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Socioeconomic fundamentals of bitcoin using stochastic growth model

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Abstract

Digital assets have become widely adopted by young investors mostly aged under 34; however; there are various questions and concerns about the underlying socioeconomic fundamentals of these digital assets, especially bitcoin, because bitcoin constituted 47 percent of the total market capitalization of cryptocurrencies in 2021. The numbers of crypto ownership are expected to reach over 320 million users worldwide in 2022. The data reveal that there was a rapid growth in digital assets investment during 2021 and 2022, and bitcoin reached an annual growth rate of 60 percent in 2021. The objective of this study is to examine the underlying socioeconomic fundamentals of global bitcoin market. Our newly developed theoretical model and empirical findings reveal the possibility of digital asset to align and integrate within the portfolio asset allocation. The model and empirical evidences indicate explicit coherence between bitcoin and some socioeconomics fundamentals that reflect the cost of living. The trend component in bitcoin data is observed. The results are consistent with financial portfolio model.

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Introduction

The role of information is undoubtedly crucial in business, investment and the economy. Blockchain technology is ideal for delivering such information because it provides immediate, shared and completely transparent information stored on an immutable ledger that can be accessed only by permissioned network members. This technology has a wide range of applications because a blockchain network can be used to track orders and payments.

As a result, many investors believe that this technology is good for decentralized transparent investment transaction. Digital assets and crypto currency such as Bitcoin, Ethereum (ETH), Binance Coin (BNB), and Dogecoin (DOGE) grew rapidly over the 5 years since 2017 (coinmarketcap.com). Ali et al. (2014) point out that these assets, especially bitcoin, can create wealth and investment opportunities, but they can also have a strong disruptive power which can affect our daily lives because investment in digital assets and crypto currency also involve high risks.

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According to Triple-a.io Report, in 2021 “there are more than 300 million cryptocurrency owners around the world, and it is equivalent to 3.9 percent of the global population. Most cryptocurrency owners are in Asia. These investors are approximately 57 percent of the total cryptocurrency owners.” Others are in Europe, Africa, North America, and Latin America respectively. India is the country that has the largest cryptocurrency owners followed by the United State, Russia, Nigeria and Brazil, respectively. The top three countries that had fast growing digital asset investment in ASEAN Economic Community (AEC) during the year 2021 were Singapore, Vietnam, and Thailand. The Securities and Exchange Commission, Thailand reported that the new digital asset investment accounts in Thailand had grown more than 5 times during 2018–2021, and the new accounts continued to expand approximately 8 times within 8 months of the year 2021 causing a big stimulus for Thai government authorities to adapt with respect to the trend. Crypto.com (2021) released its crypto market sizing report about the measures of crypto adoption worldwide. The finding indicated that “the global crypto population increased by 178 percent in 2021, with crypto users totalling almost 300 million.” The data indicated that the number of players both users and service providers in global crypto market was increasing in the global crypto market. “There was remarkable crypto adoption during the first half of 2021 due to large institutions such as Tesla, Visa and Mastercard. Bitcoin is still the main driver of growth, and constituted 47 percent of the total market capitalization of cryptocurrencies in 2021 outperforming Ethereum adoption. As of 2022, on-chain market size or

account ownership rates are over 320 million crypto users worldwide” as shown in Figure 1.

The website Triple A (2022) reveals “the crypto ownership demographic data show that 63 percent of the global crypto owners are male and 37 percent are female. About 72 percent are aged under 34 with a Bachelor’s degree or higher, with an average annual income of US\$25,000.” Triple A research also reports that “the price of bitcoin increased by over 540,000 percent between 2012 and 2021. Bitcoin reached an annual growth rate of 60 percent in 2021, and the cryptocurrency market is predicted to grow with a compound annual growth rate of 56.4 percent from 2019 to 2025.” The main objective of this paper is to examine the underlying socioeconomic fundamentals of global bitcoin market. Most of the theories used to investigate the bitcoin market did not reveal fundamental macroeconomics structural model. Even though some researches attempt to use monetary macroeconomics models to examine bitcoin investment, such models treated bitcoin as money, not a new type of financial asset for investment alternative. Our research uses the standard dynamic macroeconomics model as fundamental building block; then we modified the model to capture the effect of socioeconomic changes such as the change in population that can be applied for aging society and the change in technology via technology shocks that affect consumption and investment decision. Our findings may benefit both Thai investors and other crypto investors to make their optimum investment decisions. Moreover, academics, regulators and policy makers may have better understanding about global bitcoin.

