Precious Metals As A Safe Haven Asset In The Islamic Stock Market

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Abstract

With the recent economic downturns exhibited as a result of the Covid pandemic, this research is developed through the motivation of investment tools that are resistant to negative effects brought about by changes in the economy. This brings out the current research being performed on whether precious metals can act as safe-haven assets in the Islamic stock market through the investigations using Granger causality, Impulse response analysis, stationarity testing as well as exploration of the Vector Autoregressive models to observe and outline the relationship between the precious metals and the Islamic stock indices. Using a substantial dataset that ranges from 1997-2023, the research uses stationary testing to ascertain whether the model is fit to be analysed using the impulse response method. The main concentration however of course would be on the impulse response method as that method tells us the direction of the relationship as opposed to the granger causality approach that outlines whether the relationship is present.

The results suggest that there are causal relationships exhibited between majority of the precious metals and the Islamic stock indices through the use of the Granger causality method. There are some exceptions due to other factors that can affect the relationship such as uncertainty of the length of the pandemic among others. More notably, the impulse response function develops the notion that the precious metals have exhibited safe-haven attributes in the short run during the considered Coronavirus pandemic however overall, a positive relationship was observed during the time period of the dataset.

Keywords: Granger causality; impulse response function; safe haven

INTRODUCTION

With each new coming year, there is evidence of the evolution of the world of finance when taking ever changing investment strategies as well as new products that tend to meet the need of investors into consideration. Recently, financial markets have seen a rise in its own unpredictability and volatility which can be attributed to the recent global and political events causing sharp fluctuations in assets as well as stock prices. In this environment, investors are becoming more concerned about protecting their portfolios against potential losses and are increasingly turning to safe-haven assets as a means of mitigating risk.

Due to their inherent worth, stability and reputation for holding their value through harsh economic times, precious metals including gold and silver have long been seen as safe-haven investments. Precious metals and stock markets have been the subject of extensive research in the past, but the use of a safe-haven asset like precious metals in the Islamic stock index has received less attention. This is especially crucial since Shariah law, which forbids investing in certain sectors of the economy like gambling, alcohol, and tobacco, is followed by investors under the tenets of Islamic finance. Because the Islamic stock index is subject to particular regulatory and other requirements, it is crucial to investigate whether precious metals can function as a feasible safe-haven asset.

The main aim of this thesis is to examine the effectiveness of precious metals as a safe-haven asset in the Islamic stock index and to explore whether said commodities affect not only the world Islamic index however also the Islamic sectoral indices. A safe haven asset is similar to a hedge asset or a diversifier whereas these assets are considered as such if they have a negative correlation with another variable. A safe haven asset however displays a negative correlation with another asset during times of economic downturn. The precious metals that were taken into consideration in this paper are; gold, silver, aluminium, copper and zinc as these metals have intrinsic value as well as real world value i.e they can be used for construction. Specifically, this thesis aims to answer the following research questions: Do precious metals act as a safe-haven asset for Islamic stock index and Islamic sectoral stock indices during times of economic downturn?

The use of safe-haven assets in the context of Islamic finance will be better understood thanks to the contributions made by this thesis. Little research has been done on the use of precious metals in the Islamic stock index, despite the fact that earlier studies have looked at the connection

between precious metals and conventional stock markets. The growing popularity of the Islamic stock index and the particular ethical and legal factors that need to be taken into account when investing in this index make this research especially pertinent. Through the analysis of precious metals' performance as a safe-haven asset within the Islamic stock index, we hope to offer insightful advice to investors looking to manage risk in their holdings while adhering to Shariah law.

There are a variety of empirical studies that have focused on the relationship between precious metals and stock indices. These studies also used numerous methodologies as well as distinct data sets. The range of studies ranged from using base methodologies such as granger causality tests, others were not only focusing on the aforementioned methodology however also focusing on both the long run and short run relationships. This analysis is going to strive to incorporate both ideologies; the simplistic granger causality as well as a bivariate vector autoregressive (VAR) method to allow for the exploration of the short and long run relationship.

