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THREAT OF INTERVENTION IN CRYPTOCURRENCY MARKET: WEST SIDE STORY OF BITCOIN AND RIPPLE

Abstract. *This study examines the impact of intervention threats on the price and volume volatility of Bitcoin and XRP. Using the Threshold or GJR-GARCH model, we analyse the relationship between news shocks (representing intervention threats) and the volatilities of Bitcoin and XRP price and volume returns, based on data from January 2014 to April 2021. The results indicate a significant association between news shocks and Bitcoin's price volatility, suggesting that intervention-related news events have a notable impact. However, the relationship between news shocks and XRP's price volatility is insignificant. Notably, XRP's volume returns demonstrate a positive and significant relationship with news shocks, while Bitcoin's volume returns do not exhibit a significant relationship. Additionally, past shocks and conditional variance shocks significantly contribute to the volatility of today's price or volume returns. These findings suggest that Ripple (XRP) may benefit from the implicit threat of intervention, strategically managing its availability to control price surges.*

Keywords: *GJR-GARCH, Bitcoin, XRP, cryptocurrency, the threat of intervention*

JEL Classification: G11, G14, G15, G41

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1. Introduction

Mostly due to their revolutionary characteristic, cryptocurrencies are fastly becoming a key instrument in the modern financial arena. They are fast and comfortable means of payment with worldwide scope. Moreover, they are private and anonymous enough to serve as a means of payment for some outlawed economic activities and black markets. Therefore, they give rise to a fast-growing and incredibly dynamic market for investors and speculators. The daily trading volumes in the cryptocurrencies market exceed the major European daily stock markets. Some of these cryptocurrencies are highly volatile and may gain from 10% to 100% a day and may lose by the same margin the next day. In 2009, Bitcoin was the only cryptocurrency in the world; however, these cryptocurrencies have grown up to 1,658 in 2018 and by the end of 2019 the total number of cryptocurrencies added up to 4000+. They leverage blockchain technology to gain decentralisation, transparency, and immutability. The demand for cryptocurrencies may increase due to evasion of tax by customers, money launderers, extortions, human trafficking, high expectations or speculations, weapons and drugs sales.

Nakamoto was the first person to describe Bitcoin in 2008 and later in the year made an introduction to the world a network he refers to as Bitcoin network Kjærland et al. (2018). In his announcement of the creation of Bitcoin in late 2008, Satoshi Nakamoto, the unknown inventor of Bitcoin, the first and still the most important cryptocurrency, said that he has developed a "Peer-to-Peer Electronic Cash System" to prevent double-spending. Bitcoin is the top currency of cryptocurrency Mohsin et al. (2021), and since its creation in 2009, the price of Bitcoin has risen from $0.07 to approximately $63,000 in January 2021. In the new global economy, Bitcoin has become a central issue for many investors and governments alike, even countries like Turkey, China, and few others. It is on the verge of being adopted by the second largest bank in Spain, BBVA, and another Switzerland bank, Gazprom bank Switzerland who have already executed their first trades using Bitcoin. Interestingly, the Swiss Canton Zng will accept Bitcoin or Ether as a form of tax payments starting from 2021. There is a growing body of literature that recognises the importance of Bitcoin as a safe haven for investors, and this can be evidenced by the financial crisis during the COVID-19 pandemic. Despite the financial struggles Aysan et al. (2021), the price of Bitcoin seemed to take an increasing trend, and the prices are reportedly hitting record heights in recent months. One of the main things which attracts most investors to cryptocurrencies especially Bitcoin is due to their extreme volatility, exceptionally high return averages, less correlation with the normal traditional assets as well as daily accessibility. According with Baur and Dimpfl (2018) this is coupled with their no correlation to traditional securities, bonds, and other stocks.

A couple of years after Bitcoin led the way in the cryptocurrency era, Ripple became OpenCoin after changing tracks. Reiff (2020) stated in his research that OpenCoin is a money transfer network where large financial services companies act as counterparties to transactions. Their cryptocurrency XRP has been launched later in the year 2012 to serve as an intermediate channel of exchange between two different networks or currencies. OpenCoin was changed to Ripple Labs in the early fourth quarter of 2013.

