Are Islamic Gold-backed cryptocurrencies different?

Abstract: We assess the differential impact of geopolitical risk on Islamic and conventional gold backed cryptocurrencies using a multivariate Generalized Autoregressive Conditional Heteroscedasticity (M-GARCH) modeling. We unveil that Islamic gold-backed cryptocurrencies behave differently from their conventional counterparts. Sharia compliant cryptocurrencies are positively correlated to the yellow metal, while the conventional ones are weakly and negatively associated to gold. We find that the geopolitical risk intensifies the dependency of GBC to gold returns and volatility. Our results are of great interest for policy makers, Islamic portfolio managers and digital currency traders when undertaken their investment and hedging strategies during periods of high uncertainty and worsen geopolitical circumstances.

***JEL classification*: G1, F3, F39**

Key words: Islamic cryptocurrencies, gold-backed cryptocurrencies, GJR-GARCH, DCC, geopolitical risk.

1. Introduction and research motivations

Cryptocurrencies display similar safe haven and hedging properties against financial and economic instability as precious metals, and often compared gold (e.g. Das et al. 2018; Gkillas and Longin, 2019; Kurka, 2019). Now the gold market is employing Blockchain technology to boost back at crypto and lure gold bugs into the of cryptocurrency trading. Since the emergence of the concept of Stablecoins, hybrid assets bridging the gap between digital and traditional financial assets, there been numerous attempts to create gold-baked digital coins, to provide investors with less volatile cryptocurrencies. The gold-backed cryptocurrencies (GBC) are digital currencies that are pegged to value of a physical asset (gold). This means that although the crypto coins are on a distributed ledger and therefore easy to trade, they also have intrinsic value, which constitutes the main deficiency of conventional cryptocurrencies (e.g. Corbet et al., 2018).

Following the growing interest in Stablecoins among investors, financial regulators and the media, the new gold-backed Islamic cryptocurrencies are launched to provide Islamic investors with a new digital currency complaint with sharia rules. The Islamic cryptocurrency is baked on gold, which is one of six "*rabawi*"[1] commodities that Muslim investors are allowed to trade. Now, both Islamic and non-Islamic gold-backed cryptocurrencies are concomitantly built on the Blockchain technology. Their connectedness to the yellow metal and compliance to sharia rules stand them as a new safe haven financial asset against the tumultuous economic and financial circumstances (Baur and Hoang, 2020).

The present study attempts to investigate the differential effect of the geopolitical risk and economic uncertainty on the time-varying correlations between gold, Islamic, and non-Islamic GBC. Specifically, we ask the following questions: to which extent the gold-baked digital currencies are correlated to gold prices? Do Islamic cryptocurrencies behave differently from their counterparts in terms of correlation to gold prices? How their co-movements are influenced by systematic risk?

[1] According to Sharia rules, six commodities (gold, silver, dates, wheat, salt, and barley must be traded by weight and measure. Exchanging these commodities must be in equal measure or weight with an immediate transfer of property. The violation of this rule is called "riba" and traded commodities are known as "rabawi" commodities (Source: https://www.investment-and-finance.net/islamic-finance/r/ribawi-commodities.html).

This paper contributes to the two main strands of the cryptocurrency literature. First, we contribute to vast research on the hedging and safe haven properties of cryptocurrencies during tumultuous economic conditions (e.g., Bouri et al., 2018; Das et al, 2019, Baumohl, 2019, Kurka, 2019, Al-Mamoun et al., 2020). For instance, Bouri (2018) claims the possibility of predicting Bitcoin prices based on price information from various aggregate commodity index and gold prices, in to the findings by Kurka et al. (2019) who unveil negligible unconditional connectedness between cryptocurrencies and other traditional commodities. Al-Mamoun et al. (2020) investigate the effect of geopolitical risk, global and US economic uncertainty on the structure of the correlation with a set of various commodities. They point out significant effect of these global risk factors on the Bitcoin risk premium.

Second, this paper adds to the literature focused on the key factors deriving digital currency returns and volatilities and their speculative nature (e.g., Bauer and Dimpfl, 2018, Demir et al. 2018; Corbet et al, 2018b; Nguyen et al, 2019; Andrew et al., 2019; Urquhart & Zhang, 2019; Pyo and Lee, 2019, Al-Yahyaee et al., 2019, Aysan et al., 2019, Gozgor et al., 2019). Aysan et al. (2019), show that the geopolitical risk has a substantial predictive power of the return and volatility of Bitcoin. Similarly, Al-Yahaee et al. (2019) implement the wavelet methods and unveil that the effect of several global risk factors including the Economic policy uncertainty (EPU), geopolitical risk, crude oil volatility on the co-movements between volatility uncertainty index and bitcoin are varying across investment-horizons. Using the same methods, Gozgor et al. (2019) document a significant positive effect of the US trade policy uncertainty as a global risk factor on the bitcoin returns, supporting previous findings reported by Demir et al. (2018).

