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THE EFFECTS ON U.S. IMPORTATION: RISE OF CRYPTOCURRENCY AND TRADITIONAL CURRENCIES

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ABSTRACT

Objective: This paper aims to investigate both short and long run interactions between the U.S. Imports, Bitcoin, Gold, and U.S. Dollar by applying monthly data from January of 2011 to December of 2023.

Theoretical Framework: The United States has been experiencing trade deficit for the past several years. Hence, prices of cryptocurrency and traditional currencies are also increasing that may serve a connection with the increasing trade deficit.

Method: This study utilized Unit Root, Auto-Regressive Distributed Lag (ARDL), and Granger Causality to examine the relationship between all the variables.

Results and Discussion: The results of this study revealed that the U.S. Dollar has a positive relationship with the increasing U.S. Imports in the short run while the rest of the variables are insignificant. Notably, Bitcoin revealed a positive significant relationship with U.S. Imports in the long run while the rest of the variables remained insignificant.

Research Implications: This study has implied that the rise cryptocurrency mainly Bitcoin and traditional currencies specifically the U.S. Dollar and Gold has an implication with the current trade deficit being faced in the United States.

Originality/Value: This study unraveled the implications of cryptocurrency and traditional currencies to a macroeconomic variable, specifically imports. Furthermore, this study wishes to contribute within the field of cryptocurrency as it can change the system of financial technology and its relationship with traditional currencies implying a greater impact for the global economy, as it is showing great potential for the future of finance with its global adoption.

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OS EFEITOS NAS IMPORTAÇÕES DOS EUA: AUMENTO DA CRIPTOMOEDA E DAS MOEDAS TRADICIONAIS

RESUMO

Objetivo: Este artigo tem como objetivo investigar as interações de curto e longo prazo entre as importações dos EUA, Bitcoin, ouro e dólar americano, aplicando dados mensais de janeiro de 2011 a dezembro de 2023.

Referencial Teórico: Os Estados Unidos têm registado um défice comercial nos últimos anos. Assim, os preços das criptomoedas e das moedas tradicionais também estão a aumentar, o que pode servir de ligação com o crescente défice comercial.

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Método: Este estudo utilizou raiz unitária, atraso distribuído auto-regressivo (ARDL) e causalidade de Granger para examinar a relação entre todas as variáveis.
Resultados e Discussão: Os resultados deste estudo revelaram que o dólar americano tem uma relação positiva com o aumento das importações dos EUA no curto prazo, enquanto o resto das variáveis são insignificantes. Notavelmente, o Bitcoin revelou uma relação positiva e significativa com as importações dos EUA no longo prazo, enquanto o resto das variáveis permaneceram insignificantes.
Implicações da Pesquisa: Este estudo implicou que o aumento da criptomoeda, principalmente do Bitcoin e das moedas tradicionais, especificamente o dólar americano e o ouro, tem uma implicação no atual déficit comercial enfrentado nos Estados Unidos.
Originalidade/Valor: Este estudo desvendou as implicações das criptomoedas e das moedas tradicionais para uma variável macroeconómica, especificamente as importações. Além disso, este estudo pretende contribuir no campo das criptomoedas, pois pode mudar o sistema de tecnologia financeira e sua relação com as moedas tradicionais, implicando um maior impacto para a economia global, pois está mostrando um grande potencial para o futuro das finanças com seu impacto global. adoção.

Palavras-chave: Importações, Bitcoin, Ouro, Dólares, Cobertura, Troca, ARDL.

LOS EFECTOS SOBRE LAS IMPORTACIONES ESTADOUNIDENSES: AUGE DE LAS CRIPTOMONEDAS Y LAS MONEDAS TRADICIONALES

RESUMEN
Objetivo: Este artículo tiene como objetivo investigar las interacciones a corto y largo plazo entre las importaciones estadounidenses, Bitcoin, oro y dólar estadounidense aplicando datos mensuales desde enero de 2011 hasta diciembre de 2023.
Marco Teórico: Estados Unidos ha estado experimentando un déficit comercial durante los últimos años. Por lo tanto, los precios de las criptomonedas y las monedas tradicionales también están aumentando, lo que puede servir de conexión con el creciente déficit comercial.
Método: Este estudio utilizó raíz unitaria, retraso distribuido autorregresivo (ARDL) y causalidad de Granger para examinar la relación entre todas las variables.
Resultados y Discusión: Los resultados de este estudio revelaron que el dólar estadounidense tiene una relación positiva con el aumento de las importaciones estadounidenses en el corto plazo, mientras que el resto de las variables son insignificantes. En particular, Bitcoin reveló una relación significativa positiva con las importaciones estadounidenses a largo plazo, mientras que el resto de las variables permanecieron insignificantes.
Implicaciones de la investigación: Este estudio ha implicado que el aumento de las criptomonedas, principalmente Bitcoin y las monedas tradicionales, específicamente el dólar estadounidense y el oro, tiene una implicación con el actual déficit comercial que enfrenta Estados Unidos.
Originalidad/Valor: Este estudio desentrañó las implicaciones de las criptomonedas y las monedas tradicionales para una variable macroeconómica, específicamente las importaciones. Además, este estudio desea contribuir dentro del campo de las criptomonedas ya que pueden cambiar el sistema de la tecnología financiera y su relación con las monedas tradicionales implicando un mayor impacto para la economía global, ya que está mostrando un gran potencial para el futuro de las finanzas con su impacto global. adopción.

