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Effect Of Geopolitical Risk On Bitcoin's Price From 2016-2021: Comparative Analysis Pre-During Covid-19 Pandemic Period

Mey Frida Yosefa Br Bangun[1], **Dezie Leonarda Warganegara**[2]
School of Accounting, Bina Nusantara University, Jakarta, Indonesia.

Keywords: Bitcoin; Geopolitical Risks, Geopolitical Acts, Geopolitical Threat; OLS Estimations; Quantile Estimations.

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ABSTRACT

Purpose of the study: The study aims to the effects of the geopolitical risks (GPR) and its components indexes on Bitcoin's price from January 1, 2016, to December 31, 2021, and how covid-19 affect the GPR risk and its components on bitcoin's price.

Methodology: We performed quantitative data analysis techniques such as OLS (Ordinary Least Square) and QQ Regression. The study data covers January 1, 2016, to December 31, 2021.

Main Findings: OLS estimations show that Bitcoin's prices are positively and negatively related and statistically insignificant to the GPR and its components before and during the COVID-19 pandemic, respectively. However, the findings of the Quantile estimations state that the effects are positive and statistically significant at the higher quantiles of bitcoin's prices of both the GPR and its component, i.e., GPRA before and during the COVID-19 pandemic.

Research limitations/implications: Our paper has limitations related to the adopted methodology. We use bitcoin as the dependent variable and only use two estimation models: the OLS model and Quantile Regression.

Novelty/Originality of this study: This research is expected to be used as a source of information and input for investors in deciding to invest in the face of another economic recession ahead. Our findings align with Bouri et al. (2017b) and Aysan et al. (2019), which illustrate that the effects of geopolitical risk and uncertainty indicators on Bitcoin's price are negative in the baseline findings. We enhance the previous findings to observe the positive impact of geopolitical risks and their components, the Bitcoin's price at the higher quantiles, then compare analysis pre-during Covid-19.

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1. INTRODUCTION

On November 17, 2019, Covid-19 (Corona Virus Disease, 2019), an infectious disease caused by SARS-CoV-2, was discovered in Wuhan, China. However, the outbreak of Covid19 is so devastating and widespread that it has affected supply and demand conditions, productivity, and society. Environmental changes have made the Covid-19 crisis transform the economy into a significant financial crisis. The incident finally plunged the economy into a global financial crisis. Recent research indicates a significant relationship between the financial crisis and commodity markets. Commodity price coupling increased from 14.8% before the financial crisis to 47.9%after the 2008 financial crisis (Zhang & Broadstock, 2018). In April 2021, index data on the world's stock exchanges showed a significant decline in capital market activity. According to Stumpner et al. (2021), the markets went up significantly in 2019, and that momentum continued into 2020. The markets peaked on February 19, 2020, when investors realized the pandemic would have a significant impact, and the markets began to fall gradually and then rapidly. In the early days of the pandemic, all sectors experienced significant declines. One of the causes of the decline in equity trading activity in the capital market is the presence of digital currencies known as cryptocurrencies.

For some time, cryptocurrency has become one of the world's alternative investments and financial transactions, especially Bitcoin. Since Nakamoto (2008) introduced the concept of Bitcoin, the popularity of cryptocurrencies has increased dramatically. Bitcoin embodies innovative technology, highly secure architecture, numerous features, and asset-like investment opportunities, making it appealing to IT professionals, financiers, and investors. According to Nakamoto (2008) bitcoin is classified as a commodity under the Commodity Exchange Act (CEA), and Japan recently announced that it accepts bitcoin as a legal currency. Bitcoin's initial trading price was around $0.08 when it began in July 2010, then approached $20,000 in 2017, and has fluctuated dramatically since then, eventually rising above $60,000 in early 2021 (The Economic Times, 2022). Bitcoin exploded one year into the pandemic. For example, when the pandemic broke out, Bitcoin could be purchased for around $7,300. Today, the same token costs more than $46,800, a 640% increase (Y Jabotinsky, & Sarel, 2020). As reported by The Washington Post, young and modern investors (known as Millennials) today see investment as the most critical necessity to ensure the well-being of their future life (Laurent, 2021). According to The Week Staff (2021), millennial investors globally have fallen in love with Bitcoin, and FOMO (Fear of Missing Out) is the most potent attraction among investors. In 2017, the number of investors in digital currency assets such as bitcoin increased.

