate on the effect of cryptocurrency on macroeconomics in Modern economies. Section 4 presents the conclusion and suggestions for future research.

1. Literature Review

2.1 Concept of Crypto-currency

Since its launch in 2008, both individual and institutional investors have expressed a great deal of interest in Bitcoin. This generates the birth of rival cryptocurrencies and the development of a completely new financial ecosystem (Anastasiou et al., 2021). Cryptocurrencies are a unique asset in comparison to conventional financial instruments offered on market exchanges because of their microstructure, which is developed by the investor and consumer base (Koutmos, 2018).

Recent research indicates that cryptocurrencies may provide safe havens or diversification tools for investors during periods of severe political and economic volatility (Colon et al., 2021, Demir et al., 2018, Wu et al., 2019). Due to the careful attention that cryptocurrencies receive from investors, regulators, legislators, technologists, entrepreneurs, and academics, several researchers have started to investigate the prospect of adopting cryptocurrencies as a new safe-haven asset (Koki et al., 2022). (Jiang et al., 2021, Mokni et al., 2022, Smales, 2019, Umar et al., 2021, Conlon et al., 2020, Dwita Mariana et al., 2021).

2.2 Previous Research on Cryptocurrency

The majority of research on cryptocurrencies can be divided into two main categories: studies on the regressors and price fluctuations of crypto currencies (Beneki et al., 2019; Bouteska et al., 2023; Dyhrberg, 2016; Hayes, 2017; Ji et al., 2019; Kostika and Laopodis, 2020; Wang et al., 2024) and studies on the money functions of crypto currencies (Benigno et al., 2022; Baur et al., 2015; Bouri et al., 2018; Ciaian et al., 2016; Charfeddine, et al., 2020; Levulytė and Šapkauskienė, 2021; Yu, 2023).

Table 1: Summary of the Selected Studies

Author (s)	Objective	Method	Findings
Dyhrberg (2016)	To explore the financial asset capabilities of Bitcoin using GARCH models	GARCH volatility analysis	The asymmetric GARCH showed that bitcoin may be useful in risk management and ideal for risk-averse investors in anticipation of negative shocks to the market.
Hayes (2017)	To identify the likely determinants for cryptocurrency value formation, including for that of bitcoin.	A least-squares (OLS) multiple regression	The findings reveal that as a starting point, a no-arbitrage situation is established for Bitcoin-like crypto currencies followed by the formalization of a cost of production model to determine the fair value of a Bitcoin.

Wang et al. (2024)	To investigate the dynamic volatility spillover among ten cryptocurrency markets and three energy markets.	DCC-GARCH-CONNECTEDNESS approach	The findings show that the network topology properties are relatively stable, but there is a large heterogeneity among markets. Compared to the energy market, the cryptocurrency market exhibits more profound features of volatility resonance between different currencies.
Beneki et al. (2019)	To test the hypothesis of whether volatility spillovers and hedging abilities exist between Bitcoin and Ethereum.	Multivariate BEKK-GARCH	The findings reveal significant swaps in the time-varying correlation and a delayed positive response of Bitcoin volatility on a positive volatility shock on Ethereum returns.
Bouteska et al. (2023)	The study aims to: (a) model the volatility of Bitcoin, Dash, Monero, and Stellar	GARCH model	The study find convincing evidence of a higher magnitude of the bidirectional spillover for large cryptocurrencies and documented a unidirectional instantaneous volatility spillover impact from Monero to the other cryptocurrencies with a positive effect on BTC and Stellar, and a negative impact on Dash.
Charfeddine, et al. (2020)	To compare the financial properties of these new digital assets and investigate their	GARCH models	The findings reveal that the cross-correlation with conventional assets is changing over time but weak, supporting the idea