Palabras clave: Importaciones, Bitcoin, Oro, Dólares, Cobertura, Comercio, ARDL.

1 INTRODUCTION

International trade provides access to larger markets, allowing countries to specialize in goods and services where they have a comparative advantage, increasing efficiency and productivity (Lau & Tang, 2018). It also expands consumption choices and promotes economic growth by offering a wider variety of goods and services at competitive prices (Lau & Tang, 2018; Okenna & Adesanya, 2020). Were (2015) emphasized imports' role in providing access

to resources and goods from international markets. Redmond and Nasir (2020) noted that financial sector development promotes economic growth through higher rates of capital accumulation in domestic and international investments. However, substantial and recurring trade deficits, while not always indicative of economic weakness, may require further investigation (Kim, 2014).

The U.S. has faced a significant trade deficit and sluggish growth for years. Bryniuk (2023), reported a record goods and services trade deficit of $948.1 billion, highlighting U.S. dependency on China for affordable goods, which affects economic vulnerability and export capacity. Kim (2014) noted that the U.S. trade deficit has expanded with China and other key partners like Canada, Mexico, Japan, and Germany. While Lau and Tang (2018) observed increased demand and revenue for importers, Viet Le and Baker (2020) linked the trade deficit to a decline in manufacturing jobs, though Jackson (2018) pointed out that imports also support roles in the service sector. The U.S. trade deficit peaked due to disruptions from the Ukraine-Russia conflict and pandemic effects. Zhang (2023) noted that the pandemic caused the U.S. economy's first annual contraction since 2008. Leibovici and Santacreu (2020) reported a 20% rise in the U.S. trade deficit to $8.65 billion due to global lockdowns reducing supply and U.S. production. Orhan (2022) highlighted significant economic upheavals from the war, notably in commodity markets, which have surged and could hinder global GDP growth.

According to Drehmann and Sushko (2022), the international role of the U.S. dollar is unrivaled where the global foreign exchange market remains concentrated in a few currencies, with the U.S.Dollar dominating. Tu and Zhang (2019) argued that the US dollar's dominance as the global reserve currency is a key factor behind the persistent US trade deficit. Boz (2020), emphasized invoicing more in U.S. dollars tends to experience greater exchange rate pass-through to their import prices; also, their trade volumes are more sensitive to fluctuations in these exchange rates. Gourinchas et al. (2019) "large stocks of dollar liquidity held abroad relative to the size of the United States may lead to a loss of confidence in the dollar". Hence, the effects of exchange rate movements, deepening trade integration or the prominence of global value chains, as well as the role of international currencies, the conduct of monetary policy and international spillovers (Gourinchas et al., 2019).

The U.S. dollar, as a global reserve currency, is widely used in international trade. However, the rise of in the prices of currencies like cryptocurrencies and gold could impact consumer spending on imports and contribute to the U.S. trade deficit. Raju and Sneha (2023) explained that cryptocurrencies are digital assets on decentralized blockchains, which serve as

distributed digital ledgers, recording transactions, managing portfolios, and ensuring data integrity. Each new cryptocurrency unit is uniquely coded to prevent duplication through a process called mining. Bitcoin, invented by Satoshi Nakamoto and introduced in 2009, operates as a peer-to-peer system for direct transactions without intermediaries (Seetahraman et al., 2017). It is used globally for international money transfers and adapts to various currencies (Ibrahim and Basah, 2022). Bitcoin's value has fluctuated significantly, from less than five cents per USD in 2010 to over USD 1,200 in 2013, peaking at $69,000 in 2019, and currently standing at $50,000 in 2024 (Seetharaman et al., 2017). Ibrahim and Basah (2022) proposed Bitcoin as an efficient hedging tool like gold during financial crises, offering returns and security compared to conventional investments.