XRP was created by CEO Bradley Garlinghouse and co-founder Christian Larsen who also owned Ripple Company in 2012. It had offices in Luxemburg, the UK, and Australia. Ripple labs initially have five validating servers, and also enable other institutions to arrive at a consensus concerning the financial transactions' fate. Ripple relies on the technology of an iterated consensus ledger coupled with the validation of the servers' network to accept and validate XRP transactions within seconds. Moreover, according to Reiff (2020) Ripple is a syndicate of 200 financial institutions or more based in at least 40 countries to allow for the ease of facilitation of cross-border payments. Due to these XRP has emerged as powerful platforms for interbank transfers and provided competition for SWIFT transfers because of its reliability, cheap, and ease of transaction. Aysan et al. (2021) state that it is developed additionally to be used as currency exchange and payment settle for two currencies that cannot be directly exchanged. Moreover, Reiff (2020) argued that one hundred billion XRP are pre-mined, whereas only 38 billion of them are in the market and the rest of which are kept in Ripple Labs. According to numerous studies (Katsiampa, 2019; Sapuric et al., 2020; Walther et al., 2019). Ripple controls XRP; however, the nature and ways of how Ripple controls XRP remain unclear, but one method is clear. It is believed that they control it by reducing the supply of XRP in times of high greed or fear in the cryptocurrency market. This is because the Ripple company still holds the largest amount of XRP tokens and they can decide whenever to release them for sale or keep them. XRP hit its record high in the early days of 2018 at $3.31, but the market was corrected shortly after and it had a stable price ever since and below $1. This may be because it has been strongly involved with banks which boosts its popularity but this could be the reason it has a low stable price and it may also be a limitation since decentralisation is the main idea of cryptocurrencies. In December 2020, due to the investigations by the Securities and Exchange Commission (SEC), the price of XRP was also reduced.

Coming to the key differences between XRP and Bitcoin, Bursztynsky (2020) stated that XRP was developed to settle payments, for exchange of currencies, and to be used as money transfer system to be utilised mostly by payment networks and banks. This nature of XRP helps greatly in providing transparent, secure, and cheap real-time direct asset transfers than the predominant payment methods such as SWIFT. Whereas, the development of Bitcoin, which was created by an unidentified group or person called Satoshi Nakamoto, was mainly for the payment of services and goods as a digital currency (Ripple Vs. Bitcoin: Key Differences, 2020). Furthermore, Reiff (2020) said that Bitcoin is an equivalent of real-world USD for purchases, whereas XRP is its equivalence for inter-bank transfers. The transaction cost for Bitcoin is $40, but it's $0.004 for XRP, which translates the inflationary and deflationary nature of Bitcoin and XRP, respectively. Just to note again, Bitcoin has a total supply of 21 million tokens, whilst XRP has 100 billion out of which only 38 billion are available in the market. Bitcoin is mostly used by organisations or individual investors, whilst XRP payments are commonly used by banks and payment networks.

Moreover, according to Reiff (2020), Bitcoin tokens are spread all around the world while Ripple owns at least 60% of XRP tokens. On average, XRP transactions only take five minutes to complete, whereas it takes a maximum of 15 minutes for Bitcoin transactions to be completed. While Ripple's main goal is to use XRP for currencies and commodity transfers such as gold or oil over the network, Bitcoin is used to buy goods and services in the capacity of fiat money. While Bitcoin is intentionally used as a mean to facilitate online payment for goods and services, Ripple is used for payment settlements, exchange of currency, and remittance systems for banks and payment entities. The idea of XRP is to bring about a system for easy transfer of assets (e.g. money, gold, etc.) that settles in nearly real-time and is a more transparent, cheaper, and secure alternative to transfer systems used by banks today such as the SWIFT payment system. The Bitcoin network is overseen by a group of miners distributed around the globe. It has no central controlling body. Its price is influenced by the market forces of supply and demand. However, the XRP ledger works via a consensus algorithm that uses a network of validating servers, as opposed to the "proof of work" used by Bitcoin miners. This makes Bitcoin difficult to be affected by threats from owners, any institution, or government as opposed to the case of XRP. This phenomenon is the motivation behind this study.

As Ripple holds approximately 60% of the tokens and Ripple can intervene into the market to stabilise the price of XRP, therefore it is worth to investigate that how this "threat of intervention" will affect the XRP and Bitcoin (the leading and the first cryptocurrency in the market). Hence, the main objective of this study is to investigate or examine the threat of intervention on XRP and Bitcoin price returns' volatilities and volume returns' volatilities. Another aim Glosten et al. (1993) is to check the overall asymmetric effect of the threat of intervention on both currencies using GJR-GARCH proposed by. We analyse and assess the potential economic effect of the threat posed by potential intervention and discuss key regulatory questions as to how Ripple Company also poses a threat to control the price of XRP.