	dynamic relationship with major financial securities and commodities.		that these cryptocurrencies can be suitable for financial diversification.
Ji et al. (2019)	To examine connectedness via return and volatility spillovers across six large cryptocurrencies from August 7, 2015, to February 22, 2018	Connectedness framework of Diebold & Yilmaz (2012, 2016)	The finding shows that return shocks arising from these two cryptocurrencies have the most effect on other cryptocurrencies. Further analysis shows that connectedness via negative returns is largely stronger than via positive ones.
Kostika and Laopodis (2020)	To investigate the short- and long-run dynamic linkages between selected cryptocurrencies, several major world currencies, and major equity indices.	VAR model and Engle's dynamic conditional correlation generalized autoregressive conditional Heteroskedasticity (DCC-GARCH)	The study find that cryptocurrencies do not interact with each other because their correlations are weak and do not share a common long-run path; thus, they are not cointegrated.
Baur et al. (2015)	To examine cryptocurrencies as a potentially disruptive sort of payment method. Due to its relative importance, we focus in particular on Bitcoin.	Exploratory research design	The results reveal that most stakeholders consider perceived ease of use still rather low, with perceived usefulness varying according to the user group. The notion of Bitcoin as having much future potential as a payment method is confirmed by all interviewees.

Bouri et al. (2018)	To investigate the spillovers between Bitcoin and other assets during bear and bull markets.	VAR GARCH-in-mean model	The study find that Bitcoin returns are related quite closely to those of most of the other asset studies, particularly commodities, and therefore, the Bitcoin market is not isolated completely.
Ciaian et al., (2016)	To identify and analyze Bit Coin features that may facilitate Bit Coin to become a global currency.	Econometric model	The results suggest that Bit Coin attractiveness indicators are the strongest drivers of Bit Coin price followed by market forces. In contrast, macro-financial developments do not determine Bitcoin's price in the long run.
Levulytė and Šapkauskienė (2021)	To investigate the ability of cryptocurrencies to fulfill three main money functions: medium of exchange, a unit of account, and store of value	Statistical analysis methods, Spearman correlation, cluster analysis, linear regression.	The study found that Bitcoin and Ethereum could be considered as mediums of exchange. Market participants benefit by using them primarily due to lower transaction costs, and the absence of geographical restrictions.
Yu (2023)	To study conditions under which cryptocurrency is valued and under which it coexists with fiat money.	Two-currency model	The results show that cryptocurrency and fiat money can circulate at the same time and that the rates of return on these two assets may not be the same.
Benigno et al. (2022)	To analyze a two-country economy with complete markets, featuring two national currencies as well as	Lagos-Wright monetary model, money-in-utility function model, and cash-in-advance-constraint model	The results show that nominal interest rates must be equal and that the exchange rate between the home and the foreign currency is a risk-adjusted

	a global (crypto) currency.		martingale
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However, a substantial portion of studies only state their views on the issue of whether or not cryptocurrencies are considered forms of money without going into great detail to examine their features (Baur et al., 2015; Bouri et al., 2018; Cheah and Fry, 2015; Levulytė and Šapkauskienė, 2021). All three-currency aspects are only partially covered by writers (Ammous, 2018; Ciaian et al., 2016; Weber, 2016). However, Hazlett and Luther (2020) and Schilling and Uhlig (2019) are among the authors who address cryptocurrencies as a possible new form of currency and mention one or two of the currencies' functions, then provide an opinion on whether the cryptocurrency corresponds to them or not. Fewer publications (e.g. Carrick, 2016; Kim, 2017) go into further detail about cryptocurrencies as a substitute for fiat currencies in developing nations; the majority of these pieces analyze cryptocurrencies from the standpoint of developed countries' fiat currencies, contrasted to gold and indexes.

One of the main benefits of cryptocurrencies is the lower cost of transactions when compared to transactions using fiat currency (Dwyer, 2015; Nair and Cachanosky, 2017).

Carrick (2016), assert that because payments conduct in local currency incurs relatively large administrative costs, emerging nations should pay particular attention to the cost problem. Conversely, cryptocurrencies could be able to reduce the cost of payments and help developing countries build global trade ties.