Hypothesis

Due to the recent economic downturns brought by war and COVID-19, I predict that gold will be seen to have a more safe-haven relationship with the Islamic indices as gold is used more in portfolios as compared to other precious metals. I also hypothesize that the safe haven property of the metals will be more prevalent in periods during the times of economic downturns due to other economic factors.

Structure of the paper

This paper will consist of 5 more subsections; empirical analysis, data analysis, methodology, result analysis and the conclusion. Firstly, I will go through multiple empirical research papers and explore how the safe haven topic has been interpreted by other authors and use that to find commonalities and discrepancies between my research and research done by other authors to further strengthen my analysis as well as give me a historical perspective of how the variables should interact. Furthermore, the data for this analysis will be presented and will be justified.

The methodology section will cover what models were used and how I came to choosing certain models as well as certain aspects in the models such as the lag length and form of model. Moreover,

the results for each model will be presented and the analysis of said results will be discussed focusing on the vice versa relationship between my variables. Finally, I present my conclusion and further explore how this research will further expound on the previously explored literature as well as the implication that my research will develop.

RESULTS

This section will cover the results of the tests that were performed in the previous section. Moreover, an analysis of said results will also be performed to further understand the topic question.

Unit root testing

Prior to the investigation of the safe-haven relationship between the precious metals and the Islamic indices, an Augmented Dickey-Fuller test is required to be able to ascertain whether the series considered is stationary or not. The series includes both the price level series and the return series. The null hypothesis of the unit root test is that each of the series has a unit root thus making the series non-stationary.

The ADF test has three different tests which are; constant, drift and trend. Due to the price level data being used in this research display upwards and downward trends, the drift and trend test for a unit root are thus required to be performed. The data from the return series also exhibits a condition in which there are no trends nor are there intercepts which allows us to use the constant test. The appropriate lag level required for these test are based on the information criteria and as aforementioned, the information criteria that will be used in this paper will be the Schwartz information criteria.

Table 1.1: Unit root test(ADF) for all variables in terms of price level

	Drift t-statistic	Trend t-statistic
Gold	-0.6743	-2.3114
Silver	-2.1239	-2.4081
Aluminium	-1.7905	-2.1525
Copper	-1.6702	-2.1248
Zinc	-2.3423	-2.4883
DJIM	-0.3508	-1.7984
DJIBSC	-1.8482	-2.6846
DJICYC	-0.8612	-2.1331
DJINCY	-0.4678	-2.3868

| DJIHCR | -0.1281 | -1.0312 |
| DJIFIN | -0.0952 | -1.8292 |

Critical values at 5% level are; -1.95(Constant), -2.86(Drift) and -3.41(Trend)

Critical values at 1% level are; -2.58(Constant), -3.43(Drift) and -3.96(Trend)

H_0= The series does contain a unit root process (non-stationary)

H_a= The series does not contain a unit root process (Stationary)

Firstly, for the series that is in terms of the price level series, it is evident that for the drift test statistic, all variables in the series are higher than the critical values at both the 1% and 5% level thus we fail to reject the null hypothesis of a unit root process. Similarly for the trend process, the values for all variables tested are higher than the 1% and 5% level (-3.96 and -3.41 respectively) thus in this case we also fail to reject the null hypothesis of a unit root process thus showing non-stationarity. This will result in the analysis of the models to be inaccurate. As a result, the price levels cannot be used to analyse the relationship considered therefore the first log difference or the return series needs to be considered and checked whether they are be stationary.

Table 1.2: Unit root test(ADF) for all variables in terms of returns

	Constant t-statistic
Gold	-25.8823
Silver	-25.3891
Aluminium	-26.0197
Copper	-23.6913
Zinc	-25.0158
DJIM	-24.9815
DJIBSC	-25.1766
DJICYC	-25.9863
DJINCY	-24.0672
DJIHCR	-23.6913
DJIFIN	-24.0151

Critical values at 5% level are; -1.95(Constant), -2.86(Drift) and -3.41(Trend)

Critical values at 1% level are; -2.58(Constant), -3.43(Drift) and -3.96(Trend)

H_0= The series does contain a unit root process (non-stationary)

H_a= The series does not contain a unit root process (Stationary)

The ADF test when the data is in terms of returns yielded different results. It is evident that the values of the test statistics are lower than the critical value at a 5% level therefore we reject the null hypothesis of a unit root process. This is also the case at a 1% level as the test statistic is lower than the critical value and similarly we reject the null hypothesis of non-stationarity thus showing that the series using returns can be assumed to be stationary.

