PANDEMIC. A NON-LINEAR ANALYSIS

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Abstract:

In this paper we investigate the impact of Bitcoin, Gold and S&P Index on BET index in order to test the Safe Havens hypothesis during COVID-19 Pandemic. Using daily data covering 2019-2021 period we find that BET index returns is sensitive to S&P Index returns regardless the information's surrounding the USA economy and the political environment. Furthermore, the Gold return exhibit a positive impact on BET Index Return indicating that the higher the return of Gold, the higher the profit of traders investing on BET Index. Finally, we find strong empirical evidences indicating that BITCOIN, Gold and S&P are not safe havens relative to BET Index.

Keywords: *Bitcoin, Gold, quantile regression, threshold regression*

JEL classification: *E62, H21, O23*

Introduction

Covid-19 set an unprecedented impact over the economy with big meltdowns on stock markets worldwide. Few examples are the US Dow Jones Index DJIA which fell by 2997 points mid-March, the French CAC 40 that decreased by 9% in just a day, the NSE50 that lost more than a fourth of its value on March 2020. US regulations implemented three levels of a circuit breaker, which are set to stop trading when the S&P 500 Index drops at 7%, 13%, and 20%, and in March 2020 these have been triggered four times.

Normally, in times of market turmoil, the investors search and move towards safe-haven assets in order to protect their investments. One of these assets is Gold which has played a role of currency throughout its long and rich history and often used as a liquidity source and a portfolio stabilizer. **Van Hoang et al. (2016)** found Gold to be a useful hedging tool against inflation in the USA and UK. **Elder et al. (2012)** states that gold reacts counter-cyclically to macroeconomic news and it not only maintains its value during times when equity market indices tumble, but sometimes even increases in value.

Taking into consideration the behavioral aspect the decision to buy gold is very well rooted, moreover we are showing biases towards this sort of commodity (**Baur and McDermott, 2016**) and some authors even state that the occasional bubbles in the prices of Gold are results of the "flight to safety" phenomenon (**Zhao et al., 2015**). **Beckmann et al. (2015)** demonstrated that on the UK Stock Market gold is a strong safe-haven, while on the Swiss, German, French and Italian it is a weak safe-haven. Also, on the US stock market in conditions of extremely low or high volatility, **Hood and Malik (2013)** proved that gold doesn't behave as a good hedging tool or safe-haven as it doesn't show a negative correlation.

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As the blockchain technology evolves and more and more cryptocurrencies appear on the crypto market, researchers are trying to analyses if any of them might be used as safe-haven assets, but the results are even more ambiguous. **Smales (2019)** is considering the extremely high volatility and long-term risk of Bitcoin as being incompatible with any characteristics of a safe-haven.

In their paper, **Baur and Lucey (2010)** provided the definition for hedge, diversifier, and safe haven in the light of a growing array of financial instruments that has raised the risk of the financial system: „*Hedge: An asset that is uncorrelated or negatively correlated with another asset or portfolio on average. A strict hedge is (strictly) negatively correlated with another asset or a portfolio on average. Diversifier: An asset that is positively (but not perfectly correlated) with another asset or portfolio on average. Safe haven: An asset that is uncorrelated or negatively correlated with another asset or portfolio in times of market stress or turmoil*."

Although one can argue that Bitcoin has little to no connection with the real economy as that is one of the reasons behind its creation so that no banks or governments can interfere, the fact that cryptocurrencies are highly volatile and easily manipulable is well established. Bitcoin in particular is very prone to high volatility, induced by traders that act under a heard effect and buy or sell large amount in a short period of time, and as demonstrated by **Gandal et al. (2018)** the Bitcoin Bubble of 2013 was caused by just two investors that managed through their activity to cause a significant price increase. **Caferra et at (2021)** concluded via an event study analysis that traders move capital from commodities and stock market to Bitcoin in case of positive events of the cryptocurrency.

In another paper **Będowska-Sójka, and Kliber(2021)** tried to determine if Gold, Bitcoin or Ether can be potential safe-haven assets for four stock price indices (S&P500, DAX, STOXX600, and FTSE250) and concluded that only gold could play this role, but during the crisis caused by the coronavirus outbreak it didn't act as a strong safe-haven. According to them, Bitcoin cannot be considered a safe-haven for any of the indices, but only be regarded as a weak one against FTSE250 and DAX. Similar situation is valid for Ether where it shows weak safe haven characteristics for all four indices.