[1] Corresponding Author: mey.bangun002@binus.ac.id, dezie@binus.edu2

Furthermore, the growth rate of bitcoin in the capital market increased significantly in 2020. The competitive trend of bitcoin experienced during the Covid-19 outbreak raised concerns about the risks of investing. The general public, particularly investors, reacted by adding bitcoin to their portfolios to protect themselves (The Week Staff, 2021). However, The Covid-19 pandemic has threatened human health and the global economy and damaged social and political patterns. People who have been in the investment field for a long time frequently discuss Geopolitical Risk (hereafter referred to as GPR). This Risk is significant as most studies have identified GPR as a critical determinant of investment decisions. Geopolitics is a method of foreign policy analysis that seeks to comprehend, explain, and forecast international political behavior based on geographic variables (Kurniawan, 2020). The emergence of economic research states that geopolitics is a response to so-called external shocks and forces that have dramatically impacted the world's stock, bond, and derivatives markets over the past two decades (Takushi, 2015). GPR highlights the problems and opportunities that arise when investing, particularly for investors. GPR has emerged as a significant concern for investors worldwide. A country's political situation, combined with its economic performance, can impact its economy. Countries with lower political Risk will be more appealing to investors.GPR is more than just predicting market and price volatility; it is also about scanning the business environment to strengthen investment strategies in the face of geopolitical events (Ikeda-Chelminska, 2020). Caldara and Iacoviello (2018) developed the geopolitical risks (GPR) index to understand political instability, terrorism, and conflicts between countries or countries that can disrupt business activities and international relations. They calculated the index by counting the number of articles about negative geopolitical events published in each newspaper each month (as part of the total number of news articles). Caldara and Lacoviello (2018) further divide the index into two sub-indices: the Geopolitical Threats Index (GPRT) and the Geopolitical Acts Index (GPAI) (GPRA).

Due to global uncertainty caused by rising GPR levels, investors have recently avoided stocks. It has led investors to believe that bitcoin is a secure investment that can help them protect the value of their property. Bouri et al. (2020) discovered in their research that the movement of the GPR index increased the movement of Bitcoin significantly. Meanwhile, Al Mamun et al. (2020) examine the nature of Bitcoin's risk premium, noting that GPR and economic uncertainty both carry a risk premium, particularly during bear markets. Finally, Bouri et al. (2020) provide convincing evidence that only Bitcoin's rise depends on increased GPR levels of the top five cryptocurrencies studied. This outcome is not surprising given Bitcoin's unique ability to protect against global uncertainty and recent evidence indicating that Bitcoin is a hedge against the GPR (Aysan et al., 2019). Aysan et al. (2019) confirmed that changes in the global GPR index have predictive power for Bitcoin price volatility and returns. Aysan et al. (2019) demonstrate, using OLS estimation, that changes in the GPR index negatively and positively affect Bitcoin price returns and volatility. However, using the QQ estimation technique, the document shows that changes in the global GPR index have a positive and statistically significant impact on Bitcoin price volatility and returns in the upper quintile. Based on these findings, Bitcoin should be regarded as a hedging tool against global geopolitical risks, particularly in times of crisis, such as the Covid-19 pandemic spreading around the world. The realization that Covid is one of the significant factors disrupting the global economy, combined with the statement that the GPR movement has significantly impacted Bitcoin, demonstrates the growing importance of Bitcoin as a safe haven and alternative to Bitcoin's ineffectiveness in the economic system.

The present study was motivated by two questions: "Do Geopolitical Risk, and its component affect Bitcoin price before and during the Covid-19 pandemic? Moreover, "Does covid-19 affect the GPR risk and its components on bitcoin's price?". The impact of GPR and its components on Bitcoin's price pre-during the Covid-19 pandemic. We used Bitcoin data from January 1, 2016, to December 31, 2021, to examine the effect using mean-based OLS and conditional median-based quantile regression. The rest of this paper is organized as follows: The second section reviews the existing literature, and the third section describes how the data is extracted and the methods used for econometric estimation. Section 4 also presents and analyzes the findings' empirical results and economic implications. The final section concludes by outlining some future research directions.

2. LITERATURE REVIEW

2.1 The Effect of Geopolitical Risk on Bitcoin Price

From 2010 to 2018, the strength of the Geopolitical Risk (GPR) index was predicted based on daily returns and Bitcoin price volatility (Aysan et al., 2019). Finally, changes in the global GPR index have predictive power over Bitcoin price volatility and returns. Bouri et al. (2020) used a hybrid approach based on the framework to investigate geopolitical risk and the dynamics of the BRICS stock market. They discovered that geopolitical risk consistently affects stock markets by compiling monthly geopolitical risk data from research (Caldara & Lacoviello, 2018). Furthermore, Bouri et al. (2020) found that the occurrence of movements in the GPR index significantly increased Bitcoin movement.

Furthermore, this study demonstrates that the GPR index influences the movement of Bitcoin. The dependence of Bitcoin on the movement of the GPR demonstrates the growing importance of Bitcoin as a safe haven and alternative to the ineffectiveness of traditional economic and financial systems (Bouri et al., 2020) in times of increasing GPR (Aysan et al., 2019a) such as Brexit, Venezuela sanctions, US conflict with Iran in the Middle East, and US-China tensions. During times of heightened geopolitical events, investors tend to flock to Bitcoin. These findings also reflect the potential contagion effect between the safe-haven digital asset (Bitcoin) and GPR, allowing Bitcoin traders to forecast price increases based on GPR index movements.