In conclusion, the tests applied prior imply that a series that contains variables that use the price level have a unit root thus are said to be a non-stationary process. A series that contains variables that are comprised of returns do not have a unit root and are therefore stationary. This is important for this research as we require a series that is stationary and thus will be using the return series as opposed to the price level series.

DISCUSSION

Granger causality

The relationships between retained precious metals/commodities and Islamic assets are determined by using static as well as dynamic Granger Causality test. The static Granger causality is the base form of a Granger causality model that determines the causality between retained returns series by using the whole dataset. As the causality/relationships between retained precious metals/commodities and Islamic assets may change through time, the Granger Causality test was implemented in different sub-periods as well as by using rolling window method. The rolling window approach uses selected group time periods and analyses the granger causality between each time period however the intervals are differed by a specific time period (which can be said to be rolled over).

Static Granger Causality (whole dataset considered)

The static Granger causality when the whole dataset is considered will be able to show whether there is a relationship between the return series. The Granger causal relationship for the whole dataset was explored from 1997 to 2023.

Table 2.1: Static Granger Causality running from Islamic returns to precious metals

	Gold	Silver	Zinc	Aluminium	Copper
DJIM	0.000097*	0.000000*	0.000000*	0.000000*	0.000000*
DJIBSC	0.000001*	0.000000*	0.000001*	0.000000*	0.000027*
DJINCY	0.045310*	0.000000*	0.000002*	0.000001*	0.000015*
DJICYC	0.000902*	0.000000*	0.000000*	0.000000*	0.000000*
DJIFIN	0.004395*	0.000000*	0.000000*	0.000000*	0.000000*
DJIHCR	0.140700	0.000000*	0.000020*	0.000027*	0.000811*

H_0 = Islamic Indices do not Granger cause precious metals

H_a = Islamic Indices Granger cause the precious metals

Reject if p-value<0.05

(*) denotes a rejection

Viewing the results of table 2.1, it is evident that almost all retained Islamic indices Granger cause the precious metals that is to say that changes in the returns of the Islamic indices cause changes to the returns of the precious metals, except the Dow Jones Index for healthcare which do not Granger cause Gold. Through the result, it is evident that as there is a relationship visible between the Islamic indices and the precious metals.

Table 2.2: Static Granger Causality running from precious metals to Islamic returns

	DJIM	DJIBSC	DJINCY	DJICYC	DJIFIN	DJIHCR
Gold	0.3161	0.3987	0.6869	0.2137	0.0005249*	0.6895
Silver	0.717	0.6994	0.7236	0.9758	0.0248*	0.2157
Zinc	0.9207	0.1614	0.2526	0.8288	0.05226	0.02311*

| Aluminium | 0.1639 | 0.7597 | 0.4238 | 0.09607 | 0.2128 | 0.002916* |
| Copper | 0.7698 | 0.003452 | 0.4487 | 0.2126 | 0.06529 | 0.003762* |

H_0 = *Precious metals do not granger cause Islamic indices*

H_a = *Precious metals granger cause the Islamic indices*

Reject if p-value<0.05

(*) denotes a rejection

The results of the vice versa aforementioned test are outlined by table 2.2, however. This table indicates that all of the precious metals do not Granger cause most of retained Islamic indices. Gold and silver are shown to Granger cause the Dow jones Islamic financial sectoral index and the other precious metals are shown to Granger cause the Dow Jones Islamic Healthcare sectoral index.

There is then a bidirectional causality between the return of Gold/Silver and the Dow jones Islamic financial sectoral index return and a unidirectional causality running from other retained Islamic index return toward the Gold/Silver return.

Similarly, a bidirectional causality is observed between Zinc/Aluminium/Copper and the Dow Jones Islamic Healthcare sectoral index return. By contrast, a unidirectional causality running from the return of other retained Islamic index return toward Zinc/Aluminium/Copper return is observed.