Against this background it is of interest to investigate how BET index is influenced by Bitcoin, Gold and S&P, considering low and high regimes of economic uncertainty in USA. In this paper we investigate these aspects and provide some interesting facts that might be useful to investors on Bucharest Stock Exchange and regulators.

The reminder of the paper is structured as follows: Section 2 presents the data and the econometric approach; Section 3 is summarizing the results while section 4 concludes the paper.

Methodology and Data

To investigate the nonlinear impact exerted by different covariates on BET index on we use a threshold regression model (**Tong, 1983; Hansen, 2011**). These methods are alternatives to standard OLS method in order to capture the asymmetric patterns or the structural breaks which are usually describing the evolution of financial time series. A threshold regression with two regions can be described by Eq. (1):

$$y_t = \begin{cases} x_t\beta + z_t\delta_1 + \epsilon_t, & -\infty < w_t \leq \gamma \\ x_t\beta + z_t\delta_2 + \epsilon_t, & \gamma < w_t \leq \infty \end{cases}. \quad (1)$$

In Eq. (1), y_t is the dependent variable (BET Index return), the explanatory factors exhibiting a constant impact on the dependent variables are given by x_t and might contain lagged values of y_t while z_t is a matrix of independent variables featuring some region-specific coefficients

captured by δ_1 and δ_2. Furthermore, β is a vector containing region-invariant estimates, w_t is the threshold variable given EPU index while ϵ_t is an IID error term with zero mean and constant variance σ^2.
Region 1 holds those data associated with w_t lower than the threshold γ. Similarly, Region 2 holds those data associated with w_t greater than γ. The superiority brought by including a threshold in the baseline model resides from delineating one state from another. The output of the estimation consists of a set of coefficients up to the threshold and another set of coefficients (another effect) beyond it.
Estimating γ, which is a nuisance parameter is a difficult task mainly due to its nonstandard asymptotic distribution. Thus, to identify the threshold value ($\hat{\gamma}$) requires performing the least square optimization to Eq. (2) with T observations and two regions:

$$y_t = x_t\beta + z_t\delta_1 I(-\infty < w_t \leq \gamma) + z_t\delta_2 I(\gamma < w_t \leq \infty) + \epsilon_t. \quad (2)$$

The threshold is estimated based on the following minimization algorithm:

$$\hat{\gamma} = \arg min_{\gamma \in \Gamma} S_{T_1}(\gamma). \quad (3)$$

In Eq. (3), $\Gamma \in (-\infty, \infty)$, $T_1$is a sequence of values in w_t, with $T_1 < T$ and corresponds to the number of observations between two certain quantiles of w_t distribution. In addition, $S_{T_1}(\gamma)$ can be computed as:

$$S_{T_1}(\gamma) = \sum_{t=1}^{T} [y_t - x_t\beta - z_t\delta_1 I(-\infty < w_t \leq \gamma) - z_t\delta_2 I(\gamma < w_t \leq \infty)]^2. \quad (4)$$

Eq. (4) represents a $T_1 x1$ vector of SSR given γ which is a $T_1 x1$ vector of potential thresholds.

In this paper we rely on a sample covering 2019 to 2021 period. The dependent variable is the daily return of the BET Index. As covariates we include the lagged returns of the BET Index, the BITCOIN returns, Gold returns and S&P returns. The threshold variable is the EPU index. All financial data are extracted from Refinitiv while records from EPU Index are extracted from https://www.policyuncertainty.com/ . Figures 1, 2, and 3 present the evolution of the BET index compared to the ones of the covariates.