Therefore, this study systematically evaluates the volatility trends for Bitcoin and XRP in order to examine the emerging role of Ripple Company in the context of controlling XRP prices by intervening in the cryptocurrency market. For this purpose, the Threshold GARCH or GJR GARCH model has been used. Both price and volume returns' volatilities are used to investigate the effect of the threat of intervention. The study concludes that Ripple Company explicitly or implicitly controls the prices of XRP by holding the tokens off the market as proven by the relationship between volume returns' volatility of XRP and outside news proxying the threat of intervention. XRP's volume returns volatility has a significant and positive relationship with the threat of intervention. The insignificant relation between XRP price returns' volatility and the threat of intervention confirmed that XRP's prices are not affected by the threat of intervention. In other words, the threat of intervention may cause Ripple Company to intervene in the market by controlling the volume traded in the market, as they are holding 60% of XRP. This is supported by the significant relationship between XRP volume returns' volatility and the threat of intervention.

The findings from this study make several contributions to the current literature. Firstly, we conclude that unlike other cryptocurrencies XRP is not as fully decentralized and uncontrolled. Secondly, XRP is basically for risk-averse investors whilst Bitcoin is for Risk-loving investors based on the nature of the volatilities in the prices. The study of the threat of intervention in the cryptocurrency market provides a useful account of how and why some coins are more expensive and others are not. The study of threat of intervention also try to assess that why XRP is still not having a higher price even though it has a large market capitalisation. Since XRP is specifically designed to be used as means of settling payments and currency exchanges, this study will be relevant for banks and other financial institutions that will presumably adopt it as it is way faster and cheaper than the traditional SWIFT transfers. The current study is also a good guide for potential investors into the crypto market.

This paper has been divided into four sections. This is the first to deal with the introduction of the main cryptocurrencies used in the study. The second concerns the data and methodology used for this study. The third is centered on the results and their discussion and the fourth and final section details down the conclusion.

2. Data and methodology

This section details out the data source and the econometric methods used in the study.

2.1. Data Source

The cryptocurrencies were selected based on the market capitalisation and the phenomenon "threat of intervention" under investigation here. As Bitcoin is the leading and the first cryptocurrency having more than 50% of market capitalisation, therefore, it has been assessed. Whereas XRP is a special type of cryptocurrency (which is owned and controlled by a legal entity) unlike most cryptocurrencies and as the study is about the threat of intervention and the Ripple company (owning the XRP) claims that they can and will intervene in the market (XRP White paper) named as "Threat of intervention" therefore XRP has been chosen as the other cryptocurrency. Whereas, in order to measure that whether this threat of intervention also affects the other cryptocurrencies, the leading cryptocurrency i.e., Bitcoin has been chosen. The data set ranges from Jan 1, 2014 to Apr 30, 2021. The data on closing prices and volumes with daily frequency have been obtained from www.coinmarketcap.com. The prices and volumes were then converted to returns series, which will be used for further econometric analysis. In a good number of financial studies, researchers as Campbell, Low, and Mackinlay (1997) used returns instead of assets' price and volume. According with Tsay (2005) there are two reasons for this; the first, returns give a complete and a free scale summary of investment opportunities for average investors and it is easier to handle returns than price or volume simply because return series have a better attractive statistical features. The return series (price/volume) for both currencies are calculated as:

$$r_t = ln\left({P_t}/{P_{t-1}}\right) = p_t - p_{t-1} \quad (1)$$

$$p_t = ln(P_t) \quad (2)$$

Where P_t is the price or volume of a cryptocurrency at time t.

2.2. Methods

The econometric methodological framework covers various unit root tests assessing the stationarity of the time series under consideration and the Threshold GARCH (TGARCH) model developed by Glosten et al. (1993). This method was chosen for this study because it allows conditional volatility to possess different reactions to past shocks or innovations based on the news about a particular market or asset, using the leverage component of it. This threshold term is used to capture the threat of intervention.