It is not easy to analyse whether an asset or a commodity is a hedge or a safe-haven based on Granger Causality test. Indeed, the Granger causality test gives information on just whether X causes Y. If a commodity does not Granger cause an Islamic index and the Islamic index does not cause the commodity then these both assets can be a good diversifier for each other. If an Islamic index Granger causes a commodity/precious metal then we cannot interpret this result in term of hedging and safe-haven as we do not know the sign of the causality.

To ascertain their ability to be a hedging asset, an impulse response test will have to be carried out to determine the direction of the relationship.

Granger Causality during sub-periods

As written previously, the relationship between financial series may change through time and mainly may be different during stable and unstable periods. The unstable/crisis period observed for this analysis is the COVID-19 pandemic. For the purpose of this research, the Covid-19 pandemic was split into two groups being the phase 1 group and the phase 2 group. The phase 1 group spanned from when the first case of the virus was reported until there was a worldwide lockdown (all countries underwent lockdown) was established so that is between December 12th 2019 to March 31st 2020. The second phase of Covid spanned for the duration of the lockdown which is from April 1st 2020 to 31st October 2021. Both phases of the pandemic were considered in the analysis. The difference between the phases of the Covid lockdown is that phase 2 Covid was at a period where there was no work being done and income was reduced. As a result, spending and investment as well as manufacturing was down which could negatively affect the precious metals as opposed to phase 1 where there was no lockdown considered however the uncertainty of the pandemic could also affect the precious metals.

Empirical results obtained for the first phase

Table 2.3.1: Static Granger Causality running from precious metals to Islamic returns (Covid-19 Phase 1)

	DJIM	DJIBSC	DJINCY	DJICYC	DJIFIN	DJIHCR
Gold	0.1054	0.1464	0.3132	0.2111	0.008935*	0.04514*
Silver	0.0164*	0.2188	0.009563*	0.9296	0.01517*	0.04501*
Zinc	0.6029	0.2146	0.6025	0.4087	0.6527	0.9455
Aluminium	0.6517	0.3025	0.8138	0.3031	0.3649	0.2818
Copper	0.8303	0.589	0.6862	0.6753	0.7381	0.6164

H_0 = Precious metals do not granger cause Islamic indices

H_a = Precious metals granger cause the Islamic indices

Reject if p-value<0.05

(*) denotes a rejection

The results of the phase 1 denote that some of retained precious metals (Zinc, Aluminium, Copper) do not Granger cause retained Islamic markets as we see the p-values are higher than the critical value thus concluding that the null hypothesis should not be rejected. Regarding Silver, it Granger causes the return of most of retained Islamic assets, except the return of DJIBSC and DJICYC. As for gold, it Granger causes the finance and the healthcare sectoral Islamic stock indices.

Table 2.3.2: Static Granger Causality running from Islamic returns to the precious metals (Covid-19 Phase 1)

	Gold	Silver	Zinc	Aluminium	Copper
DJIM	0.6138	0.989	0.177	0.602	0.6352
DJIBSC	0.9731	0.7265	0.5449	0.8649	0.2326
DJINCY	0.6973	0.8983	0.3258	0.89	0.3999
DJICYC	0.002155*	0.92	0.1182	0.9525	0.9203
DJIFIN	0.2144	0.2498	0.8995	0.3212	0.479
DJIHCR	0.2733	0.8708	0.2442	0.6272	0.5089

H_0 = Islamic indices do not granger cause Precious metals

H_a = Islamic indices granger cause the Precious metals

Reject if p-value<0.05

(*) denotes a rejection

Looking at table.2.3.2, when it comes to the reverse relationship, granger causality of the Islamic indices to the precious metals, they are insignificant as their p-values are higher than 0.05 which implies that the null hypothesis should not be rejected and thus showing that there is no ganger causal relationship between the Islamic indices and a majority of the precious metals, except for the causality running from DJICYC toward Gold.

In sum, the Granger causality between the return of Zinc/Aluminium/Copper and the return of Islamic indices are not statistically significant during the first phase. These results indicate that these precious metals and Islamic indices were diversifier/hedge to each other.