Finally, this paper contributes to the literature comparing the Islamic and conventional financial assets, providing the novel evidence from the GBC (Aloui et al. 2016; 2017). Thus, this paper investigates the effect of global geopolitical risk and economic uncertainty on the cryptocurrencies-gold connectedness. We test whether the compliance to sharia rules differentiates the Islamic gold-baked digital currencies from their conventional homologous. As far as we know, this is the first study to apprehend such research questions.

2. Methodology and data

This study proceeds in two steps. In the first step, we implement a multivariate GJR-GARCH of Glosten-Jagannathan-Runkle (1993)[2] under dynamic conditional correlation (DCC) to model the time-varying unconditional correlations between the gold and gold-backed cryptocurrency prices. This model has the ability to account for the main stylized facts of cryptocurrency volatility and their connectedness to other financial assets or commodities such as volatility clustering and asymmetry and non-linearity, performing better than other models according recent studies by Guesmi et al. (2018), Takaishi (2018), and Al Maamoun et al. (2020).

We consider the daily frequency data for two gold-backed sharia compliant cryptocurrencies: OneGram Coin (OGC) and X8X Token (X8X), as well as five conventional GBC: the GoldMint (MNTP), DGX gold token (DGX), Xaurum, (XAUR), Gold Bits Coin (GBC), HelloGold (HGT) for the period from July, 23, 2018 to January, 11, 2020. It is worthily noting that the inception of the data sample period is conditioned by the data availability and finding of a common period. The GBC dataset yield 539 observations. The five conventional GBC as well as the X8X prices were manually collected from the coinmarketcap.com[3], while the OGC prices are collected from the WorldCoinIndex.com[4]. Since the GBCs are traded on different markets, their time series were daily synchronized to avoid the time lag across the markets. The gold prices collected from the US Stlouis Fed[5], and the news-based geopolitical risk index of Caldara and Iacoviello (2019) is used in this paper. The GPR index is computed by accounting the number of articles corresponding to geopolitical risk in each newspaper for each month[6], and then normalized to average a value of 100.

[2] To preserve space, the multivariate GJR-GARCH model is not presented here. Indeed, the multivariate GJR-GARCH is frequently used to model the time-varying connectedness among financial time series. The journal readers can refer to Glosten-Jagannathan-Runkle' (1993) paper cited within the reference list.
[3] Source: https://coinmarketcap.com/currencies/goldmint/
[4] https://www.worldcoinindex.com/coin/onegram
[5] Source : https://fred.stlouisfed.org/series/GOLDPMGBD228NLBM.
[6] The authors construct various GPR indices by counting the occurrence of words related to geopolitical tensions derived from automated text searches in 11 leading national and international newspapers.
10 Daily Telegraph, The Guardian, The Times, The Washington Post, The Chicago Tribune, The Wall Street Journal, The New York Times, The Financial Times, The Boston Globe, The Daily Telegraph and the Globe and Mail. The GPR index is constructed based on searching for some key words such as "Middle East tension", "geopolitical" "uncertainty", "war risk" (see Caldara and Iacoviello, 2019).

Table 1 demonstrates that all the conventional and Islamic GBC exhibit negative daily returns, while the gold average return is positive. Furthermore, the risk of the digital currency returns is extremely high compared to the gold return.

Table 1. Stochastic properties of the Gold-backed cryptocurrencies daily returns

	Islamic gold backed cryptocurrencies		**Conventional gold-backed cryptocurrencies**					**Gold**
	OGC	**X8X**	**HG**	**DGX**	**MNTP**	**GBC**	**XAUR**	
Mean	-1.187	-0.2528	-0.58	-0.0176	-0.145	-0.605	-0.58	0.032
Max.	431.25	63.4	86.35	105.09	149.48	117.95	15.01	2.746
Min.	-539.4	-52.8	-64.41	-103.56	-109.76	-99.10	-16.65	-2.04
S.D	26.99	9.42	15.41	7.46	13.64	21.89	3.89	0.634
Skewness	-1.6***	1.00***	0.51***	0.24***	2.61**	0.29***	0.249***	0.325***
Kurtosis	38.39***	11.83***	4.43***	144.41***	44.52***	1.47***	1.47***	1.66***
J-B	101.2***	312.2***	438.8***	458.01***	442.2***	53.41***	53.41***	70.11***
Q(20)	89.76***	51.47***	125.47***	131.4***	176.23***	67.87***	67.87***	82.08
ADF	-8.60	-16.75***	-18.96***	-18.13***	-18.69***	-12.88***	-12.78***	-13.78***

Notes: S.D refers to the standard deviation. ADF, PP are the unit root tests of the Augmented Dickey-Fuller (1979) and Phillips-Perron (1981). ***, ** and * designate the significance at the 1%, 5% and 10% levels, respectively. Q(20) is the Ljung-Box statistic of the squared standardized returns.