2.3. Unit Root Tests

A time series can come in three forms, namely; having a unit root, explosive or stationary. The most vital property of the time series is that of the stationarity. The basic idea of stationarity is that the probability laws that govern the behaviour of the process do not change over time. In other words, the value does not increase with time. A stationary time series may also mean that the variance of the process does not change with time, and even if it does, it will regularise with time. Testing for the stationarity of time series is vital because it shows that the statistical features of a time-series/process generating it do not change with time. Stationarity is important due to the reliability of many statistical tests and analytical tools. There are various tests available in the literature to assess the stationarity/unit root of time series; however, the most common unit root testing tool is the Augmented Dickey-Fuller (ADF) Test(Dickey & Fuller, 1981). The ADF test evaluates the null hypothesis of unit root against the alternative of stationarity. Similarly, another frequently used unit root/stationarity test is the Phillips Perron (PP) test developed by Phillips and Perron (1988). It also has the same null and alternative hypotheses as ADF. However, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS)test developed by Kwiatkowski et al. (1992) has a different null hypothesis from the rest of two as it has stationarity as its null hypothesis against the alternative of non-stationarity. These three tests are used for confirmatory purposes while deciding about the nature of time series. An Autoregressive of order one i.e. AR (1) time series process may come in three forms; with only constant, with constant and trend, and without constant and trend.

$$Y_t = \alpha_0 + \beta t + \delta Y_{t-1} + e_t \quad (3)$$

$$Y_t = \alpha_0 + \delta Y_{t-1} + e_t \quad (4)$$

$$Y_t = \delta Y_{t-1} + e_t \quad (5)$$

For *δ=1*, the time series has a unit root, for *δ>1* the time series is explosive and for *δ<1* the time series is stationary.

2.4. Selection of the Model

This study relies on the automated model selection procedure for the adequate autoregressive (AR) and moving-average (MA) terms of the ARMA models in choosing the most appropriate ARMA model as the mean equation. Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) were used to select the best-of-fit model among all the possible ARMA models. The lower the information criteria value, better the model fit is (Brockwell and Davis, 2009; Burnham and Anderson, 2004). By definition $AIC = -2\ln(L) + 2k$ whereas, $BIC = -2\ln(L) + k\ln(T)$. L represents the maximised value of the likelihood function, k equals the number of parameters plus the constant; mathematically, $k = p + q + 1$; where p is the number of AR terms and q represents the number of MA terms (Ayele et al., 2017).

2.5. Model Specification

An Autoregressive Conditional Heteroscedasticity (ARCH) with q lags usually known as ARCH(q) is of the form

$$\sigma_t^2 = \omega + \sum_{t=i}^{q} \alpha_1 \epsilon_{t-1}^2 \quad (6)$$

where σ_t^2 is the squared conditional variance of returns at time t, ω accounts for the long-term volatility, $\varepsilon_{t-i}^2$is the past shock and $\alpha_i$is the effect of past shocks on the volatility today or in other words, short-run shocks. ARCH(Engle, 1982) frequently yields negative estimates of the α_i due to the over-parameterised model. Lim and Sek (2013) found that in ARCH, large lagged values reduce the accuracy of the estimation, but the Generalised ARCH i.e., GARCH uses few parameters to capture long lagged effects and it improves the efficiency of the estimation. All types of ARCH models have two equations; one the conditional mean equation and the other conditional variance equation. As stated earlier in the paragraph the simple ARCH model frequently provides negative estimates of the variance equation, which are against the non-negativity constraints of the variance equation. Therefore, to resolve the problem of negative estimates, Bollerslev (1986) developed the GARCH model. The GARCH includes the lagged conditional variance terms, as AR terms and hence its conditional variance process is written as;

$$\sigma_t^2 = \omega + \sum_{i=1}^{q} \alpha_i \epsilon_{t-1}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-1}^2 \, , t \in \mathbb{Z} \quad (7)$$

Where q is the order of ARCH and p is the order of GARCH. The non-negativity constraints are; $\alpha_i \& \beta_j \geq 0 \; and \; \omega > 0$. The Threshold GARCH was developed by (Glosten et al., 1993) and it allows conditional volatility to possess different reactions to past shocks or innovations based on the news. This model is known as GJR-GARCH or TGARCH and it is specified as:

$$\sigma_t^2 = \alpha_0 + \sum_{i}^{q} \alpha_i \epsilon_{t-i}^2 + \gamma_i \epsilon_{t-i}^2 I_{t-i} + \sum_{j}^{p} \beta_j \sigma_{t-j}^2 + \varepsilon_t \quad (8)$$