Gold is a highly valued metal with a rich history and diverse uses. Parshina (2020) noted that in the financial world, gold is a universal instrument for preserving purchasing power amid inflation. Its value as an investment asset is highlighted during periods of low and negative real interest rates (Jermann, 2021). Gold's value stems from its natural scarcity, physical properties, historical and cultural significance, use as a haven asset, role in strategic asset allocation, and potential as a mineral reserve. Christian (2016) and Gomes et al. (2022) emphasized gold's safe haven properties and relevance for strategic asset allocation. Bildirici and Sonutsun (2018) highlighted gold's critical role in the financial sector, commodity market, and socioeconomic bases, noting its use in industrial components and hedging against political, currency, inflation, geopolitical risks, and crises. O'Connor et al. (2015) characterized gold as a currency-like asset, appreciating against the dollar over time due to its negative correlation with the US Dollar. Ibrahim and Basah (2022) underscored gold's dependable investment qualities, providing stable returns and security, making it valuable for savings and emergency funds, especially during crises like the COVID-19 pandemic.

This paper aims to investigate both short and long run interactions between the U.S. Imports, Bitcoin, Gold, and U.S. Dollar Index by applying monthly data from January of 2011 to December of 2023. This study will also analyze the possible causal relationships between the variables. As to carry out information for understanding the dynamics of trade deficit that is crucial for policymakers, economists, and stakeholders.

2 THEORETICAL REFERENCE FRAMEWORK

2.1 U.S. DOLLAR AND IMPORTS

According to Adler et al. (2020), the US dollar's predominant role in international trade pricing is especially notable in emerging markets and developing economies. The United States benefits uniquely from the dollar's position as the leading global reserve currency, which has allowed the country to sustain a substantial and growing trade deficit over many decades. Kallianiotis (2022) explored the short-term relationship between the trade balance and fluctuations in the real exchange rates of other countries relative to the U.S. dollar. "The study found that changes in real exchange rates significantly impact the U.S. trade balance" (Kallianiotis, 2022). Furthermore, empirical findings indicated a long-term relationship between the trade balance and factors such as income, terms of trade, and exchange rate volatility, all of which significantly affect trade accounts (Kallianiotis, 2022).

Arize et al. (2017) found a significant long-term link between exchange rates and trade balances in several Asian countries, with a stronger dollar correlating with larger U.S. trade deficits and Asian trade surpluses (Thorbecke, 2023). Using the NARDL approach, Arize et al. (2017) identified a significant long-term relationship between trade balances and the real effective exchange rate for countries like China, Israel, and Malaysia. Bosupeng et al. (2024) noted that while volatility negatively impacts developed nations' trade balances, it may benefit developing economies during downturns. Matlasedi (2017) found that South Africa's import demand is influenced by the exchange rate in the long run, whereas Inyang and Effiong (2021) observed that exchange rates do not significantly affect Nigeria's import volume in the short run but have a significant long-term impact. Ganziro (2016) highlighted that the dollar's reserve status can impose economic and security burdens on the U.S. Ma et al. (2020) established that changes in the dollar's exchange rate directly affect international trade patterns and import prices. Truong and Vo (2023) suggested a weaker dollar could positively impact the trade balance by making exports cheaper and boosting imports. Dogru et al. (2019) emphasized sectoral differences in trade balances, with specific sectors possibly showing surpluses even in countries with overall trade deficits. Wang (2018) noted that higher incomes in the U.S. and China impact their bilateral trade deficit, with a stronger dollar discouraging U.S. exports to China without significantly increasing imports in the long run.

Tu and Zhang (2019) argued that the U.S. dollar's status as the global reserve currency is a major factor behind the persistent U.S. trade deficit, especially with China. They found that the trade deficit increases with global economic activity, with rapidly growing economies like China exacerbating the deficit. The dollar's reserve currency status allows the U.S. to finance the deficit, but it also makes U.S. exports less competitive, widening the deficit during periods of rapid growth in China (Tu & Zhang, 2019). In contrast, Shi and Li (2016) found a weak association between the trade deficit and exchange rates, suggesting that U.S. GDP growth, rather than currency fluctuations, is more significant for the trade deficit with China. Rajković et al. (2020) found that while dollar devaluation may improve the trade account in the long term, it can have short-term negative effects. Choi (2022) noted that U.S. dollar depreciation has positive effects on trade balances, contrasting with negative effects from other currencies due to intermediary import effects. Choi and Lee (2021) found that currency depreciation negatively impacts gross exports in the U.S. and Korea but positively affects value-added exports in Japan and Korea.