2.2 The Effect of Geopolitical risk on Bitcoin Prices Before and During Covid-19

According to a study conducted by Bouri et al. (2020) an accurate analysis will enable investors to make the right decisions; therefore, investors must anticipate geopolitical turmoil in the future. As is known, Jacobsen et al. (2011) and Caldara & Lacoviello (2018) measure GPRT and GPRA by calculating the number of international political crises. Caldara & Lacoviello (2018) verify that the defining elements of geopolitics exist in regions, countries, nations, and leadership and that the elements that determine GPR are centred around the risks of war and terrorism. Tavares (2004), Glick & Taylor (2010), and most recently, investigate the economic consequences of war, terrorist attacks, and other forms of collective violence. In addition, according

to Bouri et al. (2020) GPRA becomes important because the presence of GPRA can lead to an increase in GPRT. A spike in asset prices can increase asset returns.

Furthermore, jump behaviour significantly affects asset allocation, risk management, derivative prices, and trading. The hypothesis in this study is based on the findings that Covid is one of the most significant factors currently disrupting the global economic situation, as well as the statement that the GPR movement significantly affects Bitcoin and demonstrates the growing importance of Bitcoin as a shelter and alternative to the economic system's lack of effectiveness. Furthermore, this study demonstrates that the GPR index influences the movement of Bitcoin. The dependence of Bitcoin on the movement of the GPR demonstrates the growing importance of Bitcoin as a safe haven and alternative to the ineffectiveness of traditional economic and financial systems (Bouri et al., 2020) in times of increasing GPR (Aysan et al., 2019a) such as Brexit, Venezuela sanctions, US conflict with Iran in the Middle East, and US-China tensions. During times of heightened geopolitical events, investors tend to flock to Bitcoin. These findings also reflect the potential contagion effect between the safe-haven digital asset (Bitcoin) and GPR, allowing Bitcoin traders to forecast price increases based on GPR index movements.

3. METHODOLOGY

3.1 Data Sampling and Analysis Methods

The study data covers the period from January 1, 2016, to December 31, 2021, and is then combined with the time before the onset of Covid, namely February 20, 2020, to December 31, 2021, and during Covid, namely January 1, 2016, to February 19, 2020, with a total of 2188 observations compared, and with the data frequency is daily. Data analysis was performed using Ordinary Least Square (OLS) and Quantile techniques Regressions by first carrying out Descriptive Statistical Tests, Classical Assumption Tests, f Tests, T-tests, and R Square tests and processed using the STATA program.

Data on Bitcoin uses logarithmic returns following Jacobsen et al. (2011), where Bitcoin data is obtained from http://www.coindesk.com/price/. For the GPR index data in this paper, we will also use logarithmic changes of the global GPR index on the website recently constructed by Caldara and Lacoviello (2018) and downloaded from; https://www.matteoiacoviello.com/gpr.htm. Caldara & Lacoviello (2018) developed a proxy for GPR that correlates only weakly with other widely used uncertainty indices. They created a monthly GPR index based on newspaper coverage by calculating the frequency of articles discussing key GPR-related terms in 11 leading national and international newspapers. Furthermore, Geopolitical Risk (GPR) is also divided into two components, namely: The Geopolitical Threats (GPRT) and The Geopolitical Acts (GPRA). Jacobsen et al. (2011) and Caldara & Lacoviello (2018) measure GPRT and GPRA by calculating the number of international political crises. Caldara & Lacoviello (2018) affirm that the defining elements of geopolitics exist in regions, countries, nations, and leadership and that the elements that determine GPR focus on the risks of war and terrorism.

Furthermore, according to Jacobsen et al. (2011), GPRA is significant because its presence can increase GPRT. Increases in asset prices can lead to higher asset returns. Besides, bouncing has significant implications for asset allocation, risk management, derivatives pricing, and trading. In addition, this paper will also make Covid-19 a dummy variable. Dummy receives the value 1 for observations during the Covid-19 period, namely from February 2020 to December 2021, and 0 for the non-Covid-19 period, from January 2016 to January 2020. February 2020 was chosen as the beginning of the pandemic because the WHO declared Covid-19 a global outbreak on February 20, 2020.

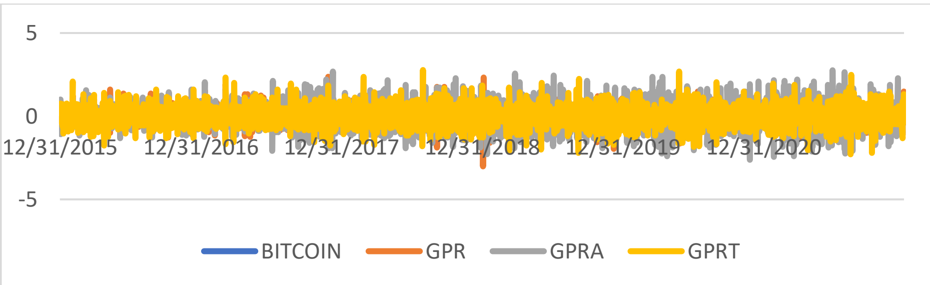

Figure 1: *The history of Bitcoin's Price and Geopolitical Risk and its components over the period 2016 - 2021.*
Source: Author's estimation (2022)