Regarding the causalities between the Gold return and retained Islamic index's returns, they are almost insignificant, except the causality running from Gold return towards the Islamic financial and Healthcare sectoral stock indices and the causality running from DJICYC index return toward Gold return. Apart these exceptions, Gold and other retained Islamic indices acted as diversifier/hedge to each other.

Empirical results obtained for the second phase

Table 2.4: Static Granger Causality running from Precious metals to Islamic returns (Covid-19 Phase 2)

	DJIM	DJIBSC	DJINCY	DJICYC	DJIFIN	DJIHCR
Gold	0.00003*	0.000015 *	0.002431 *	0.000065 *	0.000000435 *	0.0009808*
Silver	0.002588 *	0.002964 *	0.02502*	0.000866 *	0.000008724 *	0.000008724*
Zinc	0.3283	0.5683	0.2611	0.1735	0.3708	0.09175
Aluminium	0.235	0.1381	0.9887	0.1461	0.8467	0.1577
Copper	0.2577	0.1476	0.27	0.09799	0.7307	0.3293

H_0 = Precious metals do not granger cause Islamic indices

H_a = Precious metals granger cause the Islamic indices

Reject if p-value<0.05

(*) denotes a rejection

The results show that gold and silver have p-values that is lower than 0.05 for all the Islamic indices (sectoral included) so as a result the null hypothesis is rejected. This implies during the COVID-19 period, changes in the returns of gold and silver granger cause the changes in the returns of the Islamic indices. Zinc, aluminium and Copper however have p-values that are greater than 0.05 for all indices observed therefore we fail to reject the null hypothesis. This again signifies that changes in the returns of the other precious metals (Gold and Silver not included) do not granger cause the changes in returns of the Islamic indices hence developing the idea that zinc, aluminium and copper can be good safe-haven assets in a portfolio that consists of Islamic indices.

With the lockdown and uncertainty of the secondary lockdowns, it is evident that the intrinsic precious metals start losing their safe-haven attributes as investors were worried on the length of the lockdowns and whether further outbreaks will occur and negatively affect the market again.

Table 2.4.2: Static Granger Causality running from Islamic index returns to the precious metals (Covid-19 Phase 2)

	Gold	Silver	Zinc	Aluminium	Copper
DJIM	0.2628	0.5023	0.008839*	0.1307	0.632
DJIBSC	0.09676	0.6421	0.006648*	0.1101	0.1212
DJINCY	0.6174	0.8774	0.01892*	0.1479	0.8927
DJICYC	0.5239	0.1829	0.00708*	0.07404	0.2179
DJIFIN	0.5542	0.07783	0.1515	0.5899	0.9954
DJIHCR	0.4462	0.06997	0.03652*	0.7073	0.6558

H_0 = Islamic indices do not granger cause Precious metals

H_a = Islamic indices granger cause the Precious metals

Reject if p-value<0.05

(*) denotes a rejection

Table 2.4.2 shows the granger causal relationship between the Islamic indices and the precious metals during the phase 2 of the pandemic. The Islamic indices have a value that is not less than 0.05 thus the null hypothesis again is not rejected and the conclusion is that there is still a possibility for the Islamic indices to be a safe haven asset for majority of the metals. For zinc however, every Islamic index apart DJIFIN, has a value that is not greater than 0.05 thus we reject the null hypothesis and conclude that there is no possibility of the Islamic indices not having a granger causal relationship.

In sum, the obtained results reveal a unidirectional causality running from the returns of Gold and Silver toward the return of retained Islamic financial stock indices. The causalities between aluminium and copper returns and the Islamic index returns are not statistically significant. Finally, a significant unidirectional causality from Islamic returns toward zinc return can be observed, except for the financial stock index.

Dynamic Granger Causality

Granger causality test was implemented by using a 750-rolling between retained precious metals and the Islamic indices over the 25 year period.

The null hypothesis of the dynamic Granger causality is the same as the static granger causality;

H_0: Precious metals do no granger cause Islamic index.