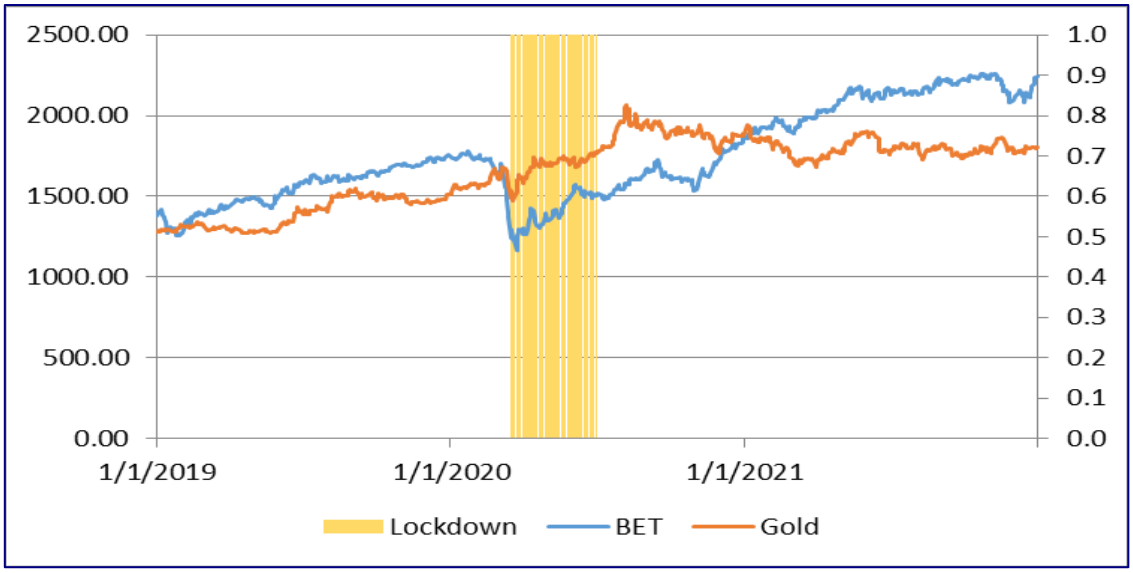

Figure 1 – BET vs Gold (2019-2021)

Source: own processing

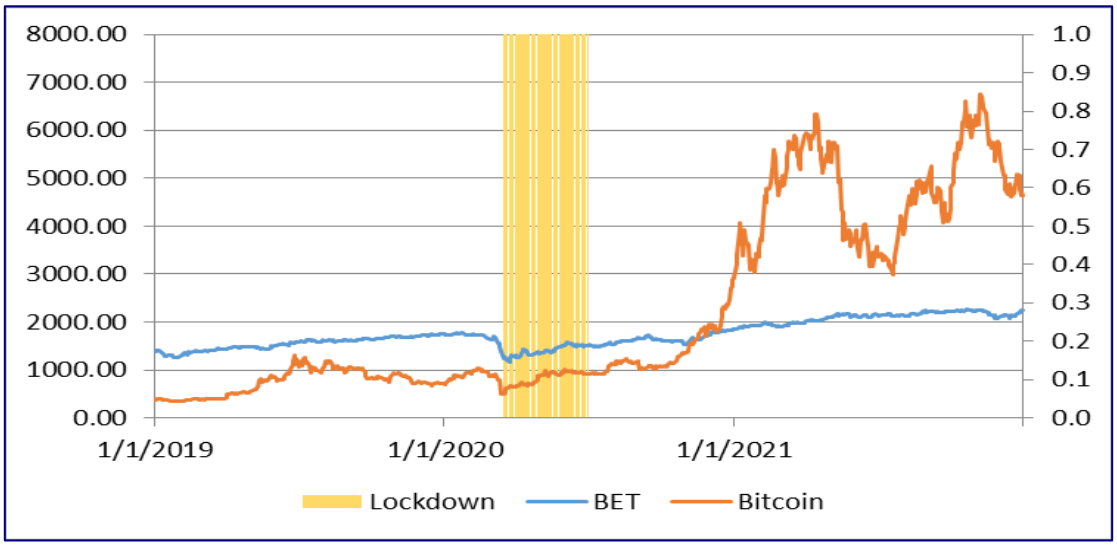

Figure 2 – BET vs BITCOIN/10 (2019-2021)