2.2 BITCOIN AND IMPORTS

According to Chen (2021), "the rise of cryptocurrencies has captured the economic interest of numerous nations by introducing groundbreaking concepts such as blockchain technology and decentralized currencies". Plakandaras et al. (2021) highlighted a fundamental characteristic of Bitcoin that sets it apart from many other cryptocurrencies: its controlled supply of coins, established by the algorithm's creator, ensuring that the number of new Bitcoins introduced into the system decreases over time until reaching a maximum of 21 million units. This suggested that the supply is determined externally and that it follows a deflationary trajectory (Plakandaras et al., 2021). Valeria et al. (2021) contended that blockchain technology could enhance the financing process, rendering it faster, more dependable, and accessible to a broader audience. Through technology, the monitoring and licensing of intellectual property products could be simplified (Valeria et al., 2021).

Dwyer (2015) and Baur et al. (2017) contended that Bitcoin possesses characteristics to both gold and currency, as it lacks government backing yet functions as a medium of exchange. Zhu et al. (2022) "Bitcoin serves as a valuable long-term asset, especially during crises such as the COVID-19 pandemic". Additionally, Bouri et al. (2020) stated that "Bitcoin can act as a hedge against the US stock market amid escalating trade policy uncertainties, offering evidence

of its potential to provide diversification benefits to investors". According to Chen (2021), "the market capitalization of cryptocurrencies surpassed $2 trillion (USD) in September 2021, prompting countries to consider cryptocurrencies as a viable system to embrace".

Nasir and Leung (2019) stated that improvements in the trade balance cannot be attributed to a single macroeconomic factor alone. Macedo (2018) highlighted blockchain's potential for managing import-export records, invoices, and bills, offering benefits for international trade and financial services. Therefore, Gursoy (2021) noted Bitcoin's emerging role as a shopping tool in some countries and companies, while Ibrahim and Basah (2022) pointed out its increasing use in international money transfers due to its currency convertibility. Sagheer et al. (2022) suggested that better technological knowledge and transaction transparency could boost Bitcoin's adoption as a medium of exchange. Hence, Thanh et al. (2023) argued that cryptocurrencies' efficiency and cost-effectiveness in international transactions will enhance their acceptance. Ahmadova et al. (2023) proposed exploring Bitcoin's potential as legal tender to understand its global impact. Rezgui (2022) noted Bitcoin's ability to reduce trade costs and improve product tracking in developing nations. While Hasan et al. (2022) emphasized that perceived benefits of cryptocurrency could drive its adoption. Hence, Sheikh (2022) hypothesized that crypto prices influence a country's economic prosperity. Jati et al. (2022) found that Bitcoin has a long-term impact on economic growth, suggesting that recognizing it as legal tender could enhance its role in international trade and economic growth.

According to Thomson Reuters (2022), the United States has the largest presence of crypto investors, exchanges, trading platforms, crypto mining firms, and investment funds. Even though, Hang et al. (2020) underscored Japan's pioneering stance in fully embracing Bitcoin by enacting legislation recognizing Bitcoin and other virtual currencies as official payment methods. Consequently, Plakandaras et al. (2021) suggested a correlation between the escalation of the U.S.-China trade war and the surging Bitcoin prices, aligning with recent market trends. Hence, Onyekwere (2023) concluded that Bitcoin's growing prominence will significantly reshape the dynamics of international trade and foreign relations, challenging established currencies like the dollar. Furthermore, Givargizova (2023) noted an increase in Iran's trade turnover attributed to the emergence of cryptocurrency and shifts in the money transfer system.

Alves and Goncalves (2022) utilized ARDL and discovered a positive correlation between Bitcoin and purchasing power, suggesting its potential as a hedge against inflation.

This implies that consumers may maintain their purchasing power for imports. Similarly, Naser (2021) employed ARDL and observed that rising Bitcoin prices coincide with declines in the S&P 500, indicating Bitcoin's role as a safe haven in times of heightened global financial stress. Additionally, Naser (2021) found a negative significant relationship between economic policy uncertainty and Bitcoin, suggesting Bitcoin's utility as a hedge against such uncertainty over the long term. Consequently, Onyekwere (2023) stressed that "the ease of international trade, particularly for merchants in heavily import-dependent countries, would greatly benefit from Bitcoin adoption, as it could mitigate transaction costs associated with exchange rate fluctuations".

Givargizova (2023) noted that due to sanctions and the growing cryptocurrency market, countries are exploring cryptocurrencies for foreign trade to enhance economic relations and streamline international payments. Astuti and Fazira (2018) pointed out that Bitcoin is not universally accepted, even in countries where it is legal. Chen (2021) found a negative relationship between cryptocurrency adoption and international trade, suggesting that countries with weak trade support institutions, such as those affected by corruption, are more likely to adopt cryptocurrencies. Hence, Sheikh (2022) argued that digital currencies are not yet ready to replace traditional currencies and credit cards in global trade, as many people need further education about cryptocurrencies. Therefore, Gursoy (2021) concluded that while there is speculation about cryptocurrencies potentially replacing traditional money, strong political trust in conventional currencies currently limits widespread adoption.