In the second step, we check the geopolitical risk effect on the GBC-gold unconditional correlation magnitude and volatility using a standard GARCH (1,1) model with dummy variable. We include the GPR index as well as its lagged value in the mean equation of the DCCs to test its actual and/or lagged effect on the time-path of the DCCs. This allows us to test the impact of the GPR on the strength of the time varying connectedness between GBCs and gold. The DCCs mean equation is as follows:

$$DCC_t = \alpha_0 + \beta_1 gpr_t + \beta_2 gpr_{t-1} + \varepsilon_{i,t} \quad (1)$$

where gpr_t and gpr_{t-1} refer, respectively, to the current and lagged values of GPR index.

Simultaneously, we include the dummy variables corresponding to geopolitical risk episodes in the conditional variance equation of the DCCs. Here, our main objective is to test whether the occurrence of geopolitical risk incidents affect the volatility of the GBC-gold time-varying correlations. Therefore, the conditional variance equation is written as follows:

$$h_{ij,t} = c + ae_{ij,t}^2 + bh_{ij,t-1} + \sum_{k=1}^{M} d_k dum_{k,t} \quad (2)$$

where $dum_{k,t}$ is the dummy variable corresponding to high geopolitical risk dates.

3. Empirical Results

3.1. The cryptocurrencies-gold' dynamic correlations

The estimation outcomes are, respectively conveyed in Tables 2a and 2b. The estimated average values of the DCCs (panels B), show that all the conventional GBC are weakly and negatively correlated to the gold returns while their Islamic counterparts are weakly and positively correlated. Table 2b displays that the AR(1) component of the mean equation is positive and significant for only the gold returns, while the ARCH and GARCH parameters are strongly significant for the two selected cryptocurrencies. Contrarily to the conventional cryptocurrencies, the leverage effect' estimated parameters are significant but positively signed indicating no asymmetric response of Islamic cryptocurrencies to positive and negative volatility shocks. The estimated average values of the DCC are significant, positively signed, and weak, indicating that the Islamic GBC are weakly connected to the price movements of their underlying physical asset, which differentiates them from their conventional digital currencies. This finding may be attributable to behavior of Islamic cryptocurrency traders. Indeed, the compliance to sharia ethics standards doesn't allow any intended or unintended speculation which in turn reduces the connection of Islamic investors to the gold when undertaking their trading positions.

Table 2a. Estimation results of the bivariate GJR-GARCH-DCC for conventional gold-backed cryptocurrencies.

	Islamic gold-baked cryptocurrencies									
	Gold	**DGX**	**Gold**	**HG**	**Gold**	**MNTP**	**Gold**	**GBC**	**Gold**	**XAUR**
Panel A: GJR-GARCH estimates										
$Cst.(m)$.	0.002**	-0.186	0.002**	-0.467	0.002**	0.205	0.02**	0.132	0.002**	0.176
	(1.99)	(-1.09)	(1.99)	(0.59)	(1.99)	(0.52)	(1.99)	(0.65)	(1.99)	(0.57)
$AR(1)$	0.049***	-0.48***	0.049**	-0.08***	0.049***	-0.167***	0.049	0.047***	0.049***	0.089**
	(2.06)	(-4.23)	(2.06)	(3.2)	(2.06)	(-2.62)	(1.17)	(3.01)	(2.06)	(1.84)
$Cst.(v)$.	0.014***	-0.04	0.014***	38.12***	0.014***	1.69	0.014***	0.032***	0.014***	0.064*
	(3.30)	(-0.81)	(3.30)	(1.92)	(3.30)	(1.18)	(3.18)	(2.2)	(3.30)	(1.61)
$ARCH(1)$	0.062***	0.101*	0.062***	0.164	0.062***	0.08***	0.062***	0.055**	0.062***	0.902***
	(3.45)	(1.72)	(3.45)	(2.29)	(3.45)	(2.31)	(3.42)	(2.44)	(3.45)	(12.34)
$GARCH(1)$	0.94***	0.77***	0.94***	0.67***	0.94***	0.847***	0.94***	0.84***	0.94***	0.81***
	(7.97)	(9.23)	(7.97)	(5.45)	(7.97)	(9.14)	(7.97)	(5.43)	(7.97)	(4.31)
$GJR\ (\gamma)$	-0.097***	0.02***	-0.097***	-0.12	-.097***	-0.097***	-0.097***	-0.08***	-0.09***	0.089***
	(-2.91)	(2.22)	(-2.91)	(-0.019)	(-2.91)	(-2.10)	(-2.91)	(-3.01)	(-2.91)	(-3.01)
Panel B: DCC estimates										
$DCC(average)$		-0.01**		-0.015***		-0.021**		-0.031***		-0.022***
		(-2.26)		(-3.39)		(-1.99)		(-2.38)		(-2.04)
a		0.02		0.001		0.002***		0.001		0.99
		(1.26)		(0.53)		(2.32)		(0.78)		(0.01)
b		0.93***		0.80***		0.85		0.75***		0.81***
		(3.69)		(3.48)		(0.52)		(3.06)		(4.31)
Panel C: Test diagnostics										
$Q(20)$		5.23		4.78		30.66		45.31		25.96
		[0.999]		[0.99]		[0.95]		[0.96]		[0.86]
$Hosking(20)$		94.55		144.2		102.76		172.3		102.39
		[0.097]		[0.99]		[0.93]		[0.99]		[0.98]
$Li-McLoed(20)$		95.84		144.9		103.91		172.9		103.58
		[0.99]		[0.99]		[0.94]		[0.99]		[0.98]

Notes: $Q(20)$ refers to the Ljung-Box test statistic of the squared residuals at length (20). $Hosking(20)$ and $Li-McLoed(20)$ designate the multivariate Portmanteau serial correlation tests, respectively. ***, **,* indicate the significance levels of 1%,5% and 10%, respectively. Figures between parentheses are the t-student statistics, while those between brackets refer to the p-values.