Factoring out ϵ_{t-i}^{2} from the equation, GJR-GARCH (q, p) is rewritten as:

$$\sigma_t^2 = \omega + \sum_{i=1}^{q}(\alpha_i + \gamma_i I_{t-i})\epsilon_{t-i}^2 + \sum_{j=1}^{p}\beta_j \sigma_{t-j}^2 \quad (9)$$

$$\begin{Bmatrix} I_{t-i} = 1 \; if \; \epsilon_{t-i}^2 < 0 \; (bad\ news) \\ I_{t-1} = 0 \qquad\qquad Otherwise \end{Bmatrix}$$

The bad news has different effects on the volatility. This indicator term's coefficient γ_i measures the impact of bad news on the volatility. In this study, this "bad news" indicator has been used as a proxy for "threat of intervention". If $\gamma_i = 0$ then it means that there is no impact of bad news on volatility and good or bad news impact is symmetric, however the $\gamma_i \neq 0$ implies that the impact of bad or good news is asymmetric. Moreover, $\gamma_i > 0$ concludes that the bad news increases volatility and the news impact is asymmetric. This study uses the student's-t as the error distribution, as its tails are much heavier than the normal distribution.
Moreover, we use the Threshold GARCH model by Glosten et al. (1993) as the main statistical tool for this study because it takes into account the impact of factors that cannot be calculated. This method is an advanced form of the traditional GARCH model, and it was chosen for this study because there is a strong persistence in volatility (long memory), and it can be used to explain price volatilities which are caused by factors that cannot be calculated such as news or sentiments, using the leverage component of it.

3. Results discussion

3.1. Descriptive Statistics

The summary statistics of the price and volume returns for Bitcoin and XRP are given in table 1. XRP prices rose to a high point and peaked in 2017 due to market manipulation. Whereas, the Bitcoin prices surge in 2020. The standard deviations of the prices of Bitcoin and XRP are 10,402.92 and 0.3215, respectively, which further translates that the Bitcoin is highly volatile since standard deviation is a proxy for measuring the volatility of an asset. The mean prices of both currencies are at 6,457.76 and 0.2277 for Bitcoin and XRP respectively.

Table 1. Descriptive Analysis for the Returns of Bitcoin and XRP's Prices and Volumes

Cryptocurrency	Bitcoin Prices	XRP Prices	Bitcoin Volumes	XRP Volumes
Observations	2677	2677	2677	2677
Mean	6,457.763	0.2277	10,935,885,364.5	1,205,606,324.5
St. Dev	10,402.92	0.3215	18,455,643,024.2	3,077,514,271.9
Maximum	63,503.46	3.38	350,967,941,479	36,955,175,105
Minimum	178.1	0.0028	2,857,830	8,316

Source: Eviews

3.2. Graph of the Original Series

Figure 1, depict the historical picture of both the prices and trading volumes and their respective returns for Bitcoin and XRP dated from 1st January 2014 to 30th April 2021. The market experienced a drastic rise in the prices of cryptocurrencies in the year 2017 towards the beginning of 2018 which was due to manipulation of the market by a Bitcoin holder hailed as whale. The price of Bitcoin jumped from $1 in January to around $19,000 in the later part of that same year. The Bitcoin's price has experienced jumps afterwards however, the price of XRP has shown stability afterwards. This price stabilisation in XRP could be because unlike Bitcoin XRP is controlled by a certain entity called Ripple and also XRP is not as decentralised as many other cryptocurrencies are. On the other hand, the returns of prices and volumes showed an Autoregressive conditional heteroscedastic behavior where periods of higher volatility are followed by periods of higher volatility and vice-versa. These returns also appeared to fluctuate around the constant level but showed volatility clustering. The 2017 price rise can be observed in the graphs below as there has been a huge increase in the crypto market in 2017, returns in the same year for both currencies have been huge but XRP has been settling down from that and has not been piling up as Bitcoin does.