Source: own processing

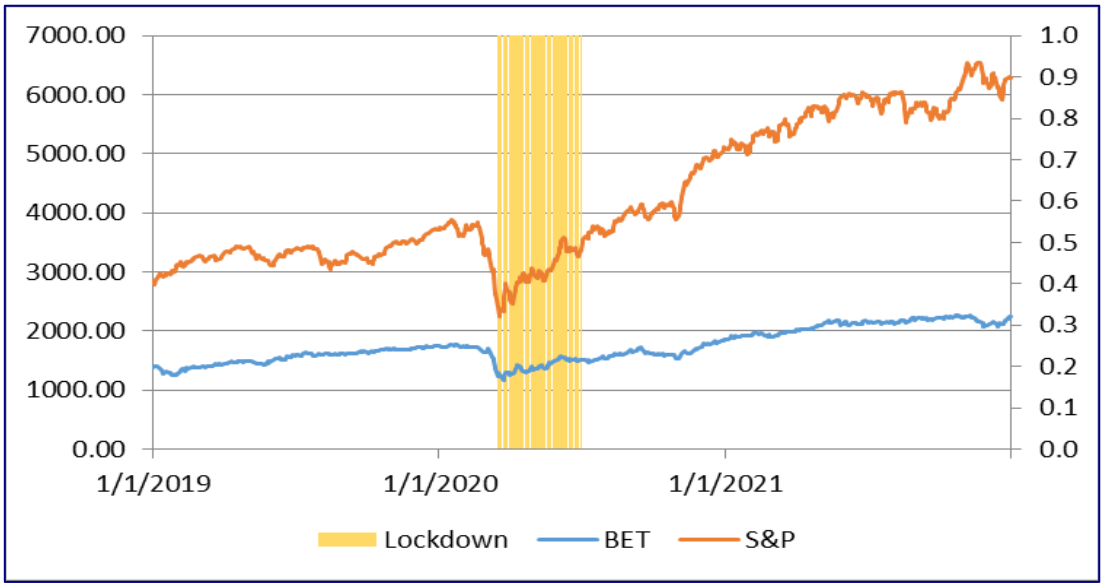

Figure 3 – BET vs S&P (2019-2021)

Source: own processing

Results

The first step of the empirical analysis is to investigate the stationarity of the data. We will use the ADF test to investigate the risk of running spurios regression due to non-stationarity behavior of the data series. The results are presented in Table 1:

Table 1

ADF test

Variables	Level		First Difference	
	Test Value	Prob	Test Value	Prob
BET	-0.6011	0.8676	-16.7813	0.0000
Gold	-1.7060	0.4279	-28.2858	0.0000
Bitcoin	-0.7917	0.8204	-29.1871	0.0000
S&P	-0.4361	0.9003	-16.5563	0.0000
EPU	-3.3928	0.0115	-18.3004	0.0000

Source: own calculation

All the covariates present a unit root in the level and became stationary after the first difference. The threshold variable, EPU Index is stationary in both, level and the first difference. For this reason, we will estimate the baseline model using daily percentage change for BET, BITCOIN, Gold and S&P and the level for EPU. To account for some autoregressive effects on the time series we will also include the lagged dependent variables. The results are presented in Table 2:

Table 2

Threshold regression results (BET returns as dependent)

Variables	Regime 1		Regime 2	
	Coeffcient	Prob	Coeffcient	Prob
Lagged BET Return	0.0343	0.7163	-0.0400	0.6690
Gold Return	0.0840	0.3512	**0.2708**	**0.0642**
Bitcoin Return	0.0150	0.4047	-0.0355	0.4148
S&P Return	**0.2446**	**0.0004**	**0.5280**	**0.0000**
Intercept	-0.0462	0.5635	-0.0854	0.6318
EPU	<275		>275	
Observations	648		134	

Source: own calculation

As we can see in Table 1, the evolution of BET Index is influenced by the evolution of S&P Index in both regimes (EPU<275 vs. EPU>275). The impact coefficient is twice as higher in Regime 2 compared to Regime one (0.5280 vs 0.2446) indicating that the spill over effects from USA to Bucharest are more pronounced during episodes of high political uncertainty. Both coefficients are statistically significant at 1% level. Furthermore, we report a positive relationship between Gold and BET, statistically significant at 10% level in Regime 2, indicating that BET index goes hand in hand to gold price, but only in times of persistent economic uncertainty.

Conclusions

In this paper we test the existence of Safe Haven hypothesis relative to BET index. Using daily data covering 2019-2021 period we find that BET index returns is sensitive to S&P Index returns regardless the information's surouning the USA economy and the political environment. Furthermore, the Gold return exhibit a positive impact on BET Index Return indicating that the

higher the return of Gold, the higher the profit of traders investing on BET Index. Finally, we find strong empirical evidences indicating that BITCOIN, Gold and S&P are not safe havens relative to BET Index.

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