3.2 Technical Analysis

The regression model to study the relationship between geopolitical risk and Bitcoin price follows the model used by Aysan, Demir, Gozgor, and Lau (2019a).
The research model for the entire sample period is as follows:

$$Ln\Delta(BT_t) = \beta_0 + \beta_1 Ln\Delta(GPR_t) + \beta_2 Ln\Delta(GPR_{t-1}) + \varepsilon_t \quad \textbf{(1)}$$

$$Ln\Delta(BT_t) = \delta_0 + \delta_1 Ln\Delta(GPRT_t) + \delta_2 Ln\Delta(GPRT_{t-1}) + \delta_3 Ln\Delta(GPRA_t) + \delta_4 Ln\Delta(GPRA_{t-1}) + \theta_t \quad \textbf{(2)}$$

If model 1 and model 2 are proven, then β_1, β_2, δ_1, δ_2, δ_3, & δ_4 have a positive and significant sign at least at the 10% level.

The regression model to examine the relationship between geopolitical risk and bitcoin prices in the period before and during the Covid-19 outbreak is as follows:

$$Ln\Delta(BT_t) = \beta_0 + \beta_1 Ln\Delta(GPR_t) + \beta_2 Ln\Delta(GPR_{t-1}) + \beta_3 Ln\Delta(GPR_t) \text{ X Covid} + \beta_4 Ln\Delta(GPR_{t-1}) \text{ X Covid} + \varepsilon_t \quad \textbf{(3)}$$

$$Ln\Delta(BT_t) = \delta_0 + \delta_1 Ln\Delta(GPRT_t) + \delta_2 Ln\Delta(GPRT_{t-1}) + \delta_3 Ln\Delta(GPRA_t) + \delta_4 Ln\Delta(GPRA_{t-1}) + \delta_5 Ln\Delta(GPRT_t) \text{ X Covid} + \delta_6 Ln\Delta(GPRT_{t-1}) \text{ X Covid} + \delta_7 Ln\Delta(GPRA_t) \text{ X Covid} + \delta_8 Ln\Delta(GPRA_{t-1}) \text{ X Covid} + \theta_t \quad \textbf{(4)}$$

From Eq. (1) to Eq. (4), BT denotes the returns of Bitcoin prices, GPR is the Geopolitical Risk which is measured as the natural logarithm of the average of the GPR index, GPRT and GPRTA the Geopolitical Threat and Geopolitical Acts which are measured as the natural logarithm of the average of the GPRT and GPRA index,T is time in the sample period. ε represents the error term as same as θ. All notations are the same as before, except for Covid, which is a dummy variable that has a value of 1 for observations during the period of Covid-19, namely from February 2020 to December 2021, and for the Period before Covid-19 gets the value 0, namely from January 2016 to January 2020.

If hypotheses 1b, 2b and 3b are proved, then in addition to β_1, β_2,δ_1,δ_2, δ_3, & δ_4 have a positive and significant sign at least at the 10% level as well as β_3, β_4 ,δ_5,δ_6, δ_7, & δ_8 have a positive and significant sign at least at the 10% level.

The above regression models are estimated using ordinary least squares (OLS) and quantile regression methods. The OLS method is used to see the impact of political risk changes on bitcoin price changes, while QQ is used to see the impact of political risk changes on bitcoin price changes for each quantile (0.10, 0.20, ... 0.90) to see changes in bitcoin prices. The QQ method used in this study is based on the method proposed by Koenker & Bassett (1978) and used in a recent study by Colon & Kim (2021); this method is an adjunct to the linear regression method to explain the mean analysis quantiles are not constant compared to the linear regression method. QQ method is used to determine the median of the data distribution based on the variables in that distribution. In addition, the QQ method allows us to find the relationship between variables outside the data mean, so it helps us understand results that are not normally distributed and have a nonlinear relationship with predictor variables.

4. EMPIRICAL RESULTS

To determine the magnitude of the GPR and its component measures' impact on Bitcoin's price, we present the results of OLS and QQ regressions in Tables 1 and 2 before the COVID-19 pandemic and Tables 3 and 4 during the Covid-19 period. The OLS estimation results in Table 1 show that the effect of the GPR, GPRA, and GPRT indexes on Bitcoin prices is that the change in the GPR index has a significant negative and positive effect on Bitcoin's price, respectively. In addition, the GPR index coefficient (from lag 1 to lag 2) is negative, GPRA (from lag 1 to lag 2) is only positive in GPRA lag 2, and GPRT (from lag 1 to lag two is only negative in GPRA lag 2. However, the probabilities are also not statistically significant.

TABLE 1

Results of the OLS on Geopolitical Risk, Geopolitical Acts and Geopolitical Threat before Covid-19

Variable	Coeffecients	p-value
ΔGPR	0.0000274	0.987
ΔGPR (–1)	-0.0006417	0.719
ΔGPR (–2)	-0.0001173	0.944
ΔGPRA	-0.0011945	0.347
ΔGPRA (-1)	-0.0013865	0.319
ΔGPRA (-2)	0.0002681	0.831
ΔGPRT	0.0011551	0.440
ΔGPRT (-1)	0.0008905	0.575
ΔGPRT (-2)	-0.0010184	0.495
F-statistic (p-value)	0.242	
Adj R-square (p-value)	-0.0011	

Source: Authors' estimation, GPR: Geopolitical Risk, GPRA: Geopolitical Acts, GPRT: Geopolitical Threat, L1 & L2: time delays/past period.