Table 2b. Estimation results of the bivariate GJR-GARCH-DCC for Islamic gold-backed cryptocurrencies.

	Gold	X8X	Gold	OGC
Panel A: GJR-GARCH estimates				
$Cst.(m)$.	0.023	-0.23	0.023	-4.86**
	(0.88)	(-0.68)	(0.88)	(-1.76)
$AR(1)$	0.046***	0.032	0.046***	0.059
	(2.96)	(0.53)	(2.96)	(0.86)
$Cst.(v)$.	0.012***	44.46***	0.012***	41.2
	(2.95)	(3.69)	(2.95)	(0.76)
$ARCH(1)$	0.55*	0.55*	0.55*	-0.137**
	(1.75)	(1.75)	(1.75)	(-2.03)
$GARCH(1)$	0.90***	9.09***	0.90***	0.85***
	(2.99)	(2.99)	(2.99)	(2.67)
$GJR(\gamma)$	-0.312***	0.312**	-0.312***	0.32***
	(-2.98)	(2.06)	(-2.98)	(2.12)
Panel B: DCC estimates				
$DCC(average)$		0.002***		0.012**
		(3.05)		(3.02)
a		0.01***		0.001
		(2.03)		(1.33)
b		0.83		0.84**
		(0.36)		(2.03)
Panel C: Test diagnostics				
$Q(20)$		10.29		10.68
		[0.96]		[1.00]
$Hosking(20)$		56.22		52.2
		[0.97]		[0.98]
$Li-McLoed(20)$		102.37		68.4
		[0.93]		[0.94]

Notes: $Q(20)$ refers to the Ljung-Box test statistic of the squared residuals at length (20). $Hosking(20)$ and $Li-McLoed(20)$ designate the multivariate Portmanteau serial correlation tests, respectively. ***, **, * indicate the significance levels of 1%, 5% and 10%, respectively. Figures between parentheses are the calculated t-student statistic, while those between brackets refer to the p-values.

Fig.1a reports the time DCCs[7] between the conventional baked gold cryptocurrencies and gold. As we can see, the cryptocurrency-gold correlations are varying through time and the average correlation is found to be negative for all the five gold-baked currencies, except for the DGX-Gold where the correlation is ranging between -0.15 and 0.2. These small and negative correlations indicate that gold can serve as a hedge asset against conventional gold-baked cryptocurrencies, and these results are inconsistent with Al-Mamoun et al. (2020).

[7] For space scarcity, the stochastic properties of the DCCs time series are not reported here but are available upon request addressed to the corresponding author. However, the visual inspection of the GBC-gold' DCCs reveal volatility clustering and substantial heteroscedasticity justifying the suitability of the standard GARCH model.