2. Macroeconomic Effects of Cryptocurrency

3.1 Financial Stability Effect

Some macroeconomists believe that in the lack of clear regulations, the sudden and quick adoption of cryptocurrencies could be dangerous for the stability of the financial system. However, it is difficult to preserve financial stability when it comes to cryptocurrencies (White et al., 2022). With cryptocurrencies, a central bank cannot enforce flexible monetary policy, which is something they can do with fiat currencies to maintain price stability and serve as a lender of last resort. Due to their magnitude, systemic problems, and connectedness to conventional financial institutions, the quickly emerging crypto asset markets may represent a hazard to the stability of the global financial system (Financial Stability Board, 2022).

Table 2. Criteria for Net Positive Macroeconomic Outcomes

Criteria Pillars	Measures	Example of Economic Effects
Financial stability (global and domestic)	Promotes monetary stability Promotes stability of the financial system	– Exchange rate effects – Liquidity effects – Valuation effects – Duration risk
Equity and Safety	Promotes access to the financial system for people who have been historically excluded Promotes protection against illegal activity	– Financial deepening effect
Innovation	Promotes productive innovation/e efficiency	– Innovation effect – Efficiency gains – Multiplier effect
Sustainability	Promotes critical environmental sustainability	

Moreover, if the current trend of crypto-assets increasing scale and connectedness to these institutions continues, it might have an impact on the integrity of the global financial system. Expert opinion is mixed on whether currency competition improves or worsens financial stability (International Monetary Fund, 2020). There are well-known risks related to currency competition, denomination, and dollarization, especially in emerging economies. Significant declines in exchange rates are a glaring indication that

these hazards are essentially present. Furthermore, aggressive corporate strategies, however, have the potential to raise ecosystem risk. Examples of these strategies are those employed by service providers looking to acquire a dominant market position at a loss (International Monetary Fund, 2020).

Financial instability may result from institutional investor interest if investors are forced to sell other assets to cover margin calls on their cryptocurrency

holdings (Financial Stability Board, 2022). Based on current statistics, investors may get discouraged by an abrupt drop in the value of crypto-assets, which might exacerbate additional, broad market

corrections (White et al., 2022). When bitcoin began to trade in tandem with the S&P 500 during the COVID-19 epidemic, worries about spillover effects surfaced.