In Table 2, we tested the QQ estimates across different quantiles. The effect of the GPR, GPRA and GPRT indexes on Bitcoin prices is only statistically significant for GPR and GPR (–1), also for GPRA and GPRA (-2). However, on the GPRT variable, there is no significant index on bitcoin prices. As for the GPR variable, it has a negative effect but has a significant impact on the 0.15 quantile but has a positive relationship and has a significant effect on some of the top quantiles, namely; 0.80..,0.85..,0.90, while the GPR (-1) has a significant positive effect on the 0.70 quantiles. The GPRA variable was significant in some quantiles 0.40.., and 0.90. In contrast to GPR, the GPRA variable has a significant number of spreads in several quantiles in lag two or GPRA (-2), namely, 0.20.., 0.25.., 0.30..., and 0.35.

TABLE 2

Results of the QQ Estimations on Geopolitical Risk, Geopolitical Acts and Geopolitical Threat before Covid-19

QQ at the Different Quantiles	ΔGPR	ΔGPR (–1)	ΔGPR (–2)	ΔGPRA	ΔGPRA (-1)	ΔGPRA (-2)	ΔGPRT	ΔGPRT (-1)	ΔGPRT (-2)
0.05	-0.004	0.001	-0.005	-0.001	-0.000	0.000	0.001	0.003	-0.002

0.10	-0.006	-0.001	-0.005	-0.002	-0.002	-0.004	-0.003	-0.001	-0.002
0.15	-0.005*	-0.002	-0.003	-0.000	-0.000	-0.003	-0.002	-0.001	-0.000
0.20	-0.002	-0.001	-0.001	-0.001	-0.000	-0.003**	-0.000	-0.001	-0.000
0.25	-0.002	-0.002	-0.001	-0.001	-0.001	-0.003***	-0.000	-0.001	-0.001
0.30	-0.001	-0.002	-0.001	-0.001	-0.001	-0.002*	-0.000	-0.000	-0.001
0.35	-0.001	-0.001	-0.000	-0.001	-0.000	-0.001*	-0.000	-0.000	-0.000
0.40	-0.000	-0.001	-0.001	-0.001*	-0.000	-0.001	-0.000	-0.000	-0.001
0.45	-0.000	-0.001	-0.000	-0.000	0.000	-0.000	0.000	-0.000	-0.001
0.50	-0.000	-0.000	0.000	-0.000	0.000	0.000	0.000	-0.000	-0.000
0.55	0.001	-0.000	-0.000	-0.000	-0.000	-0.000	0.001	-0.000	-0.000
0.60	0.001	0.000	0.000	-0.000	0.000	-0.000	0.001	-0.000	-0.000
0.65	0.001	0.001	0.001	-0.000	0.000	0.000	0.000	0.001	-0.000
0.70	0.001	0.002*	0.001	0.000	0.001	0.000	0.000	0.001	-0.000
0.75	0.001	0.002	0.001	0.001	0.002	0.001	0.000	0.001	-0.000
0.80	0.004*	0.001	0.001	0.001	0.002	0.001	0.000	0.001	-0.000
0.85	0.004*	0.001	0.002	0.003	0.003	0.001	0.002	-0.000	0.000
0.90	0.005*	0.002	0.001	0.003*	0.003	0.001	0.004	0.001	-0.000
0.95	0.001	-0.004	-0.000	0.003	0.003	0.002	0.001	-0.000	0.001

Source: Authors' estimation, GPR: Geopolitical Risk, GPRA: Geopolitical Acts, GPRT: Geopolitical Threat, L1 & L2: time delays/past period. Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The OLS estimation results during the Covid-19 pandemic in **Table 3** shows that the effect of the GPR and GPRT are positive, and GPRA is negative but statistically insignificant, respectively. In addition, the GPR, GPRA, and GPRT indexes coefficient (from lag 1 to lag 2), GPRA (from lag 1 to lag 2), and GPRT (from lag 1 to lag 2) illustrate the positive and negative relationship. However, the probabilities are statistically insignificant.

TABLE 3

Results of the OLS on Geopolitical Risk, Geopolitical Acts and Geopolitical Threat before Covid-19

Variable	Coeffecients	p-value
ΔGPR	0.0000774	0.964
ΔGPR (–1)	-0.0006457	0.717
ΔGPR (–2)	-0.0001202	0.943
RCOVID	0.0001605	0.899
ΔGPRA	-.0014037	0.353
ΔGPRA (-1)	-.0014181	0.309
ΔGPRA (-2)	.0002426	0.848
ΔGPRT	.0011979	0.472
ΔGPRT (-1)	.0008976	0.572
ΔGPRT (-2)	-.0010217	0.493
ACOVID	.0004693	0.817
TCOVID	-.0000589	0.979
F-statistic (p-value)	0.374	
Adj R-square (p-value)	-0.0018	

Source: Authors' estimation, GPR: Geopolitical Risk, GPRA: Geopolitical Acts, GPRT: Geopolitical Threat, L1 & L2: time delays/past period.