Fig 1a. The GJR-GARCH-DCCs of conventional GBC and gold

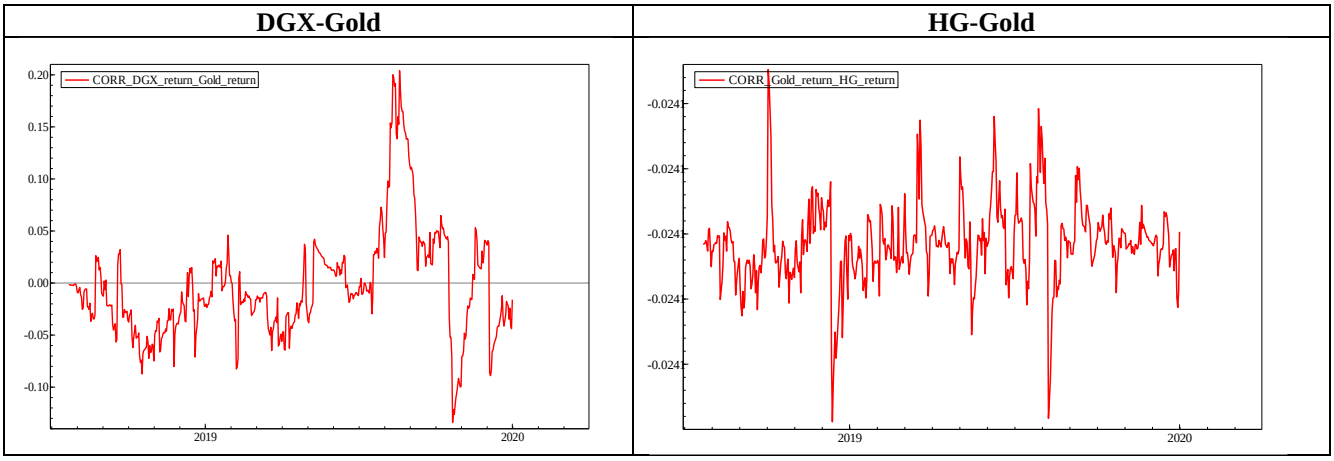


Fig.1b- The GJR-GARCH-DCCs of Islamic gold-baked cryptocurrencies

X8X	OGC

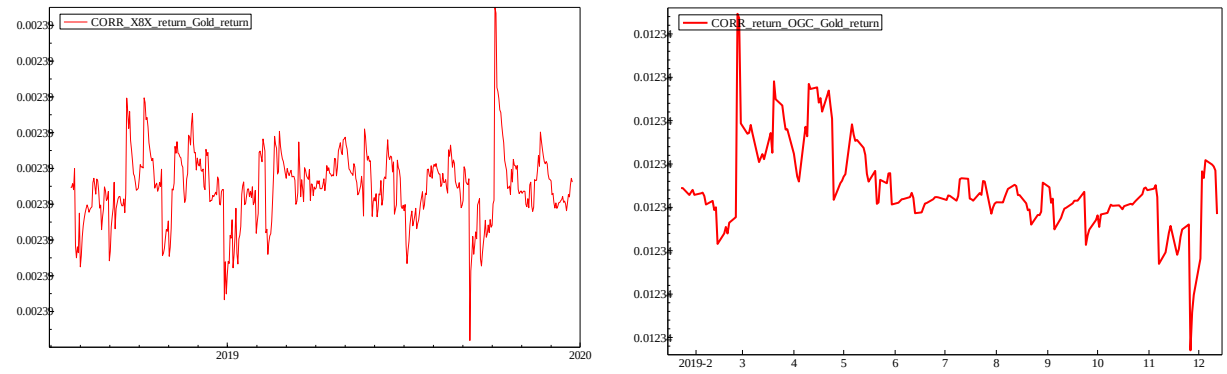
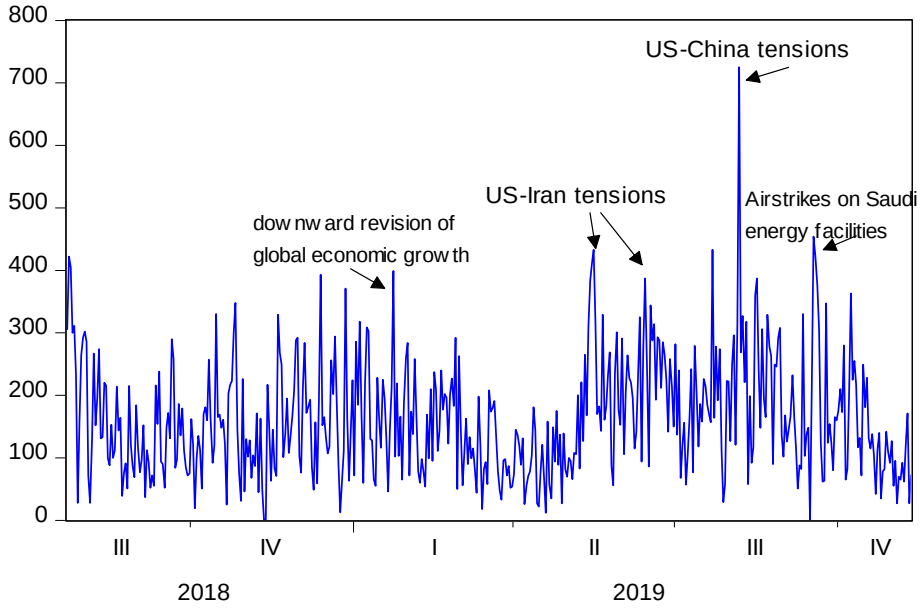


Fig. 1b reveals that the two sharia compliant digital currencies are weakly and positively correlated to the price changes of their underlying physical asset. From a portfolio management point of view, these two results imply that cryptocurrency traders are invited to account for the weak positive association between the Islamic GBC prices and gold prices when adding gold to their cryptocurrency portfolios. Thus, the yellow metal seems to not serve as a safe haven asset against cryptocurrency' systematic risk.

3.2 Geopolitical risk and cryptocurrency - gold connectedness

The global geopolitical risk can be viewed as a global risk factor affecting both the strength and the volatility of the connectedness between gold and Islamic and conventional cryptocurrencies. In Fig. 2, we report the time-path of the GPR index as well as some selected episodes of high geopolitical risk levels. Specifically, we consider the following dates: (1) the announcement of downward revision of the global economic growth (23rd of January, 2019), (2) the US-Iran tensions (15th of May 2019) and (3) (14th of June 2019), (4) the US-China tensions (1st of August 2019), and (5) the airstrikes on Saudi energy facilities (17th of September, 2019).