2.3 GOLD AND IMPORTS

Based on Ibrahim and Basah (2022) emphasized gold's qualities as a dependable investment, providing stable returns and security, making it a valuable asset for savings and emergency funds, particularly during crises like the COVID-19 pandemic. Akhataruzzaman et al. (2021) observed during the pandemic that gold experienced a milder price drop compared to global equities and other commodities such as oil. Thus, gold serves as a hedge against currency fluctuations, bolstering its role in ensuring future financial security (Ibrahim &Basah, 2022; Iqbal, 2017).

O'Connor et al. (2015) characterized gold as resembling a currency-like asset, noting its tendency to appreciate against the dollar over time, attributed to its negative correlation with the US Dollar, which aligns with its function as a hedge. Nair et al. (2015) supported

this view, linking the relationship between gold and the USD exchange rate to gold's role as a hedge against dollar depreciation. Fried (2023) argued that shifts in the asset compositions of international portfolios have increased demand for safe assets like the US dollar, leading to a stronger dollar that has reduced the competitiveness of US exports, made imports more affordable for domestic consumers and businesses, and contributed to trade deficits. Esteves and Ploeckl (2018) suggested that the choice of exchange rate is influenced by network externalities from international trade, with gold playing a significant role. Kan (2022) further investigated the dynamic relationships between gold prices and various financial indicators, highlighting gold's importance as a safe haven for investors. Together, these studies emphasize the intricate and significant role of gold in international trade and its broader economic implications.

The relationship between gold and international trade has long been a topic of interest. Soemitra et al. (2021) suggested gold's stability makes it a potential substitute for fiat money in international trade. Gold reserves are crucial for macroeconomic stability (Moldalieva, 2022). Guan et al. (2021) found that increased gold market volatility stimulates short-term economic growth in resource-producing countries, leading to higher import demand. In Ghana, gold prices show a short-term positive correlation with GDP growth but a long-term negative one, indicating that rising gold prices may temporarily enhance import capacity but prolonged reliance could destabilize the economy (Larmin, 2022).

Some advocate for returning to the gold standard for benefits like enhanced price stability (Asquin, 2017), while others question its practicality (Revenda, 2018). Abuamria and Ajouz (2020) explored reintroducing gold as payment. Gezgin (2020) and Istan (2023) discussed gold's dual role in Islamic economics. Hoàng et al. (2016) found gold ineffective as a long-term hedge against inflation, although it may serve this purpose short-term in the UK, USA, and India. Manu et al. (2020) asserted that gold prices do not significantly influence India's trade balance, encouraging policymakers to reduce dependence on crude oil and gold imports.

3 METHODOLOGY

This study conducted a quantitative research design to analyze the data gathered. It allowed the researchers to examine, describe, and determine the effects of the prices of Bitcoin, Gold, and U.S. Dollars to Trade Deficit in the United States monthly from 2011 until 2023. The

data used for the independent variables were taken from Investing.com, while the data used for Bitcoin was the monthly opening price of Bitcoin from 2011 to 2023, and for Gold was the monthly opening price of Gold from 2011 to 2023, and for U.S. dollar is the monthly opening price of the U.S. Dollar Index from 2011-2023. For the dependent variable, the Trade Deficit was measured monthly in the value of International Trade Imports of Commodities measured in U.S dollars of the United States from 2011-2023 taken from the Federal Reserve Economic Data (FRED). After gathering the data from secondary sources, the researchers utilized EVIEWS as its software to examine the relationship between the variables. Hence, the researchers utilized the following tests: Unit Root Test, Auto-Regressive Distributed Lag (ARDL), and Granger Causality.

The econometric model utilized two or more independent variables to predict their underlying effects on the dependent variable. Where IMP is the monthly value of International Trade Imports of Commodities in the United States, BTC is the monthly opening price of Bitcoin, GOLD is the monthly opening price of Gold, and USD is monthly opening price of the U.S. Dollar Index.

$$IMP = f(BTC, GOLD, USD) \qquad (1)$$

3.1 STATIONARITY TEST

According to Shrestha and Bhatta (2018), the stationarity of a time series, specifically its movement from the upside or downside is examined by conducting unit root tests. A unit root test is a crucial step to check if the data has a trend or fluctuates randomly around a constant mean (Shrestha & Bhatta, 2018).

$$E(Y)_t = E(Y_{t-s}) = \mu, for\ some\ s > 0 \qquad (2)$$

$$Var(Y_t) = Var(Y_{t-s}) = \sigma y^2\ and \qquad (3)$$

$$Cov(Y_t, Y_{t-s}) = \gamma_s \qquad (4)$$

The expected value of Y at period t, denoted by ***E(Yₜ)***, represents the average outcome of Y at that time. Variance, denoted by ***Var***, measures how much Y_t deviates from this average

value. Lastly, $\boldsymbol{Y_{t-s}}$ signifies the lagged value of Y at period t-s, which allows us to examine how past values of Y influence its expected value and variance at the current period t.