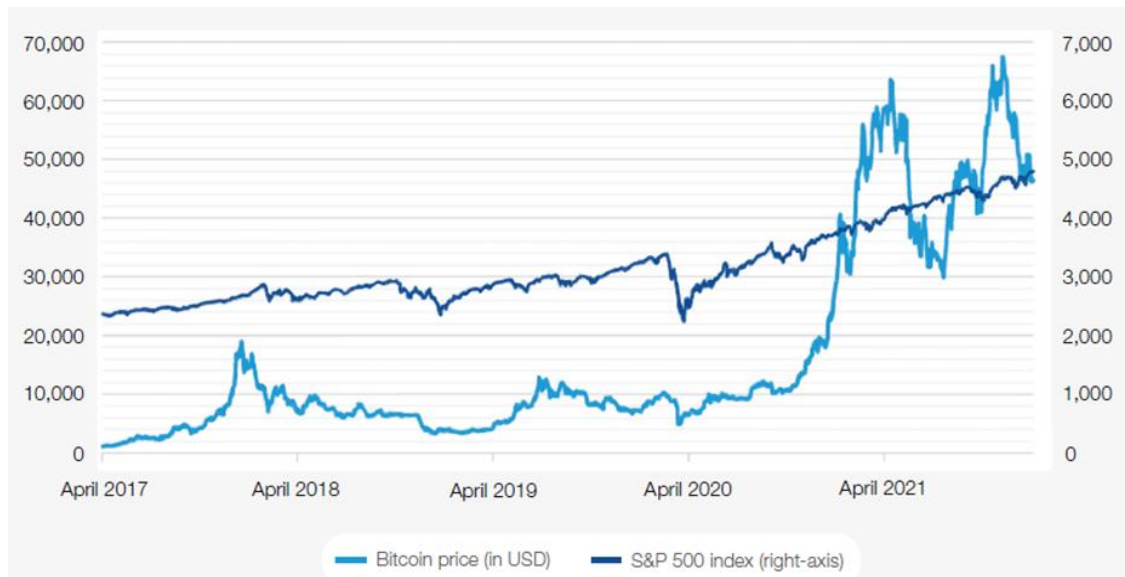


Figure 1: Bitcoin price and S&P 500 index

Source: World Economic Forum, 2022

2.2 Equity and Safety Effect

2.3 Cryptocurrencies can promote financial inclusion and deepen financial penetration by adopting more efficient distribution techniques. The considerable changes in the value of cryptocurrencies, such as Bitcoin and Ether, restrict their capacity to pose a challenge to reserve currencies in the payments arena (White et al., 2022). However, in numerous emerging economies, the popularity of cryptocurrencies has overtaken that of developed nations due to inefficient payment systems or sub-optimal local

macroeconomic policies (International Monetary Fund, 2021). When residents search for a safer location to store their money, asset substitution may result from a poor central bank's reputation mixed with weak banking institutions. Though this is reliant on having access to the internet and other technologies, people are driven to faster and less expensive crypto-asset payment services because of inefficiencies in cross-border transfers brought on by a lack of payment system compatibility.

2.4 In addition, frequently employed in developing countries to reduce

volatile currency exchange rates and inflation, this may be easier to understand in countries where cryptocurrencies gain widespread acceptance. If there are new exchange platforms that are exempt from capital control laws and if there are no global standards for cryptocurrencies,

monetary authorities, and central banks might not be able to enforce these agreements. Cryptocurrency-based crime hit a new all-time high in 2021, with illicit addresses receiving \$14 billion over the course of the year, up from \$7.8 billion in 2020 (Chainanalysis, 2022).

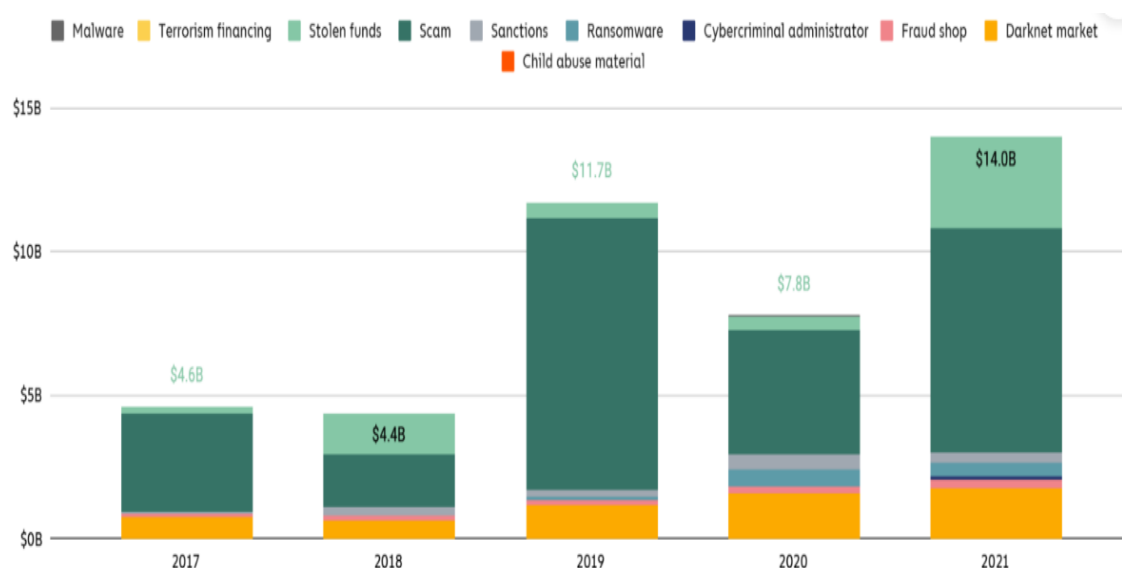


Figure 2: Total cryptocurrency value received by illicit addresses, 2017 - 2021
Source: Chain analysis, 2022