Fig. 2- Geopolitical risk time-path and some selected extreme episodes



The Islamic and conventional cryptocurrencies exhibit typically similar behavior in terms of the response of their dependence structure to the episode of geopolitical risk incidents. However, the Islamic cryptocurrencies distinguish themselves when assessing the magnitude of their correlation to the current and lagged effects of the global geopolitical risk. Table 3 displays result for the DCC-GARCH(1,1) model including the GPR as dummy variable in the conditional variance.

Table 3. DCC model with GPR extreme events' dummies

	Conventional Gold-backed cryptocurrencies					Islamic gold-backed cryptocurrencies	
	DGX	HG	MNTP	XAUR	GBC	OGC	X8X
Panel a. DCCs mean equation: $DCC_t = \alpha_0 + \beta_1 gpr_t + \beta_2 gpr_{t-1} + \varepsilon_{i,t}$							
α_0	-0.04***	-0.04***	-0.0218***	0.002***	-0.0032***	0.0021***	0.0033***
	(-8.03)	(-7.12)	(-8.39)	(12.6)	(-3.33)	(-5.82)	(-4.02)
β_1	**0.0012*** **	-0.0024	**0.0018*** **	**0.001*** **	**0.0029*** **	**-0.00152*** **	**-0.0006*** **
	(4.57)	(-0.37)	(1.47)*10^2	(2.132)	(7.56)	**(-3.01)**	**(-4.01)**
β_2	**0.013*** **	0.0122	**0.00132*** **	0.001	**0.0031*** **	**-0.00148** **	**-0.0005*** **
	(4.58)	(-0.072)	(4.68)	(0.231)	(6.61)	**(-2.01)**	**(-2.96)**
Panel b. DCCs variance equation: $h_{ij,t} = c + ae_{ij,t}^2 + bh_{ij,t-1} + \sum_{k=1}^{M} d_k dum_{k,t}$							
cst	0.007***	0.007***	0.0006***	0.0005***	0.0044***	0.00332***	0.0002***
	(3.84)	(3.23)	(3.25_	(4.22)	(3.62)	(3.0)	(2.41)
a	0.817***	0.55***	0.56***	0.68***	0.72***	0.68***	0.71**
	(4.85)	(3.55)	(2.39)	(3.01)	(4.06)	(3.03)	(1.99)
b	0.21***	0.22***	0.21***	0.24***	0.21***	0.23***	0.26***
	(2.37)	(2.39)	(3.41)	(3.32)	(2.01)	(4.01)	(2.39)
dum_1	-0.005	-.001	-0.004	-0.006	-0.0021	-0.0041	-0.0062
	(-0.15)	(-1.29)	(-0.25)	(-0.21)	(-0.19)	(-0.11)	(-0.09)
dum_2	-0.0026	-0.005	-0.0023	-0.0039	-0.0056	-0.0044	-0.0039
	(-0.09)	(-0.23)	(-1.28)	(-0.96)	(-0.61)	(-0.16)	(-0.12)

dum_3	-0.0039	0.0037	0.0034	0.0048	0.0055	-0.0030	-0.0041
	(-0.121)	(0.24)	(0.26)	(0.22)	(0.28)	(-0.29)	(-0.21)
dum_4	**0.0058***	**0.007*****	**0.0057*****	**0.0066*****	**0.0053*****	**0.0062*****	**0.0055****
	(1.45)	**(3.27)**	**(3.44)**	**(3.08)**	**(4.02)**	**(2.99)**	**(3.03)**
dum_5	-0.0033	**0.00294*****	**0.0024*****	**0.0027*****	0.0019	**0.0063*****	0.0021
	(-0.26)	**(3.82)**	**(3.02)**	**(2.99)**	(0.96)	**(2.01)**	(0.28)
$LB(20)$	10.22	10.26	11.01	9.65	10.19	8.52	8.55
	[0.96]	[0.99]	[0.99]	[0.98]	[0.99]	[0.96]	[0.96]

Notes: Figures between parentheses correspond to the t-student while LB(20) is the Ljung-Box statistic test for the 20th squared residuals. (***) refers to the significance at the 1% level.

The mean equation estimation results are conveyed in panel A, while the conditional variance estimations are displayed in panel B. When inspecting the conditional mean estimation results, we perceive that the geopolitical risk has a substantial negative effect on gold-conventional cryptocurrency average DCCs. The estimated coefficient of the current geopolitical risk variable is negatively signed and significant for the all the selected digital currencies except for the XAUR. Similarly, the lagged geopolitical index exerts a positive influence on the conditional correlations except for the HG and XAUR currencies. By probing further, the dynamic correlations are responding positively to the escalation of geopolitical uncertainty which means that the negative connectedness between gold and conventional cryptocurrencies is strengthening during high geopolitical risk episodes. This result may be explained by the "flight to quality" phenomenon. Indeed, investors operating in these conventional digital currencies might swap over their portfolios and "fly" to gold to reduce their portfolios total risk during distress periods.