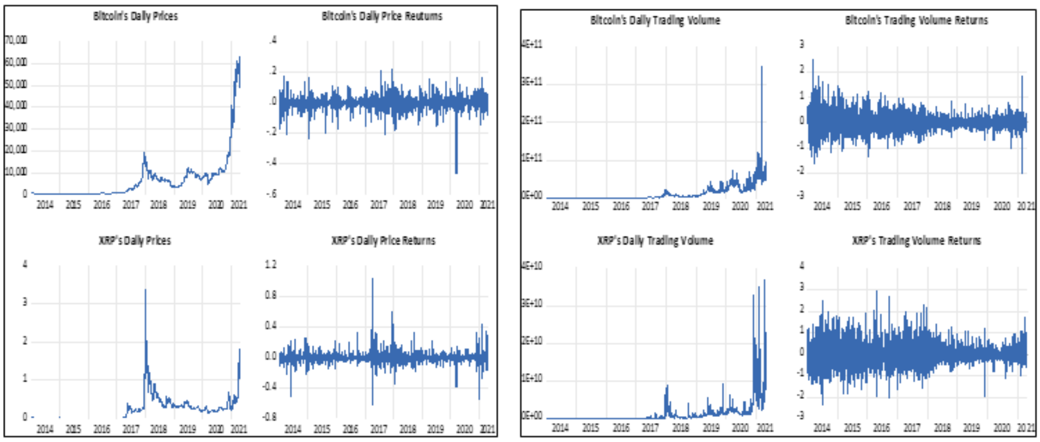

Figure 1. Bitcoin and XRP Prices and Returns versus Bitcoin and XRP Volume and Returns

3.3. Unit Root Test results

Table 2 below shows the results of the unit root tests using ADF, PP and KPSS tests respectively.

Table 2. Unit Root Tests for the Return Series of Bitcoin and XRP Prices and Volumes

Variables	ADF Test for Price Returns		ADF Test for Volume Returns	
	Constant	**Constant & Trend**	**Constant**	**Constant & Trend**
Bitcoin	-52.696***	-52.757***	-16.135***	-16.133***
XRP	-50.676***	-50.695***	-32.729***	-32.723***
	PP Test for Price Returns		**PP Test for Volume Returns**	
Bitcoin	-52.688***	-52.747***	-96.652***	-96.643***
XRP	-52.009***	-51.987***	-80.375***	-80.353***
	KPSS Test for Price Returns		**KPSS Test for Volume Returns**	
Bitcoin	0. 388	0.142	0.028	0.028
XRP	0.152	0.101	0.015	0.015

Note: All the tests are presented in their statistical values.
***, ** and * indicates the rejection of null hypothesis at 1%, 5% and 10% level of significance respectively.

Source: EViews

The Augmented Dickey-Fuller (ADF) test uses the basic Ordinary Least Square principle for testing the stationarity of data while the Phillips-Perron (PP) uses the long-run variance-covariance estimators' instead of the traditional variance-covariance estimator used by OLS. Both of these tests, i.e., ADF and PP, have the null hypothesis of unit root and from the results in table 2 it is concluded that price and volume returns series for both Bitcoin and XRP are stationary at levels, as both ADF and PP are rejecting the null of unit root at 1% level of significance. On the other hand, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test has stationarity as it's the null hypothesis. The KPSS also conclude that all of the return series are stationary as the null hypothesis cannot be rejected. This further confirms the results of the ADF and PP tests.

3.4. Identifying ARCH Effect: ARCH-LM Tests

The ARCH-LM test was proposed by Engle (1982) and it tests for heteroskedasticity in the data. This is to say, it checks for the ARCH effects using the squared residuals of the price return series by Ayele et al. (2017). The null hypothesis of this test is that the series has no ARCH effects in it with the alternative being that, there's an ARCH effect or heteroskedasticity. We have chosen to check for the ARCH effects in the residuals for up to 3 lags to give an early guess. Hence, early results before the GARCH model showed that there is an ARCH effect in the series as is tabulated in table 3.

Table 3. ARCH-LM test for Checking ARHC-Effects. H0: No ARCH Effects

	F-statistics			Chi-Squared (X^2)		
Statistical Lag	**1**	**2**	**3**	**1**	**2**	**3**
Bitcoin Price Returns	37.005 (0.000)	19.403 (0.000)	13.445 (0.000)	36.527 (0.000)	38.293 (0.000)	39.793 (0.000)
XRP Price Returns	261.073 (0.000)	142.073 (0.000)	96.114 (0.000)	238.021 (0.000)	258.030 (0.000)	260.619 (0.000)
Bitcoin Volume Returns	106.561 (0.000)	65.477 (0.000)	54.199 (0.000)	102.553 (0.000)	124.974 (0.000)	153.489 (0.000)
XRP Volume Returns	43.017 (0.000)	36.845 (0.000)	28.465 (0.000)	42.368 (0.000)	71.792 (0.000)	82.872 (0.000)