Indeed, the proportion of unlawful activity in the number of cryptocurrency transactions has never been lower, with the increase of legitimate cryptocurrency usage far surpassing the growth of criminal usage. Furthermore, the increasing popularity of cryptocurrencies has generated a lot of study on the benefits of investing in them, especially their safe haven characteristics. Bitcoin serves as a hedge, diversifier, and safe haven for a range of foreign currencies, according to Urquhart and Zhang (2019),

who look at the cryptocurrency's hedging and safe haven qualities hourly. Shahzad et al. (2019) use a cross-quantilogram approach to define safe haven traits and find some evidence indicating that commodities with time-varying behavior, including gold, Bitcoin, and the commodity index, are poor safe-havens. Guesmi et al. (2019), argue that portfolio risk is considerably reduced when Bitcoin is included in a portfolio alongside gold, oil, and emerging market equities.

In contrast, Smales (2020), concludes that because of its greater volatility, lesser liquidity, and higher transaction costs, Bitcoin is not a good investment to be held in a safe haven. Klein et al. (2018) find that Bit coin positively correlates with falls in developed markets when comparing the hedging and safe haven characteristics of gold and crypto currency. Critics have pointed out that there is a danger involved in even classifying cryptocurrencies as financial assets due to their immaturity, the number of criminal activities, and financial theft (Corbet et al., 2019). The formation of bubbles in cryptocurrency markets, which are suggestive of speculative behavior, raises issues regarding cryptocurrencies' eligibility as safe havens (Gandal et al., 2018).

3.3 Innovation Effect

The crypto currency space has seen rapid innovation, which is multiplying new concepts like the metaverse and non-fungible tokens (NFTs). Crypto currency will be used as a means of exchange by the DeFi, NFT economy, and decentralized autonomous organizations (DAOs). Cryptocurrencies are already being used in the metaverse to purchase real estate and experiences. This wave of innovation is launching new projects that attract capital and highly qualified workers, which creates employment and new companies specializing in the digital economy. NFTs are now one of the most popular assets or tokens in the Ethereum ecosystem. In early 2022, the NFT trading platform OpenSea set a record with \$5 billion in monthly sales, despite plateauing revenues.

Moreover, the tokenized assets continue to attract a lot of interest. Other applications, currencies, and virtual economies that are resistant to censorship and top-down control are some use cases for tokenized assets (Andrew, 2022). The use of cryptocurrencies as a means of payment for goods and services is becoming more and more common. For instance, Brisbane's International Airport became the world's first crypto-friendly airport in 2018 (Redman, 2018). In the same year, 59% of airlines began conducting research and pilot programs to utilize block chain technology over the ensuing three years (Sita, 2020). Similar strategies have been observed in the hotel industry as companies seek to improve their direct customer relationships.

Crypto currencies might be a reasonably successful recovery approach as they can offer three more benefits to consumers over existing compensation forms—benefits that could increase customer satisfaction and benefit the business. First off, unlike vouchers, cryptocurrency can be cashed. Furthermore, cryptocurrencies provide greater spending flexibility than vouchers, which are usually limited to a single provider (Gelbrich and Roschk, 2011). This is because cryptocurrencies can be used at a variety of outlets directly or indirectly through third-party mobile apps (Torpey, 2019; Cuthbertson, 2019). Third, cryptocurrencies could be more satisfying than both cash and vouchers as they have the potential to increase in value and are thus seen as an investment opportunity (Becker, 2018). Because of these benefits for consumers, cryptocurrencies might make

recovery more satisfying or allow for a similar degree of pleasure at a lower cost, giving early adopters a competitive edge in the service recovery industry.

3.4 Sustainability Effect

Macroeconomics is now directly impacted by global climate challenges; hence, climate has become the new monetary policy. When examining the macroeconomic implications of cryptocurrencies, the environment is a crucial lens to consider. Proof of Work (PoW), the consensus mechanism behind Bitcoin and Ethereum, is energy-intensive by design, even if many distributed ledger platforms only use a small amount more electricity than commonly used databases nowadays (World Economic Forum, 2022). Despite all of Bitcoin's advantages, there have lately been concerns expressed over potential environmental effects. Environmentalists, especially those who specialize in climate change, have expressed grave worries about the widespread use of technology in mining and currency trading. These days, conversations around environmental sustainability have acquired momentum because of the notable increase in cryptocurrency usage, especially in developed countries.