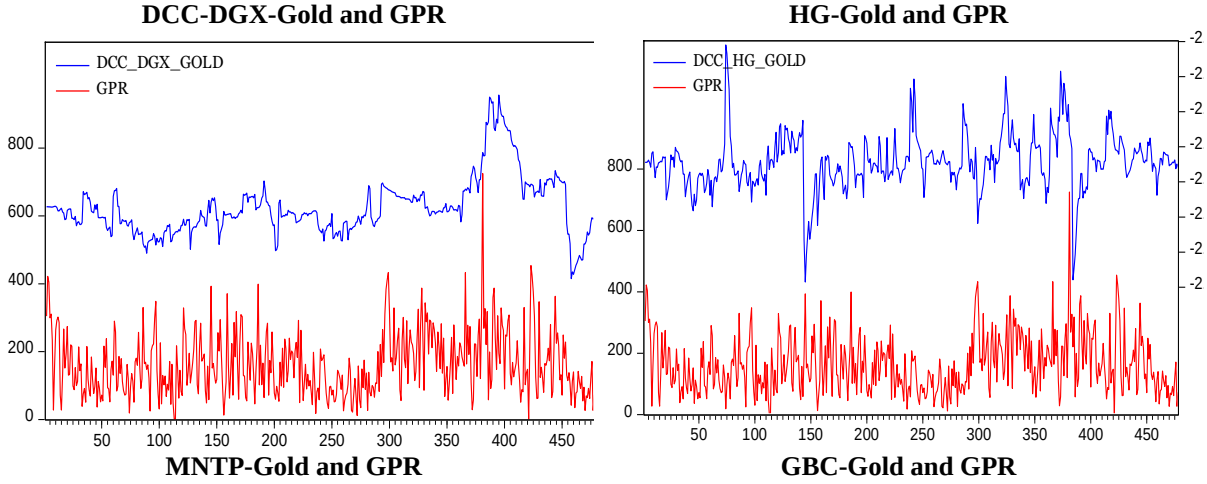
When scrutinizing the Islamic crypto-gold correlations, the estimation results are dissimilar as the estimated parameters of the current and lagged values of the geopolitical risk index in the mean equation turn out to be negative implying that the upsurge of the global geopolitical risk seems to substantially lower the conditional correlation between Islamic cryptocurrency prices and gold prices. This result may be due to the Islamic cryptocurrency trader's sharia believes who are not allowed for intended or unintended speculations based on their perceptions of the geopolitical risk and their own expectations of the gold prices.

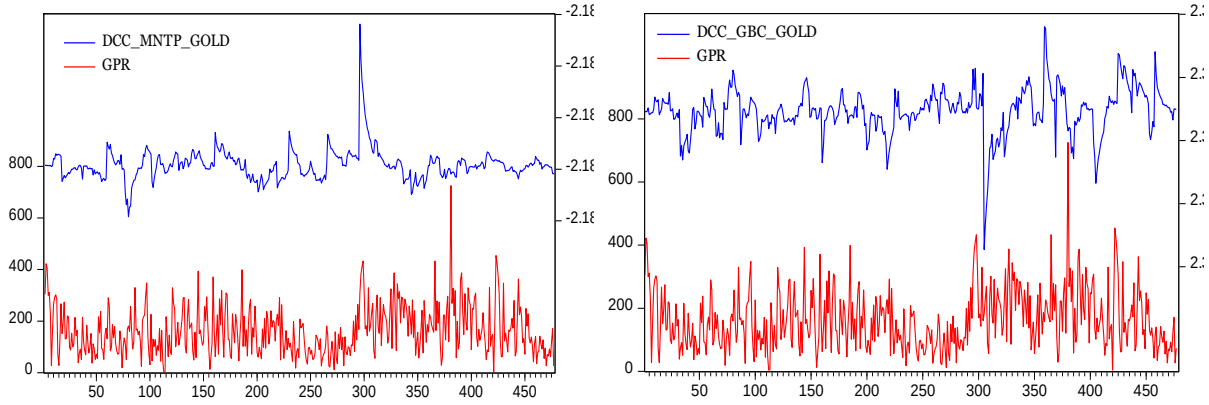
When looking to the effect of the selected GPR events on the DCCs volatilities, we perceive that for all the conventional cryptocurrencies, only the two dummies 4 and 5, corresponding respectively to the US-China trade tensions and the airstrikes on the Saudi energy facilities are influencing the DCCs' conditional variance. The estimated parameters are positively signed and statistically significant indicating the occurrence of these two extreme events are escalating the global geopolitical risk levels, which in turn increases the volatility of the conditional connectedness between the yellow metal prices and the conventional gold-backed cryptocurrencies. Quite similar findings are identified for the sharia compliant cryptocurrencies. These two particular recent global geopolitical risk incidents are increasing the volatility of the conditional correlations over time.