Note: Values enclosed in the parenthesis are p-values

Source: EViews

3.5. GJR-GARCH Estimation Results

The best ARMA models are ARMA (5,4) and (2,1) for Bitcoin and XRP price returns, ARMA (4,6) and (6,7) for Bitcoin and XRP's volume returns respectively. Table 4 is a visualisation of the results of Threshold GARCH models for the price returns of both cryptocurrencies. The aim is to find out how they react to news or information regarding the cryptocurrency market to answer the question in this study that sought to determine the impact threat of intervention in the market. It is evidenced from the table 4 that, news and information surrounding the cryptocurrency market have an impact on the volatility of Bitcoin price returns because the threshold term (γ) is significant at 10%. It also confirms that there is an asymmetric significant relationship between news and Bitcoin price returns. The impact is negative (-0.094207) which further says that the impact of bad news is greater than the impact of good news (asymmetric) on Bitcoin price returns volatility and it reduces the volatility. Collectively, the threshold term and the past shocks constitute (-0.094207 + 0.315249) 0.221, which means that the shocks have a short-term impact on the price returns volatility. When comparing the number to the impact of the past volatility shock (0.872814), it takes a longer period to recover from the shock caused by previous volatility as compared to the shocks caused by the past shock or news impact in the market on bitcoin price returns volatility. However, there was no evidence that news and incalculable shocks influence the price returns volatility of XRP. This is evidenced by the stable pricing nature of the currency and backed by the results of the GJR-GARCH model results in table 4. The most interesting aspect of this is that, contrary to bitcoin the threshold term (γ) is not significant in determining the price return volatility of XRP. This is because it has a p-value that is much higher than all the significance levels. Another thing to consider is the impact of past shock and past volatility on the price return volatility of XRP. The past shocks are both significant at all levels, but take a shorter time for the price-return volatility of XRP to recover from the slumps.

Table 4. Results of Threshold or GJR-GARCH (q, p) for Bitcoin and XRP Conditional Returns Variance

Models	Parameters	Bitcoin Returns		XRP Returns	
		Price	Volume	Price	Volume
Mean Equation	Constant (μ)	0.0016	-0.0020	0.001539	-0.00404***
	AR (1)	-0.005	0.3147***	0.84646***	1.1005***
	AR (2)	0.4973***	-1.0831***	0.0339***	-0.6747***
	AR (3)	-0.5682***	0.6005***	-	0.3928*
	AR (4)	0.1132***	-0.4104***	-	-0.7522***
	AR (5)	0.8677***	0.0338*	-	0.7193***
	AR (6)	0.0455***	-	-	-0.00486
	MA (1)	-0.0136	-0.6587***	-0.8347***	-1.4089***
	MA (2)	-0.5241***	0.9856***	-	0.7845***
	MA (3)	0.5992***	-1.0225***	-	-0.4178
	MA (4)	-0.0957***	0.4149***	-	0.7889***
	MA (5)	-0.8928***	-0.1513***	-	-0.9096***
	MA (6)		-	-	0.052385
	MA (7)		-	-	0.16186***
Variance Equation	Constant ω	1.6E-6**	1.21E-05	0.00033***	5.7E-6***
	ARCH (-1) α_1	0.31524***	0.0159***	0.8160***	0.0294***
	Leverage Effects (γ)	-0.094207*	0.0082	-0.026584	0.022418*
	GARCH (-1) β_1	0.8728***	0.98099***	0.6788***	0.96506***

Note: *** indicates significance at all levels, ** at 5% and * at 10% level of significance respectively.

The results obtained from the GJR-GARCH model for the volume returns of both cryptocurrencies are also summarised in table 4. It is found that the threshold term (γ) has a positive significant relationship with the volatility of the returns of XRP's trading volume. Whereas it has no significant relationship with the volatility of the returns of Bitcoin's trading volume. From the table 4, it can be seen that the relationship between news and XRP trading volume is positive meaning that bad news has more impact on the volume returns than good news i.e., the news has an asymmetric impact. It has an impact of 0.022418 (significant at a 10% significance level) on the volatility of XRP's volume returns. The positive coefficient shows that the bad news increases the volatility as compared to the good news. This finding can be translated as that the threat of intervention increases the volatility of XRP's volume returns.

Turning now to the evidence on the trading volume of the Bitcoin to further find the evidence from the volatility of XRP's volume returns. The results obtained from the Threshold GARCH model are also summarised in table 4. Shocks from the past return volatility for Bitcoin is 0.8728 while past shocks are 0.3152, both of which are significant at all levels. Interestingly, the threshold termγ is not significant, meaning that the bad news does not have an econometrically significant relationship with Bitcoin volume returns.