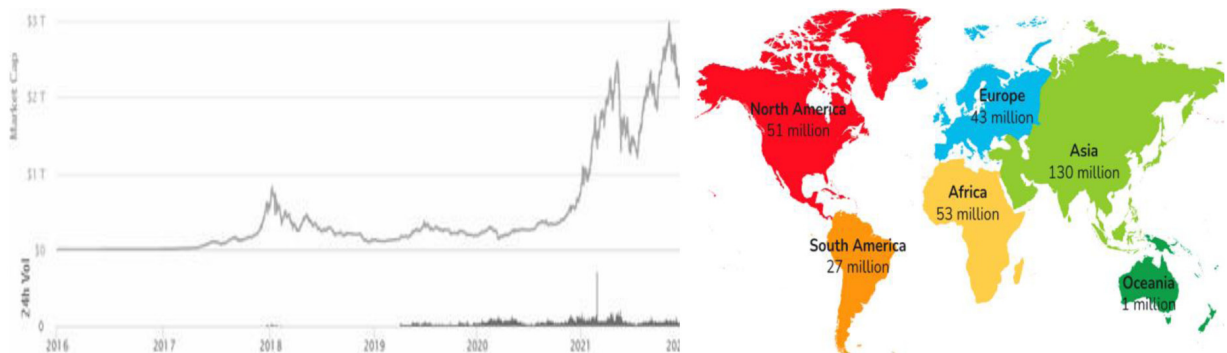


Figure 1 Historical market capitalization 2016–2022 and estimated of global crypto account by region in 2022

Source: <https://coinmarketcap.com/charts/> (CoinMarketCap, 2022) and <https://triple-a.io/crypto-ownership-data/> (Triple-A, 2022)

Theoretical Model and Literature Review

Our economic model is developed from Baker et al. (2005) model by adding dynamic stochastic effects in technological innovation that reflects the Blockchain technology. Other dynamic stochastic effects in population growth and digital asset accumulation process are introduced in this model. The concept of optimum portfolio allocation is well known in economics and finance. According to the modern quantity theory of money published in 1956, Friedman stated that “money does matter”. Friedman had distinguished between two types of money demand. The first type of money demand was for transaction purposes and the later type was considered as an asset which was a part of wealth. Friedman mentioned about five different forms of wealth, namely, money, bonds, equities, physical assets, and human capital. Our model is consistent with Friedman’s model by introducing a new type of asset such as digital asset; therefore, the assets in our model consists of physical capital (K_t), human capital or knowledge asset (KA_t), equity and financial asset (FA_t), digital asset (DA_t), and bond or risk-free asset (RFA_t). The wealth holders distribute their total wealth among its various forms so as to maximize utility from holding these assets. The assets are distributed in such a way that the rate at which they can substitute one form of wealth for another is equal to the rate at which they are willing to do. The cost of holding various assets except human capital can be measured by the rate of interest from those assets and the expected change in their prices. Investors who invest in equity and financial asset would experience equity premium while investment in digital asset can be also associated with the price of risk called “digital asset premium”. Investment in crypto currencies and token digital are associated with risk similar to equity investment. Moreover, digital assets and crypto currencies can lose the value due to amortization and asset impairment rates. Some types of digital assets, namely, Non-Fungible Tokens (NFT) such as digital music, digital movie, and digital creative contents, are not included in this model. This model assumes perfect familial altruism meaning that various family members in a single household choose the same portfolio investment decision based on the Marginal Efficiency of Investment (MEI). In the short run, the rate of return from each type of assets including digital assets and crypto currencies can be differed based on the risk factors and other economic fundamentals. To prevent double counting problem, crypto currencies used in our model are not legal tender, so they are treated as liquid

assets which have convertibility property along with some degree of relative stability and store of wealth properties. Total assets in the economy at a given time period is associated with the total output (Y_t) in the economy. The production function takes a special form of Cobb Douglas production function with labor-augmenting technology shown in Equation (1).