3.2 AUTO-REGRESSIVE DISTRIBUTED LAG

Based on Shakil et al. (2017), the ARDL co-integration approach within time series methodology is employed to assess the presence of a long-term relationship by considering lagged levels of variables. This approach assists in discerning both dependent and independent variables (Shakil et al., 2017).

$$IMP_{t} = a0 + i = 1kb1IMP_{t-i} + i = 1kb2BTC_{t-i} + i = 1kb3GOLD_{t-i} + i = 1kb4USD_{t-i} + \sigma 1IMP_{t-i} + \sigma 1BTC_{t-i} + \sigma 1GOLD_{t-i} + \sigma 1USD_{t-i} + u_{t} \quad (5)$$

3.3 GRANGER CAUSALITY

Based on Shrestha and Bhatta (2018), Granger causality tests whether past values of one variable can better predict another variable's future values. For two cointegrated variables like Y and X, potential relationships include X influencing Y, Y influencing X, or mutual influence (Shrestha & Bhatta, 2018). Granger's test determines if past values of X aid in forecasting future values of Y, indicating causation from X to Y (Shrestha & Bhatta, 2018).

$$Yt = i = 1na_{i}Yt - i + j = 1njXt - j + u1t \quad (6)$$

$$Xt = i = 1n_{i}Xt - i + j = 1njYt - j + u2t \quad (7)$$

4 RESULTS AND DISCUSSIONS

Table 1

Descriptive Statistcs

	IMPORTS	BITCOIN	GOLD	U.S. DOLLARS
Mean	207,359.20	10,367.66	1500.234	106.7342
Standard Deviation	28,346.86	15,022.64	270.5473	10.8415
Skewness	1.18	1.63	0.28	-0.39
Jarque-Bera (p-value)	0.0000	0.0000	0.0000	0.0001
Observations	155	155	155	155

This study consisted of 155 observations. Table 1 shows that the average monthly values are 207,359.2 for Imports, 10,367.66 for Bitcoin, 1,500.2 for Gold, and 106.7342 for the US Dollar Index. Imports and Bitcoin are positively skewed, indicating a longer tail on the right, while Gold and USD are negatively skewed, indicating a longer tail on the left. The standard deviations are 28,346.89 for Imports, 15,022.64 for Bitcoin, 270.5473 for Gold, and 10.8415 for USD, indicating that Imports are the most volatile and USD the least volatile among the variables. According to Ibrahim and Basah (2022), higher standard deviation indicates greater data dispersion. The p-values from the Jarque-Bera test are all below 5%, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis, indicating non-normality of residuals in all variables.

Table 2

Unit Root Test (Augmented Dickey-Fuller)

VARIABLES	AT LEVEL (P-VALUE)	1ST DIFFERENCE (P-VALUE)
Imports	0.8068	0.0000
Bitcoin	0.5467	0.0000
Gold	0.7299	0.0000
U.S. Dollars	0.3064	0.0000

The results of the Augmented Dickey-Fuller showed that all variables are non-stationary at their level p-values, as it is greater than the level of significance of 5%. However, the p-values of all variables are less than the level of significance of 5% at their first difference. Therefore, the null hypothesis was rejected, instead the alternative hypothesis was accepted that all the variables are stationary at their first difference. As all the variables are deemed stationary, hence Auto-Regressive Distributed Lag can be applied to test the association between the variables in both long-run and short-run.

Table 3

Optimal Lag Selection

LAGS	AIC	SC	HQC
1	54.6347	55.04156*	54.80001
2	54.39183	55.12418	54.68939*
3	54.44534	55.50318	54.87515

Based on Table 3., Hannan-Quinn criterion suggested that the optimal lag length order to be followed is Lag 2 to examine the relationship between Imports, Bitcoin, Gold, and the U.S. Dollars. According to Polyzos and Siriopoulos (2022), for monthly VAR models, the HQC tends to produce the most accurate impulse response estimates for all realistic sample sizes. This lag length served as the maximum lag length used in the selection of the ARDL model, hence the model followed a (2,2,2,2) ARDL structure.