This finding may be explained by the compliance to sharia rules and the behavior of Islamic cryptocurrency traders. Our novel result may pave the way to profounder research on the effect of the compliance to Islamic standard ethics and Islamic investors' perceptions of global risk on their trading strategies and subsequently on gold-backed cryptocurrency dynamics. Fig. 3 reports the time-movement of the conditional correlations and the geopolitical risk index for Islamic and conventional GBC respectively.

Fig 3. The GJR-GARCH-DCCs of gold-backed cryptocurrencies and GPR.

Fig.3a- Conventional GBC and GPR





XAUR-Gold and GPR

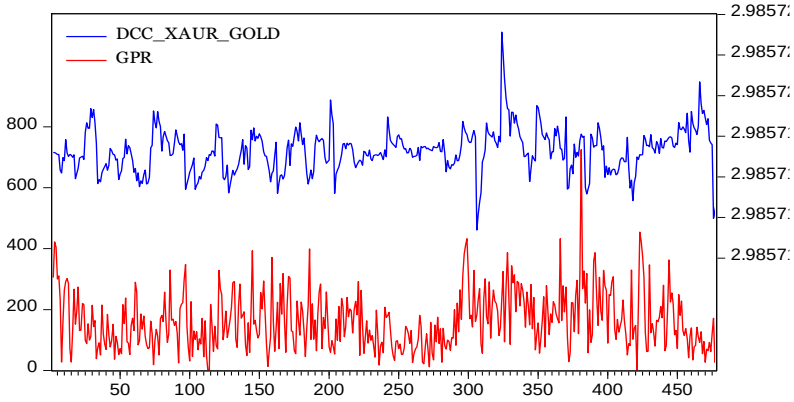
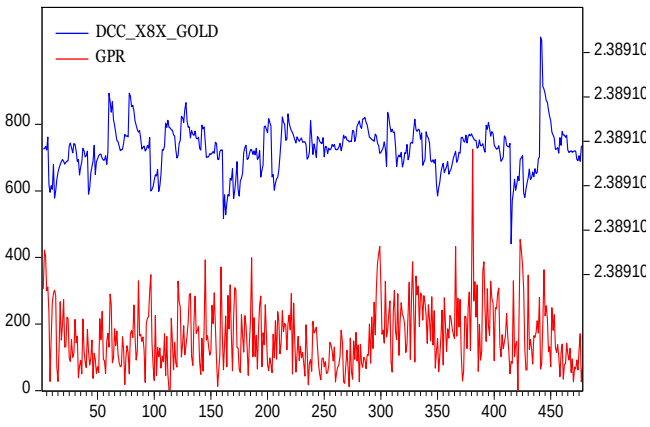
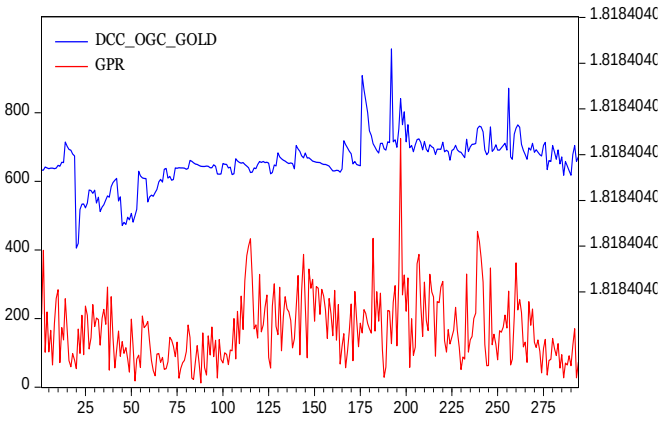


Fig.3b- Islamic GBC and GPR

X8X-Gold and GPR



OGC-Gold and GPR



Note: the DCCs are expressed in 10^{-2}

4. Conclusion

In this paper, we investigate the interactions of the gold-backed Islamic and conventional digital currencies to gold and test the differential impact of the global geopolitical risk on their time-

varying associations. We uncover three foremost results. First, the Islamic gold-backed distinguish themselves from their conventional counterparts in terms of dependence to gold. The Islamic cryptocurrencies are positively correlated to gold while the conventional ones are weakly and negatively correlated with this precious metal. Second, we found that impact of the geopolitical risk on GBC-gold relationship is stronger for conventional cryptocurrencies rather than for their Islamic counterparts. Third, the occurrence of extreme geopolitical risk incidents intensifies the volatility of the correlation. These findings show that the compliance to sharia rules and the pegging to the value of the yellow metal are lowering the sensitivity of Islamic digital currencies to global geopolitical risk. Therefore, digital currency traders as well as portfolio managers are invited to consider these attributes when designing allocating assets and designing their hedging strategies.

We would like to acknowledge that our findings must be considered with caution given the short sample period that is restricted by the data availability since some of the GBC were recently created. Our findings pave the way for further research topics. It would be interesting to cross compare the Islamic and conventional GBCs to the Bitcoin as the most capitalized digital currency and to check whether the Gold-backed can serve as a safe haven asset against the Bitcoin' risk.

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