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha}, \quad 0 < \alpha < 1 \quad (1)$$

where $1-\alpha$ is a weighted share of capital and $1-\alpha$ is a weighted share of labor. Capital and Labor (K_t & L_t) are complementary factors. High skilled labor is demanded because of its productivity. Technological development and innovation will stimulate economic growth and investment growth. The investment growth can take the forms of both direct investment in capital stock and indirect investment in portfolio assets. Technology (A_t) grows at a constant rate (g) and technology shock ($\tilde{A}_t$) follows the 1st order autoregressive process or AR(1). Technology progress and dynamic systematic effect of technology shock is shown in Equation (2) and (3).

$$A_{t+1} = (1+g)A_t + \tilde{A}_{t+1} \quad (2)$$

$$\tilde{A}_{t+1} = \zeta_A \tilde{A}_t + u_{A,t+1} \quad (3)$$

where ζ_A is one period propagation effect of technology and $u_{A,t} \stackrel{i.i.d}{\sim} N(0, \sigma_{u_A}^2)$. Capital accumulation and accumulation of j other assets (Q_{jt}) are shown in Equation (4) and (5). $j = \{FA_t, DA_t, KA_t, RFA_t\}$

$$K_{t+1} = K_t + I_t - \delta K_t \quad (4)$$

$$\phi_{jt} = \left(\frac{Q_{jt}}{Y_t} \right) = \psi_{jt} \left[\frac{s_t}{(n+g) - (\delta + \sum \gamma_j)} \right] \quad (5)$$

where γ_j is amortization and asset impairment rates for asset j . δ is depreciation rate. Capital-output ratio ($k_t = K_t / Y_t$) is determined by the long run return on physical capital. Total net portfolio asset return is associated with portfolio adjustment cost and the attitude toward risk. The gross marginal product of physical capital (r_{Kt}) is shown in Equation (6).

$$r_{Kt} = \alpha \left(\frac{Y_t}{K_t} \right) = \frac{\alpha}{k_t} \quad (6)$$

The return on knowledge asset (r_{KA_t}), the return on risk free asset ($r_{ft} = r_{RFA_t}$), the return on financial asset (r_{FA_t}), the return on digital asset (r_{DA_t}), and the return

on money (r_{Mt}) are the return on portfolio assets (r_{Pt}). The return on human capital (r_{Pt}) is permanent income. According to Oliner and Sichel (2003), and Gordon (2003), Demographic transition under aging society would affect productivity growth. Population (N_t) grows at a constant rate (n). The external demographic shock ($\tilde{N}_{t+1}$) follows AR(1) process and $u_{Nt} \sim N(0, \sigma_{u_N}^2)$. Population growth and dynamic effect of demographic shock are shown in Equation (7) and (8).

$$N_{t+1} = (1+n)N_t + \tilde{N}_{t+1} \quad (7)$$

$$\tilde{N}_{t+1} = \zeta_N \tilde{N}_t + u_{N,t+1} \quad (8)$$

where ζ_N is the dynamic systematic effect of demographic shock. With the constant returns to scale Cobb-Douglas production function, the saving rate is $s_t = S_t / Y_t$. Economic agents allocate their wealth in capital (K_t) and j-other assets (Q_{jt}) with the weighted share of saving used to finance asset i at time t (ψ_{it}) where $i \in \{K, Q_j\}$. Total weighted share of saving used to finance asset i at time t is equal to 1 ($\sum \psi_{it} = 1$). At steady-state with non-zero amortization rate ($\gamma_j \neq 0$), the growth rate is $(n+g) - (\delta + \gamma_j)$. The capital-output ratio (k_t) and the j-asset output ratio (ϕ_{jt}) are shown in Equation (9) and (10).

$$k_t = \left(\frac{K_t}{Y_t} \right) = \psi_{kt} \left[\frac{s_t}{(n+g) - (\delta + \sum \gamma_j)} \right] \quad (9)$$

$$\phi_{jt} = \left(\frac{Q_{jt}}{Y_t} \right) = \psi_{jt} \left[\frac{s_t}{(n+g) - (\delta + \sum \gamma_j)} \right] \quad (10)$$