No evidence was found for association between Bitcoin volume returns' volatility and outside news. This may be since the investors know that there is no central body that controls the activities of Bitcoin within the market. Moreover, maybe they trust Bitcoin so much that they do not care how much the price rises or falls, as they believe that it will always recover. What makes this interesting is that once the news breaks out, it will either increase or reduce the price of Bitcoin, and when this happens, the investors have nothing much to lose. Because most investors sell their coins when the prices rise and they buy when the prices fall because they always know that they can hold on to Bitcoin and wait for the prices to rise again so that they can sell it again. This is why news whether a good one or a bad one does not affect the volatility of trading volume of Bitcoin because there is always going to be someone to either buy when prices fall and sell his coins off when the prices rise.

On the other hand, XRP's volume returns volatility exhibited a significant relationship with the outside news. This is true because, due to the nature of how and why it is created, it is always meant to be different from Bitcoin and other altcoins. XRP is owned and operated under the supervision of an entity that owns more than 40% of its total token. Therefore, it is easy for them to control the flow or supply of XRP tokens on the market. This significant relationship further proved that Ripple Company controls the price of XRP by keeping a certain volume of tokens out of the market. Because news concerning the cryptocurrency market will trigger Ripple Company into doing something as a preventive mechanism to protect the coins.

4. Conclusions

This study aims to investigate the effects of the threat of intervention in the cryptocurrency market. We also intended to further assess the difference in volatility of price and volume returns of the two studied digital currencies in order to answer the main research question of this study. The findings revealed that the threat of intervention exists for XRP but not for Bitcoin. This is simply because Bitcoin is not governed or controlled by any institution while XRP, on the contrary, is owned and controlled by an entity by means of their validating servers around the world through a consensus algorithm. The GJR-GARCH model proved useful in identifying the impact of incalculable determinants of volatility. Since the impact of variables such as news and technological innovations cannot be numerically calculated, the GJR-

GARCH; an advanced form of the traditional GARCH model adds the leverage term as a dummy variable to check the significance of the impacts of these variables (news and innovations). To be briefly put, these two case scenarios confirm that the threat of Ripple Company's intervention exists in cryptocurrency market. The insignificance of the threshold term for the price return volatility of XRP translates that news surrounding the market does not change the price returns volatility of XRP as compared to Bitcoin price returns volatility do. This could be because Ripple Company owns XRP and they can hold it whenever they fear it is going to gain so much value, as their main aim is to use it as means for interbank transfers and create competition for SWIFT transfers in the banking system. In summary, these results can conclude that both GARCH, ARCH, and news shocks emerge as reliable predictors of the next day price return volatilities of Bitcoin. However, XRP, on the other hand, does not react to asymmetric shocks in the market; rather XRP only reacts to the volatility shocks. In terms of volume returns volatilities, news has an impact on the XRP volume return volatility, but not on Bitcoin's. Furthermore, the investigation of the volatility phenomena between the two currencies has shown that Bitcoin is more volatile than XRP, and as such, for a rational investor, XRP will be much preferred to Bitcoin. This makes more sense because there have been notions that Ripple controls the prices of XRP by reducing the trading volume of XRP within the market since they still own most of the coin. Even though the CEO of Ripple Company, Bradley Garlinghouse denies the claim, he further claims that they are taking steps to keep most of their XRP tokens in escrows so that they will not be touching it. Since the number of coins sold and bought within a day is the trading volume, and the more cryptocurrencies are traded, the more they gain attention and hence increase in value. It is safe to say that to control the price of any cryptocurrency, one has to keep a significant part of the coins off the market to stabilise the price. This makes much sense for XRP simply because most of it is owned by its creators and they have some degree of control over it. It will be easy for them to hoard it for some time to make sure its price does not surge like Bitcoin, Ethereum, and other cryptocurrencies do. These results can be supported by which revealed that Ripple has sold a whopping $250 million worth of XRP during the second quarter of 2019 which shows an increase in XRP sales to about 48% from the first quarter. Subsequently, this increase prompted Ripple to decrease future coin sales substantially. This is one of the mechanisms used by the company to control the prices of XRP. Like the stock exchange, the more a currency is traded in the crypto market, the more it gains value. Since Ripple's plan is contrary to the inflationary nature of the cryptocurrency market, they would hold the currency for a significant period of time so that the price will not rise as much as Bitcoin and other currencies. This is why XRP's price return has an opposite reaction to news compared to trading volumes. This is how Ripple controls the price of XRP.

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