Table 4

Auto-Regressive Distributed Lag

LONG RUN	NO LAG		FIRST LAG	
Variables	**Coefficient**	**Prob**	**Coefficient**	**Prob**
C	18,637.02	0.0144		
Imports			-0.097165	0.0004
Bitcoin	0.181674	0.1425	0.204001	0.0004
Gold	-2.295234	0.7024	0.532801	0.8264
U.S. Dollars	218.1388	0.4140	-7.709608	0.8735

Based on the Long-run results, Bitcoin, Gold, and USD all showed no significant relationship between Imports at zero lags. Furthermore, Bitcoin at first lag ($\beta = 0.204001$, p-value = 0.0004) showed a positive and significant relationship with Imports, meaning that a one-month lagged increase of 1 dollar in Bitcoin price increases Imports by 0.204001 million dollars. While Imports at first lag ($\beta = -0.097165$, p-value = 0.0004) showed a negative and significant relationship with itself, meaning that a one-month lagged increase in Imports, the United States decreases its Imports by 0.097165 million of dollars. USD at first lag ($\beta = -7.709608$, p-value = 0.8735) showed negative and insignificant relationship with Imports. Hence, Gold at first lag ($\beta = 0.532801$, p-value = 0.8264) showed a positive and insignificant relationship with Imports.

Table 5

Auto-Regressive Distributed Lag

SHORT RUN	NO LAG			FIRST LAG	
Variables	**Coefficient**	**Prob**		**Coefficient**	**Prob**
C	18,637.02	0.0000			
Imports				-0.093384	0.2299
Bitcoin	0.181674	0.1262		0.001188	0.9925
Gold	-2.396234	0.6952		0.753154	0.9061
U.S. Dollars	218.1388	0.3982		-495.0969	0.0462
CointEq (-1)	-0.097165	0.0000			
Prob (F-stat)	**0.0004**	**R-squared**	**0.1749**	**Durbin-Watson Stat**	**2.0282**

The Short-run results, Bitcoin, Gold, and USD all showed no significant relationship between Imports at zero lags. Furthermore, USD at first lag (β = -495.0969, p-value = 0.0462) showed a negative and significant relationship with Imports, meaning that a one-month lagged increase in USD index decreases Imports by 495.0969 million dollars. Imports at first lag (β = -0.093384, p-value = 0.2299) showed a negative and insignificant relationship with itself. While Bitcoin at first lag (β = 0.001188, p-value = 0.9925) showed a positive and insignificant relationship with Imports. Hence, Gold at first lag (β = 0.753154, p-value = 0.9061) still showed a positive and insignificant relationship with Imports.

Furthermore, CointEq(-1) or the Error Correction Term (β = –0.097165, p-value = 0.0000) was negative and statistically significant, it suggested that Imports return to its equilibrium level at 9.72% rate within a month after the disturbance or shock caused by the independent variables. The model significantly shows changes towards Imports as the F-stat p-value (0.0004) is less than the level of significance, but all the independent variables can only predict 17.49% of the changes towards Imports based on the R-squared while the remaining 82.51% are the factors not included in the model. Lastly, the Durbin Watson stat (2.028278), is above the lower limit (1.584) and upper limit (1.665), therefore the model has negative autocorrelation.

Bitcoin's short-run performance is marked by high risk due to substantial price fluctuations, making it an insignificant medium of exchange (Wang et al., 2022; De La Horra et al., 2019). However, long-term studies show Bitcoin positively influences economic growth and could boost international trade if adopted as legal tender (Jati et al., 2022). It also has a positive long-term correlation with purchasing power, serving as a hedge against uncertainty (Naser, 2021; Alves & Goncalves, 2022). USD depreciation may cause short-term trade account issues but can positively affect the trade balance in the long run by making exports cheaper (Rajković et al., 2020; Truong & Vo, 2023). However, its volatility can negatively impact

developed nations' trade balances, such as the US (Bosupeng et al., 2024). Gold does not significantly influence trade balance in the long term (Manu et al., 2020) and is not an effective long-term hedge, though it may serve this purpose short-term (Hoàng et al., 2016). The model's low accuracy may be due to omitted variables like inflation, exchange rates, interest rates, and differing policies among US trading partners.

Table 6

Cointegration (F-Bounds Test)

		SHORT RUN		LONG RUN	
Value	**Significance**	**Lower Bound**	**Upper Bound**	**Lower Bound**	**Upper Bound**
4.614402	10%	2.72	3.77	2.72	3.77
4.614402	5%	3.23	4.35	3.23	4.35
4.614402	1%	4.29	5.61	4.29	5.61

For both the short and long-run, the F-statistic value of 4.614402 is greater than the lower bounds and upper bounds of both the 10% and 5% level of significance. Hence, the null hypothesis was rejected and accepted the alternative hypothesis instead, that all the variables in the model are cointegrated or moving together in the same direction.