Under the uniform wealth distribution, the steady-state saving rate (s) is constant where weighted share of saving used to finance asset i is also constant at $\psi_j = \psi_K = \bar{\psi}$. The return on capital (r_K), the return on j-asset (r_j), and the average real return on assets are shown in Equation (11), (12), and (13), respectively.

$$r_K = \left(\frac{K}{Y} \right) = \psi_K \left[\frac{s}{(n+g) - (\delta + \sum \gamma_j)} \right] \quad (11)$$

$$r_j = \left(\frac{Q_j}{Y} \right) = \psi_j \left[\frac{s}{(n+g) - (\delta + \sum \gamma_j)} \right] \quad (12)$$

$$r = r_K = r_j = \bar{r} \left[\frac{s}{(n+g) - (\delta + \sum \gamma_j)} \right] = \alpha \left[\frac{(n+g) - (\delta + \sum \gamma_j)}{s} \right] \quad (13)$$

It is worth to notice that the return on physical capital (K) equals the gross marginal product of physical capital derived from production function as shown in Equation (6). The returns from other assets called the j-assets such as knowledge asset (KA), financial asset (FA), digital asset (DA), and risk-free asset (RFA) are shown in Equation (12). The connection between the return from physical capital (K) and other j-assets depends on the weighted share of saving used to finance these assets as shown in Equation (13). With permanent shock, Abel et al. (1989) demonstrated the structural transformation from one growth path to another when $0 < \alpha < 1$. The economy will have dynamic efficiency under the golden rule when the effect from investment is greater than saving rate ($\alpha > s$). With the constant returns to scale production function, if the value of s / α , the change in steady-state rate of return is shown in Equation (14), and the steady-state saving growth is shown in Equation (15).

$$\Delta r = \Delta r_K = \Delta r_j = \alpha \left[\frac{(\Delta n + \Delta g)}{s} \right] = \left[\frac{(\Delta n + \Delta g)}{(s / \alpha)} \right] \quad (14)$$

$$\frac{\Delta s}{s} = - \left[\frac{1}{(n+g) - (\delta + \sum \gamma_j)} \right] [\Delta n + \Delta g] \quad (15)$$

The steady-state capital-output ratio (k) and the j-asset output ratio (ϕ_j) are shown in Equation (16) and (17).

$$k = -(1-\alpha) \left[(n+g) - (\delta + \sum \gamma_j) \right] \quad (16)$$

$$\phi_j = \left[\frac{\psi_j}{\psi_K} \right] k = -(1-\alpha) \left[(n+g) - (\delta + \sum \gamma_j) \right] \left[\frac{\psi_j}{\psi_K} \right] \quad (17)$$

Similar to Romer (2000), our model can be integrated into the Ramsey-Cass-Koopmans Model. Let's define the variables of aggregate consumption (C_t) and individual consumption ($c_t = C_t / N_t$). In the infinite horizon model, the population number can change over time, but the number of households is assumed to be constant. The utility function of the infinitely lived representative household in our model is assumed to depend only on individual consumption $U(c_t) = \ln(c_t)$. For simplicity, we use Logarithmic utility, which is a special case of CRRA utility. The discount rate ($\rho > 0$), and the discount factor $\beta = [1/(1+\rho)]$ are assumed to be positive. Present value of aggregate lifetime household utility for perfect familial altruism is in Equation (18). Under uncertainty, the net average real return on asset investments can vary through time (r_t). Inter-temporal consumption between period t

and $t + 1$ is in Equation (19), and Euler's equation is in Equation (20),

$$U(C_t) = \sum_{t=0}^{\infty} \left(\frac{1}{(1+\rho)^t} \right) U_t(C_t) = \sum_{t=0}^{\infty} \beta^t U_t(C_t) \quad (18)$$

$$U'(C_t) = \left[\frac{(1+n)(1+r_t)}{(1+\rho)} \right] U'(C_{t+1}) dC_{t+1} = \left[\frac{(1+n)(1+r_t)}{\beta} \right] U'(C_{t+1}) dC_{t+1} \quad (19)$$

$$\frac{C_{t+1}}{C_t} = \left[\frac{(1+n)(1+r_t)}{(1+\rho)} \right] = \left[\frac{(1+n)(1+r_t)}{\beta} \right] \quad (20)$$