In Table 4, we tested the QQ estimates across different quantiles. Interestingly, the GPR, GPRA, and GPRT on Bitcoin's price during Covid-19 are statistically significant when we focus on RCovid, ACovid, and TCovid. In the GPR variable at the time of covid, it was clear that there were several significant indices in the upper and lower quantiles. The GPR variable (-1) significantly positively affects the central quantile (0.30 and 0.70). Furthermore, the RCovid variable shows that Covid strengthens the relationship between the GPR index and bitcoin prices negatively in the lower quantiles 0.25.., 0.30.., and 0.35. In the upper quantile, 0.65..,0.70..,0.75..,0.80..,0.85.., and 0.90, Covid-19 strengthens the positive relationship between the GPR index and bitcoin prices. The biggest relationship and impact of the GPRA and GPRT variable indices on bitcoin during Covid in various quintiles is ACovid when Geopolitical Acts (GPRA) is included in the Covid variable. The effect of the GPRA index on the Bitcoin price is statistically significant on GPRA (–2). The ACovid variable shows that Covid strengthens the relationship between the GPRA index and bitcoin prices negatively in the lower quantiles 0.15..,0.25..,0.30.., and 0.35. In the upper quantile, 0.55..,0.60..,0.65..,0.70..,0.75.., and 0.80, Covid-19 strengthens the positive relationship between the GPRA index and bitcoin prices. However, the GPRT variable and its lag have no significance in each quantile except for the time of covid, which is shown in the TCovid table at quantiles 0.65.., 0.70.., 0.75.., 0.80.., and 0.85.., which shows that Covid strengthens the positive relationship between GPRT and bitcoin prices.

TABLE 4

Results of the QQ Estimations on Geopolitical Risk, Geopolitical Acts and Geopolitical Threat during Covid-19

Qq At The Different Quantiles	Δgpr	Δgpr (–1)	Δgpr (–2)	Rcovid	Δgpra	Δgpra (-1)	Δgpra (-2)	Acovid	Δgprt	Δgprt (-1)	Δgprt (-2)	Tcovid
0.05	-0.003	0.003	-0.004	0.001	-0.002	-0.000	-0.000	0.000	0.001	0.003	-0.002	0.000
0.10	-0.005	-0.001	-0.004	-0.001	-0.001	-0.002	-0.003	-0.001	-0.001	-0.000	-0.001	-0.002
0.15	-0.005	-0.002	-0.001	-0.001	-0.000	-0.000	-0.003*	-0.003*	-0.001	-0.000	-0.000	-0.001
0.20	-0.003	-0.002	-0.001	-0.002	-0.001	-0.000	-0.002	-0.002	-0.000	-0.001	-0.001	-0.002
0.25	-0.002	-0.002	-0.001	-0.001*	-0.000	-0.001	-0.003***	-0.001	-0.000	-0.001	-0.002	-0.002

0.30	-0.001	-0.002*	-0.001	-0.002**	-0.001	-0.001	-0.002*	-0.001*	0.000	-0.000	-0.001	-0.001
0.35	-0.001	-0.001	-0.000	-0.001*	-0.001	-0.001	-0.001*	-0.000	-0.000	-0.000	-0.000	-0.001
0.40	-0.000	-0.001	-0.001	-0.001	-0.000	-0.001	-0.000	-0.002	-0.000	-0.000	-0.001	-0.000
0.45	-0.000	-0.001	-0.000	-0.000	-0.000	0.000	-0.000	0.000	0.000	-0.000	-0.001	-0.000
0.50	-0.000	-0.000	0.000	0.000	-0.001	0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000
0.55	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000	0.001*	0.000	-0.000	-0.000	0.000
0.60	0.000	0.000	0.000	0.001	-0.000	0.000	-0.000	0.001**	0.000	-0.000	-0.000	0.000
0.65	0.000	0.001	0.001	0.001*	-0.000	0.000	0.000	0.002**	0.000	0.001	0.000	0.001*
0.70	0.000	0.002*	0.000	0.002**	-0.000	0.001	0.000	0.002***	0.000	0.001	-0.000	0.001*
0.75	0.001	0.001	0.000	0.003***	-0.000	0.001	0.000	0.003***	0.000	0.001	-0.000	0.002*
0.80	0.002	0.001	0.001	0.003*	-0.000	0.002	0.002	0.004***	0.000	0.000	-0.000	0.003**
0.85	0.004	0.001	0.002	0.003*	0.001	0.002	0.002	0.187	0.003	0.001	-0.000	0.003*
0.90	0.003	0.001	0.003	0.004*	0.003	0.002	0.003	0.003	0.003	-0.000	-0.000	0.003
0.95	-0.000	-0.005	-0.003	0.004	-0.001	-0.000	0.003	0.002	0.001	-0.000	-0.001	0.006

Source: Authors' estimation, GPR: Geopolitical Risk, GPRA: Geopolitical Acts, GPRT: Geopolitical Threat, RCOVID ACOVID TCOVID as dummy variables, L1 & L2: time delays/past period. Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.10.