The case for a sustainable environment argues that the mining of cryptocurrencies requires a large amount of electricity, endangering the ecosystem (Bendiksen et al., 2019; Koomey, 2019). The process of cryptocurrencies causes environmental degradation because holders compete with one another to add the next block to the chain (extracted through a process known as

mining). Moreover, there is disagreement about whether the energy consumed by ASIC algorithms in cryptocurrencies, particularly Bitcoin, exceeds their market worth (Andoni et al., 2019; Reiff, 2020). These currencies offer great potential for technological advancement, claim Gallagher et al. (2019).

There are now arguments for and against cryptocurrencies' potential environmental effects. Studies such as those conducted by Krause and Tolaymat (2018) indicate that the pace of energy use and Bitcoin mining both contribute to atmospheric CO₂ levels. More precisely, according to Mora et al. (2018), and Howson (2019), Bitcoin alone, out of all cryptocurrencies, may result in a 2-degree Celsius spike in global temperatures by 2050. However, according to Köhler and Pizzol (2019), increasing Bitcoin's hash rate lowers the cryptocurrency's energy consumption and carbon footprints.

3 Economic Theory and Crypto currency

In a rational market, there are basic principles, which apply to the pricing and availability of goods and services. At the same time, these forces affect the value of currency. Currency is an item whose principal use is as a store of value.

Once upon a time, precious metals and gems are the principal value store used. Precious jewels, gold, and silver are used as currency to acquire goods and services. Over time, as nations industrialized, trading required proxy value stores, and paper money was introduced, which was tied to what became

the gold standard. This system lasted into the 20th century

As nations move off the gold standard, Keynesian economics became a much-touted model. Introduced by John Maynard Keynes, a British economic theorist in his seminal, depression-era work “The General Theory of Employment, Interest and Money”, it introduced a side demand-side model whereby nations were shown to have the ability to influence macroeconomics by modifying taxes and government spending.

Recently, cryptocurrency has thrown a curveball into our economic models, with the introduction of virtual currencies. Bitcoin is the most widely known, but there are multiple other virtual currencies or cryptocurrencies as they are now called because of the underlying mathematical formulas and cryptographic algorithms that govern the networks these are built on.

4. Conclusion and Recommendations

This paper analyzes in a more holistic approach how cryptocurrency might affect individual economies and the global financial system. The study finds that cryptocurrency serves as a hedge, diversifier, and haven for a range of foreign currencies, and given the absence of regulation, there are no protections to ensure the cautious launch of the cryptocurrency market. The paper concludes that allowing cryptocurrency to play a regulated role in economies will have the greatest macroeconomic net benefit to the high-level regulatory paths. The paper recommends that public-private partnerships are imperative to help central banks and financial regulators keep up with the fast-

moving pace of cryptocurrency developments and applications. Policymakers should act quickly to compile information on the macroeconomic effects of crypto currencies and start creating regulatory frameworks specifically tailored to them. Equally, to prevent regulatory arbitrage, there is a need for nations to collaborate and work together.

The criteria stated in this paper should be supported by the eventual regulation itself. It should support innovation, environmental sustainability, protection against illicit activity, monetary stability, financial system stability, and access to the financial system. Future objectives should focus on embracing the innovations that cryptocurrencies provide while utilizing legislation to reduce economic risks as much as possible.

In light of the foregoing discussion, the paper identified what future researchers should do. First, there is a need for further empirical studies on the macroeconomic consequences of cryptocurrency and the factors influencing cryptocurrency adoption. While previous studies have employed qualitative methods, such as questionnaires administered to macroeconomists, these may not always provide a comprehensive understanding of the underlying political and economic drivers and certainly cannot focus on the needs and opinions of the public. However, these studies can be expanded in several ways, for instance by considering how different cryptocurrencies may appeal to different consumers or different types of use.

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