At steady state, $(1+r) = \frac{(1+n)(1+g)}{(1+\rho)} = \beta(1+n)(1+g)$ and $r = (\rho + n + g)$; thus, the average real return on assets (r) and the steady state saving (s) are shown in Equation (21) to (24),

$$r = r_k = r_j = \alpha \left[\frac{(n+g) - (\delta + \sum \gamma_j)}{s} \right] = (\rho + n + g) \quad (21)$$

$$s = \alpha \left[\frac{(n+g) - (\delta + \sum \gamma_j)}{r} \right] = \alpha \left[\frac{(n+g) - (\delta + \sum \gamma_j)}{(\rho + n + g)} \right] \quad (22)$$

$$r_k = \left(\frac{K}{Y} \right) = \left[\frac{\psi_k \alpha}{r} \right] = \left[\frac{\psi_k \alpha}{(\rho + n + g)} \right] = \left[\frac{\bar{\psi} \alpha}{(\rho + n + g)} \right] \quad (23)$$

$$r_j = \left(\frac{Q_j}{Y} \right) = \left[\frac{\psi_j \alpha}{r} \right] = \left[\frac{\psi_j \alpha}{(\rho + n + g)} \right] = \left[\frac{\bar{\psi} \alpha}{(\rho + n + g)} \right] \quad (24)$$

The steady state j -asset output ratio (ϕ_j) is shown in Equation (25).

$$\phi_j = k = \left[\frac{\alpha \bar{\psi}}{(\rho + n + g)} \right] \quad (25)$$

European Central Bank (2012) provided definition and categorization and examined virtual currency schemes especially the case study of bitcoin. The ECB concluded that virtual currency is just a substantial evolution to real currencies and payment systems. The virtual currency can have positive aspects in terms of financial innovation and the provision of additional payment alternatives for consumers, it is clear that they also entail risks as our theoretical model stated. Karlene et al. (2019) explained the value-sensitive design principles for cryptocurrencies especially bitcoin. They conclude that cryptocurrencies can provide socioeconomic benefits to communities and suggest further research to understand the implications of these values. Polasik et al. (2015) empirically examined the use of bitcoin under price fluctuation focusing on payment and investment features of bitcoin.

They discovered that bitcoin returns are primarily driven by its popularity, but the size of the economy significantly determine the price of bitcoin.

Methodology

To examine global socioeconomics and financial factors affecting the value of bitcoin using either regression model or generalized autoregressive conditional heteroskedasticity (GARCH) model combined with p-order trend model. The independent variables are selected by using backward stepwise procedure. Both model specification and functional form are tested at 95 percent confidence level. Multicollinearity, Autocorrelation, and Heteroskedasticity are examined. If such problems persist, either the generalized least square (GLS) method or the generalized autoregressive conditional heteroskedasticity (GARCH) method will be used to obtain the best result. The general criteria for model selection will also be used to pick the best model.

Data Collection

The model is analyzed using monthly data from January, 2017 to June, 2022. To analyze Bitcoin value (BTCV), several socioeconomic variables are used to examine such relationships. The United States treasury bill yield (TBilly_US) is used to represent the risk-free rate. The global socioeconomics and financial variables are gold price (GoldP), food price index (FoodP), Brent oil price (OILP), global energy price index (EnergyP), average G20 headline CPI (CPI_W), world GDP or GDP of G20 (GDP_W), world investment to GDP), global nominal interest rate or average G20 interest rate (INT_W), global real interest rate or average G20 real interest rate (RINT_W), global supply chain pressure index (SCP), geopolitical risk index (GPR), Major securities market indices such as Dow Jones Industrial Average (DJIA), S&P500 (SP500), NASDAQ, Financial Times Stock Exchange (FTSE), Nikkei, Hang Seng Index (HIS), Straits Times Index (STI), and SET Index (SET).