5. DISCUSSION

Based on the research The Effect of Geopolitical Risk on Bitcoin prices over the period from January 1, 2016, to December 31, 2021, the conclusions obtained are that based on the estimation of the OLS model, the effect of the GPR, GPRA, and GPRT indices on the price of Bitcoin is negative and positive but insignificant to the price of Bitcoin. However, the effect of the GPR index (from lag 1 to lag 2) is negative, and GPRA and GPRT (from lag 1 to lag 2) are positive and negative, respectively. However, the probability is also statistically insignificant. The effect of GPR and GPRT indices is positive, and GPRA is negative but statistically insignificant. In addition, the influence of the GPR index (from lag 1 to lag 2), GPRA (from lag 1 to lag 2), and GPRT (from lag 1 to lag 2) illustrate a positive and negative relationship. However, the probability is statistically insignificant.

Furthermore, when the covid-19 categorical variables are introduced to the model, all variables still have a value that has no impact on the bitcoin price. The GPR regression coefficient is shown to have a positive but not statistically significant impact on Bitcoin Price During Covid-19 Pandemic. That means that the greater the value of geopolitical risk, the higher the bitcoin price increases, and vice versa. The smaller the value of geopolitical risk, the higher the price of Bitcoin will also decline. The results of this study are consistent with several theoretical study results. The results of a study by Al Mamun et al., (2020) focusing on the type of premium Bitcoin risk show that GPR and economic uncertainty carry a risk premium, especially during bear markets. Sharif et al., (2020) found that Covid-19 greatly impacted GPR. Baldwin & Mauro (2020) state that The Covid-19 pandemic has reportedly caused the global commodity and financial markets to have simultaneous demand shocks affecting world trade and breaking international supply chains. It is also shown by the findings presented by Corbet et al., (2020) that the Covid-19 pandemic had the same significant impact on the vulnerability of the global economy as the 2008 financial crisis.

Moreover, using the QQ estimation model, we also get results that the relationship of the GPR, GPRA, and GPRT indices on the Bitcoin price is only statistically significant at GPR and GPR (–1), also in GPRA and GPRA (-2), but there is no GPRT variable a significant index to the price of bitcoin. As for the GPR variable, it has a negative effect but has a significant impact on the 0.15 quantile but gives a positive relationship and significant effect on several upper quantiles, namely; 0.80..,0.85..,0.90, while GPR (-1) has a significant positive effect on the 0.70 quantiles. The GPRA variable is significant at some quantile 0. 40.., and 0.90 different from GPR; the GPRA variable has a significant amount spread over several quantiles in the second lag or GPRA (-2), namely, 0.20...,0.25...and 0.30. There is a relationship between Covid on Geopolitical Risk (GPR) at several quantile levels. The influence of the GPR index on the Bitcoin price is statistically significant at GPR (–1). Nevertheless, on the GPR variable during the covid period, it was clear that there were several significant indices in the upper and lower quantiles. As for the GPR variable (-1), which has a significant positive effect at 0.70 quantiles. Furthermore, the RCovid variable shows that Covid strengthens the relationship between index GPR and bitcoin price in a negative direction in the lower quantiles 0. 20..,0. 25.., and 0.30. Moreover, in the upper quantiles, namely 0.65.., 0.70.., 0.75.., 0.80.., 0.85.., and 0.90, Covid-19 strengthened the positive relationship between the GPR index and bitcoin price. The most significant relationship and impact of the GPRA and GPRT variable indices on bitcoin during the Covid period in various quantiles is ACovid when Geopolitical Acts (GPRA) entered into the covid variable. The influence of the GPRA index on the Bitcoin price is statistically significant at GPRA, GPRA (-1), and GPRA (–2). As for the GPRA variable, there is a negative effect. However, it significantly impacts the bitcoin price at the 0.30..,0.35..,0.40.., and 0.60 quantiles. The GPRA variable (-1) indicates that Covid strengthens the positive relationship between the GPRA index and bitcoin price in the upper quantile 0.90, and in GPRA (-2), there is also an index that has a significant but negative effect on the quantiles 0.15.., 0.25.., and 0.35. on variables ACovid, in the upper quantiles, namely 0.55.., 0.60.., 0.65.., 0.70.., and 0.80, shows that Covid-19 strengthened the positive relationship between the GPR index and bitcoin price. However, the GPRT variables and their lags are insignificant in any quantile except for the time covid that looks at the TCovid table at 0.40 quantile, which shows that Covid strengthens the positive relationship between GPRT and bitcoin price.