H_a: Precious metals do granger cause Islamic index.

Similarly

H_0: Islamic return does not granger cause Precious metal return.

H_a: Islamic return does granger cause Precious metal return.

Fig. 1-5. represent the estimated p-values of the Granger causality running from X to Y (*p-value_X_to_Y*) as well the critical level of 5%=0.05. If the estimated p-value<0.05 then reject Ho of no Granger causality and if p-value>0.05 accept Ho of no Granger causality.

The obtained causalities plotted in Figure 1 indicate that for majority of the time period, the p-value for gold exhibited through all the Islamic Index returns is greater than the critical value which indicates that there is a need to not reject the null hypothesis. This concludes that for majority of the time period observed, gold has no granger causal relationship with the Islamic indices. There are however some instances that the p-value of the gold on the Islamic index returns is lower than the critical value which leads to a rejection of the null hypothesis and conclude that there is a causal relationship between gold and the Islamic indices. These periods where a causality is observed coincide with periods of time where there are downturns in the economy for example the European subprime crisis and the Covid-19 pandemic. Further testing is required to determine the direction of the relationship to ascertain whether the precious metal is a safe-haven asset. Observing the gold price level graphs in Appendix in comparison to the Islamic index graphs, the gold curve is showing a similar trend with the Islamic index curves indicating a positive relationship however during the European subprime crisis, the show a decrease in the price level whilst the gold curve shows an increase indicating that during the economic crisis there was a negative relationship

affirming the results of the dynamic granger causality. During the Covid pandemic period however there was an overall positive relationship showing that gold could be a weak safe-haven asset. Looking at the vice-versa relationship between the Islamic index returns and gold returns, the Islamic indices such as the world market, the basic market and the consumer service, shows a granger causal relationship for approximately the first half of the time period however for the rest of the time period there is no causal relationship observed. For the financial, consumer goods and healthcare indices, the only time period where a granger causal relationship is observed is during the Subprime crisis indicating a possible safe-haven attribute.

The results for silver are very similar to the results observed in the gold dynamic granger causality test. The causal relationship between silver and the Islamic indices are only observed during the crisis periods mentioned before whilst for the rest of the time period, the p-value is higher than the critical value which shows that there is no granger causality between the two variables. The causal relationship between the Islamic Indices and silver however was very prevalent during the crisis for all the index returns as opposed to the results for gold showing that there is a significant relationship between Islamic index returns and silver only during the crisis periods. The silver price level graph again showed a similar trend to the gold curve when comparing it with the Islamic indices curves where there was an overall positive relationship however during the 2008 crisis there was a negative relationship further portraying a possible safe-haven attribute.

Regarding the relationship with Zinc return, the results of the causality testing were very different when compared to the previous two metals. When observing the relationship between zinc and the Islamic indices, there was almost no causality evident as the p-value was almost always higher than the critical value. The only exceptions were the healthcare and the finance Islamic index returns that exhibited causal relationships during the economic crises. The relationship between the Islamic index returns and zinc however displayed a more prolonged causal relationship evident by the p-value being lower than the critical value during the 2008 crisis and the Covid pandemic crisis. Furthermore, zinc exhibits a sharp contrast during the 2008 crisis when exploring the price level curves. Alongside the 2008 crisis, during the latter stages of Covid, Zinc also exhibited a negative relationship with the Islamic index price level curves indicating that zinc has a possibility to be a strong safe-haven asset pending further testing.

Finally, Aluminium and Copper showed very similar results. The p-values seen in the two metals' causality test with the Islamic index returns majorly exhibited higher values than the critical values thus concluding that the null hypothesis should not be rejected and that there is no causal relationship between the two variables. The only exception to this observation is seen where aluminium shows a causal relationship with the Islamic healthcare index during the Covid period and copper with the Islamic finance index during the years 2002-2007. The vice versa relationship between the Islamic indices and aluminium shows that the p-value is lower than the critical value indicating that there is no relationship between the two variables during different time periods and not specific during times of economic crises. The Islamic indices and copper only showed no relationship during the subprime period with exception to the basic market Islamic index. Moreover, the price level graphs in Appendix for aluminium and copper exhibited very similar trends to the zinc curves in that there was a negative relationship evident during both times of crises (European subprime and Covid) indicating that all non-intrinsic metals have a possible strong safe-haven attribute.