The units of measurement for socioeconomic variables are as following: The bitcoin value is measured in million USD while the world GDP is measured in billion USD. The gold price is measured in USD while the Brent oil price is measured in USD per barrel. The US treasury-bill yield and global real interest rate are measured in percent. The Dow Jones Industrial Average, S&P500, NASDAQ, Financial Times Stock Exchange, Nikkei, Hang Seng Index, Straits Times Index, SET Index, average G20

headline CPI, food price index, global energy price index, global supply chain pressure index, and geopolitical risk index are index numbers.

Results and Discussion

The descriptive statistics of socioeconomics variables and the bitcoin value is summarized in [Table 1](#).

For the time series data, the stationary test is required in order to prevent spurious results. The ADF results are shown in [Table 2](#). The null hypothesis is that the variable is nonstationary. Using monthly data, the maximum lag is set at 12 lags, and lag criteria are selected based on AIC.

All socioeconomic factors and variables, and the bitcoin value are stationary at $I(1)$, and it is cointegrated in the same order. The effects of socioeconomic factors on the global bitcoin value are shown in [Table 3](#). Many socioeconomic factors and various trend components are examined. Our results report that there are 4 possible models that can be used to explained the change in global bitcoin value. Similar findings are shown in all models. The ordinary least square regression suffers from Autocorrelation and Heteroskedasticity problems, so the GARCH model is used to estimate the models.

All our models indicate that there are significant non-linear trend components of bitcoin value. Model 1, 3 and 4 reveal that there are no significant effects of the change in global food price index (DFOODP), the change in gold price (DGOLDP), and the change in global supply chain pressure index (DSCP) on the change in bitcoin value (DBTCV). However, the evidence reported in Model 2 indicates significant relationships among the change in global food price index, the change in gold price, the change in global supply chain pressure index, and the change in bitcoin value.

It should be noted that the change in global consumer price index (DCPI_W) has a significant positive effect on the change in bitcoin value only in Model 1 and 4. Moreover, the change in the United States treasury bill yield (DTBILLY_US) has no significant effect on the change in bitcoin value in every model, so it does not report in [Table 3](#). In Model 2, the change in global food price index and the change in global supply chain pressure index have significant negative effects on the change in global bitcoin value while the change in gold price can have significant positive effect on the change in global bitcoin value.

Table 1 Descriptive statistics of socioeconomics variables and the bitcoin value

Descriptive Statistics	CPI_W	GOLDP	FOODP	SCP
Mean	275.26	1,535.23	110.98	1.28
SD	60.09	268.91	17.20	1.34
Max	413.02	1,920.00	156.53	4.26
Min	189.98	1,216.40	96.42	-0.36
Descriptive Statistics	TBILLY_US	STI	SET	BTCV
Mean	0.98	3,133.52	1,585.63	21,830.13
SD	0.87	246.89	134.01	18,195.92
Max	2.43	3,494.48	1,805.83	67,797.90
Min	0.02	2,552.06	1,302.26	225.55

Table 2 Stationary Tests using Augmented Dickey-Fuller Test

Variable	CPI_W	GOLDP	FOODP	SCP
Functional Form	NONE	NONE	Drift and Trend	NONE
Optimum Lag(s)	1	1	1	6
ADF Statistics	-3.7483	-5.4627	-6.2130	-3.1562
<i>p</i> value	.0003*	.0000*	.0000*	.0021*
Conclusion	I(1)	I(1)	I(1)	I(1)
Variable	TBILLY_US	STI	SET	BTCV
Functional Form	NONE	NONE	NONE	NONE
Optimum Lag(s)	0	0	7	1
ADF Statistics	-5.3081	-7.0534	-2.7100	-7.3918
<i>p</i> value	.0000*	.0000*	.0076*	.0000*
Conclusion	I(1)	I(1)	I(1)	I(1)

Note: * $p < .05$. ** $p < .01$.