In the previous findings, Aysan et al., (2020) observe the positive impact of GPR by looking at the Bitcoin price at the estimated quantile. Estimation OLS regression estimation in research shows a positive effect of changing the index GPR, GPRA, and GPRT on the Bitcoin price, though not statistically significant. However, using the QQ estimation technique, the researcher documented that the impact of the change in the global GPR on the bitcoin price is positive and statistically significant for most quantiles, especially during the Covid-19 crisis. Processing using OLS produces a variable model. Geopolitical risk is best when it is separated between Geopolitical Acts and Geopolitical Threats. When the dummy variable (Covid-19) was not in the model, it had no significant effect on the dependent variable, the price of Bitcoin. The coefficient of determination, too, shows us that

Geopolitical risk is not a very good predictor of Bitcoin price. When the dummy variable (Covid-19) was introduced to the model when still using OLS, the result was that Geopolitical risk, whether it acts alone or when shared between the Geopolitical Act and the Geopolitical Threat, does not significantly affect the price of Bitcoin. However, the results may shift slightly when the model is analyzed using a different basis, such as quantile regression. If we used models based on different quantile levels, we would find that Geopolitical risk affects the price of Bitcoin significantly. However, even at the individual level, we noticed that the effects were not significant and still dominated the model for the same reasons that we have explained in paragraphs previously. Still, regarding quantile regression, when the dummy variable (Covid-19) is introduced, researchers have nearly the same results in general, with significant effects still dominating the model, with the RCovid variable did have the most significant effect on prices of Bitcoins at significantly different quantile levels. Our findings align with Bouri et al. (2017b) and Aysan et al. (2019), which illustrate that the effects of risk and uncertainty indicators on Bitcoin's price are negative in the baseline findings. We also enhance the previous findings to observe the positive impact of geopolitical risks and their components the Bitcoin's price at the higher quantiles.

6. CONCLUSION

This study aims to see and analyze the effect of Geopolitical Risk on Bitcoin's Price Pre-during the Covid-19 Pandemic Period. We analyze the strength of the global GPR index on Bitcoin prices from 01 January 2016 to 31 December 2021. Although not statistically significant, our OLS estimates indicate a positive effect of changes in the GPR, GPRA, and GPRT indices on Bitcoin prices. Our results with the QQ estimation technique indicate a positive and statistically significant impact of global GPR changes on bitcoin prices at the upper quantiles, especially during the Covid-19 crisis. According to the findings, Bitcoin should be considered a hedge against global geopolitical risks, especially in times of extreme global geopolitical risk such as the current one, Covid-19. Besides that, Bitcoin's price is more like a logarithmic distribution, its pace was "slow" initially, and it sped up exponentially later. Alternatively, in other words, Bitcoin's price only went up slowly at the time of its introduction. However, after several years the price began skyrocketing as demands soared up.

This result has so many things to understand. This result has a lot to understand as it is known that almost all people in the world fall in love with Bitcoin, and FOMO (Fear of Missing Out) is the biggest attraction between one investor and another. However, the risk of investing in cryptocurrencies is relatively high because the medium of exchange uses cryptography and does not have a guaranteed asset from the invested investment. In addition, the price fluctuations are very large, making it one of the most speculative transactions (Yaomi, 2021). In this case, investors must take the risks of naturally occurring cryptocurrencies and geopolitical risks and their sub-indices to protect the value of their portfolios against potential risks. This finding is also seen in the Covid-19 crisis period; the effects of GPR, GPRA, and GPRT are positively and most statistically significant in the quantiles of the bitcoin price, respectively, at the 10% significance levels. Covid-19 strengthened the relationship between GPR, GPRA, and GPRT on Bitcoin prices. Our findings align with Bouri et al. (2017b) and Aysan et al. (2019), which illustrate that the effects of risk and uncertainty indicators on Bitcoin's price are negative in the baseline findings. We also enhance the previous findings to observe the positive impact of geopolitical risks and its components the Bitcoin's price at the higher quantiles.

7. LIMITATIONS AND FUTURE RECOMMENDATIONS

As a conclusion and recommendation, we would like to point out that each study or paper has its scope and limitations. Using OLS estimations, the results of this study show a significant negative and positive effect of GPR and its component indexes on Bitcoin's price, respectively. Nonetheless, using QQ estimation, we show that the GPR and GPRA indexes have a positive and statistically significant impact on Bitcoin's price at the upper quantiles. Based on these findings, Bitcoin should be seen as a global geopolitical risk hedging tool, particularly during extreme global geopolitical risk. However, in bear market conditions, Bitcoin must be included in the portfolio to diversify.

This study several limitations may affect the results of the study, namely:

1. Researchers only use bitcoin as the dependent variable.
2. Researchers only use two estimation models: the OLS model and Quantile Regression.

Future research should be conducted with a broader scope and variables to determine whether Geopolitical risk still has no effect on Bitcoin price when other variables are included. Future research may concentrate on risk and uncertainty indicators to determine their impact on cryptocurrencies other than Bitcoin. Researchers, for example, can discover geopolitical risk indicators for other types of cryptocurrencies. Researchers can look at the relationship between geopolitical risk and cryptocurrencies using tests other than OLS and QQ Regression. However, we should improve our academic knowledge of cryptocurrencies to understand price fluctuations in the cryptocurrency market.

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