Table 7

Granger Causality

NULL HYPOTHESIS	F-STAT	PROB
BTC does not Granger Cause IMP	10.0923	8.00E-05
IMP does not Granger Cause BTC	0.2006	0.8185
GOLD does not Granger Cause IMP	2.82392	0.0626
IMP does not Granger Cause GOLD	0.16886	8.44
USD does not Granger Cause IMP	2.11041	0.1248
IMP does not Granger Cause USD	1.03994	0.356
GOLD does not Granger Cause BTC	5.15406	0.0069
BTC does not Granger Cause GOLD	1.17229	0.3125
USD does not Granger Cause BTC	1.81214	0.1669
BTC does not Granger Cause USD	3.87369	0.0229
USD does not Granger Cause GOLD	2.75836	0.066
GOLD does not Granger Cause USD	3.8561	0.0223

Based on the Optimal Lag Selection, Lag 2 is the maximum suggested lag length. The Granger Causality test reveals mutual interactions between Imports, Bitcoin, Gold, and USD. The results show a causal relationship from Bitcoin to Imports, but not vice versa, consistent with Rezgui (2022), who noted Bitcoin's ability to reduce trade costs and streamline international trade. However, Sheikh (2022) pointed out that digital currencies still have a long way to replace credit cards and traditional currencies in global trade. Gold and Imports show

no causal relationship in either direction, aligning with Manu et al. (2020), who found no long-term impact or causal relationship between gold and international trade. Similarly, USD shows no causal relationship with Imports, which contrasts with Ma et al. (2020) who identified a link between USD and international trade patterns. Gold has a causal relationship with Bitcoin, but Bitcoin does not have a causal relationship with Gold, which contradicts Dončić (2020) who argued that historical gold price data cannot predict Bitcoin price movements. USD does not have a causal relationship with Bitcoin, but Bitcoin has a causal relationship with USD, consistent with Ibrahim and Basah (2022), who found no causality from USD to Bitcoin but a Granger causality from Bitcoin to USD. Lastly, USD does not have a causal relationship with Gold, but Gold has a causal relationship with USD, again in line with Ibrahim and Basah (2022), who found that Gold does Granger cause USD.

5 CONCLUSION

This study analyzed the short and long run relationship between the monthly prices of Bitcoin, Gold, and USD to the monthly Imports of the United States from 2011-2023. Employing ARDL to the study, results showed that among the independent variables, USD was the only independent variable to show a significant relationship in the short run with Imports as it is consistent with the result of Rajković et al. (2020) that a depreciation of the dollar may lead to short-term adverse effects in the trade account of a country. Hence, Bitcoin and Gold did not show any significant relationship to Imports in the short run. The result of these independent variables were both in line with Wang et al. (2022), De La Horra et al. (2019), and Hoàng et al. (2016) that the nature of these variables are highly volatile, therefore they may not be considered as a medium of exchange nor a currency hedge in the short run. In contrast, Bitcoin in the long-run was the only independent variable to show a significant relationship with Imports as expected. As it is also in line with the results of Jati et al. (2022), Naser (2021), and Alves and Goncalves (2022) that Bitcoin has positive correlation between purchasing power, highlighting its utility as a hedge against such uncertainty in the long-term, thereby boosting international trade of a country. However, USD showed insignificant relationship with Imports in the long-run, but it is still worth noting that if the dominance of dollars persists globally, it can make U.S. exports less competitive, which can widen the deficit of the country.

Based on the result of Granger Causality, Bitcoin does affect or cause both Imports and USD. This result can be associated that the price or presence of Bitcoin can facilitate less costly

transactions from the United States to other countries. Furthermore, Bitcoin is commonly pegged with the USD as its traditional exchange, thereby affecting the valuation of USD based on its current market value. The result also showed that Gold does affect or cause both Bitcoin and USD. This result can be associated that in times of uncertainty, Gold and Bitcoin may be seen as an alternative or hedge against traditional currencies, hence market movements in Gold can also reflect Bitcoin movement. Also, Gold is usually pegged with the USD globally, thereby changes in the prices of Gold can affect valuation of the USD.

The findings of this study hopefully provide relevant information to potential readers such as investors, traders, market makers, economists, future researchers, and the government. This study unraveled the implications of cryptocurrency and traditional currencies to a macroeconomic variable, specifically imports. Furthermore, this study wishes to contribute within the field of cryptocurrency as it can change the system of financial technology and its relationship with traditional currencies implying a greater impact for the global economy, as it is showing great potential for the future of finance with its global adoption.

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