Table 3 Socioeconomic factors affecting bitcoin value in global market

Independent Variable(s)	Dependent Variable: DBTCV			
	Model 1	Model 2	Model 3	Model 4
C	-693.3920 (545.1184)	319.7316* (82.8182)	-120.9504 (135.2771)	-415.8086* (58.6530)
DCPI_W	65.2115* (24.1190)			26.0835* (6.2718)
DGOLDP		4.2176* (1.9232)		
DFOODP		-193.3880* (9.5661)		
DSCP		-1794.147* (299.5028)		
DSTI		4.7138* (1.1207)	6.4313* (0.9998)	5.9181* (0.7928)
DSET		-8.2899* (1.6508)	6.7631* (1.7949)	-3.5964* (1.0694)
TREND	203.7850* (96.7090)		61.7064* (14.9909)	80.6333* (9.8349)
TREND ^2	-9.79297* (4.2544)		-1.81764 (0.2361)	-2.0818* (0.2495)
TREND ^3	0.09412* (0.0463)	-0.01295* (0.0017)		
ARCH(1)	2.5239* (0.6907)	5.1247* (1.0742)	4.6237* (0.9035)	5.0920* (1.1746)
GARCH(1)	0.1438* (0.0527)	0.0251 (0.0167)	0.0162 (0.0099)	0.0093 (0.0072)
AIC	20.2159	20.1255	20.0489	20.0360
Method	GARCH(1,1)	GARCH(1,1)	GARCH(1,1)	GARCH(1,1)

Note: Standard error is in parenthesis.

* $p < .05$. ** $p < .01$.

When considering the factors related to the financial markets, our evidence in Model 2, 3 and 4 shows that the change in Straits Times Index (DSTI) and the change in SET Index (DSET) can jointly determine and the change in bitcoin value. These models reveal that the change in Straits Times Index has consistent and significant positive effect on the change in global bitcoin value, but the change in SET Index does not have consistent sign on the change in global bitcoin value. This might be because The Straits Times is a larger market compared to The Security Exchange of Thailand.

Comparing the results from every model, Model 4 has the lowest AIC meaning that it is the most suitable model to explain the change in global bitcoin value. The result obtained from Model 4 indicates that there are positive significant relationships among the change in global consumer price index, the change in Straits Times Index, and the change in global bitcoin value, but the change in SET Index can have negative impact on the change in global bitcoin value. When the global bitcoin interacts with socioeconomic factors, the quadratic

trend component significantly dominates the linear trend. The change in global food price index, the change in gold price, and the change in global supply chain pressure index do not have significant impact on the change in global bitcoin value.

Conclusion and Recommendation

Our evidence reveals that there are some socioeconomic fundamentals of global bitcoin investment, and the global bitcoin value has non-linear trend component. However, it is worth to mention that, in many situations, some combinations of different socioeconomic factors might not have significant effects on bitcoin value, and the global bitcoin value almost always experiences Autocorrelation and Heteroskedasticity problems. Our theoretical model demonstrates the possibility of digital asset to align and integrate with the portfolio asset allocation. In addition, the model can provide some theoretical concepts about the interaction of digital asset and socioeconomic factors.

The theoretical meaning is to expect that the bitcoin market should be driven by some socioeconomic variables, especially the variable that affects consumption or the cost of living. Our empirical findings support the theoretical model because the cost of living can affect bitcoin market. Therefore, our theoretical model and empirical evidence are consistent with various macroeconomic models with stochastic components. The trend component observed from this study is also consistent with financial portfolio model.

Some socioeconomic fundamentals that reflect the cost of living such as global consumer price index can affect the market capitalization of bitcoin, so policymakers should stabilize inflation. When there is the persistence of inflation, the gold market did not interact with the bitcoin market meaning that investor has alternative assets to keep their wealth. This is consistent with European Central Bank (2012) and Karlene et al. (2019) findings. The United States treasury bill yield cannot be used as a policy variable to affect bitcoin market. Due to the bitcoin market being associated with non-linear quadratic trend, our findings may shed some light for a particular group of bitcoin investors who trade bitcoin according to its trend. Private investors may acquire the knowledge about the trend component in their decision; however, to identify long run and short run relationships between the market cap of bitcoin and socioeconomic fundamentals, future research using cointegration and error correction model may be examined.

Conflict of Interest

The authors declare that there is no conflict of interest.

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