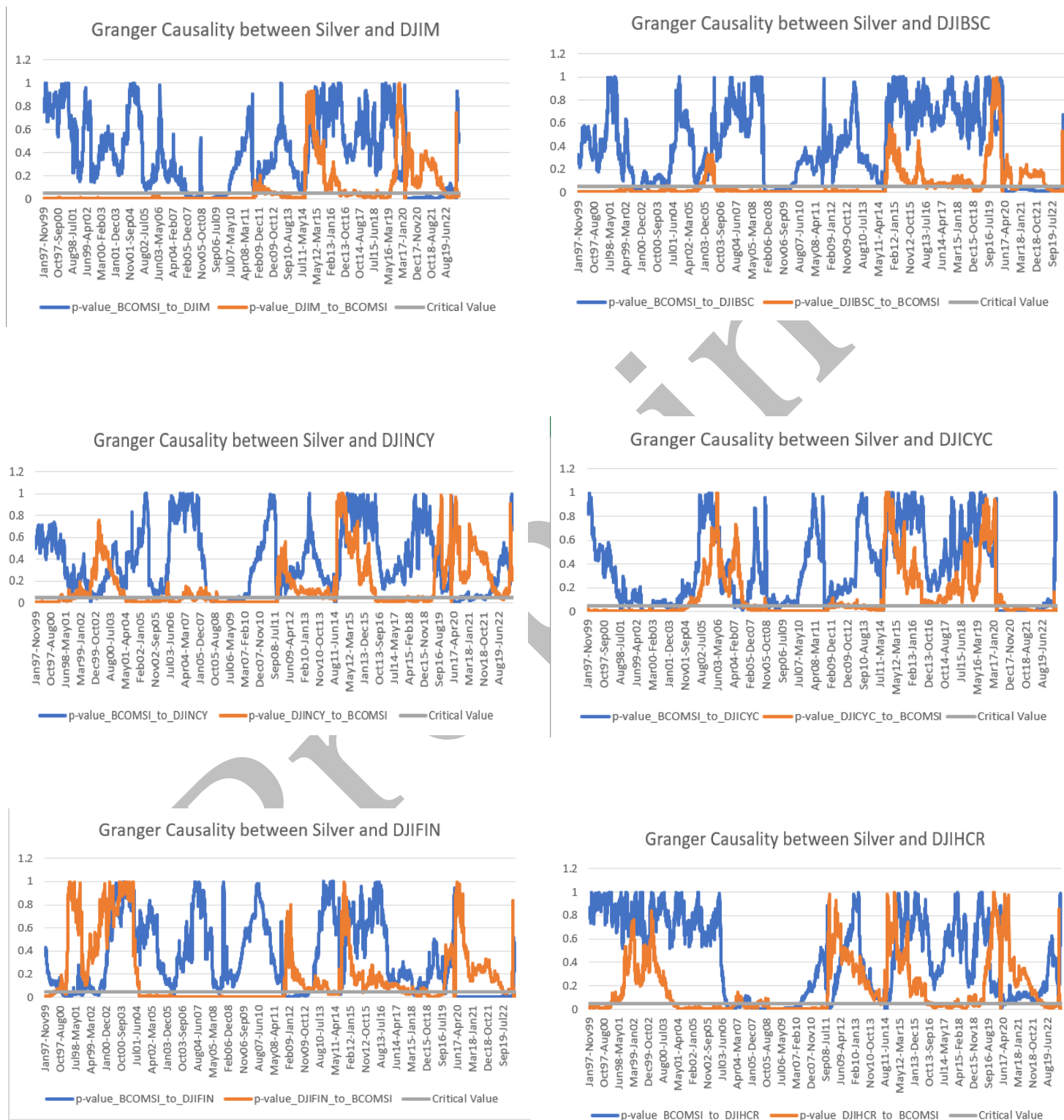## *Fig.1.1: Dynamic Granger Causality between Gold and Islamic Indices*
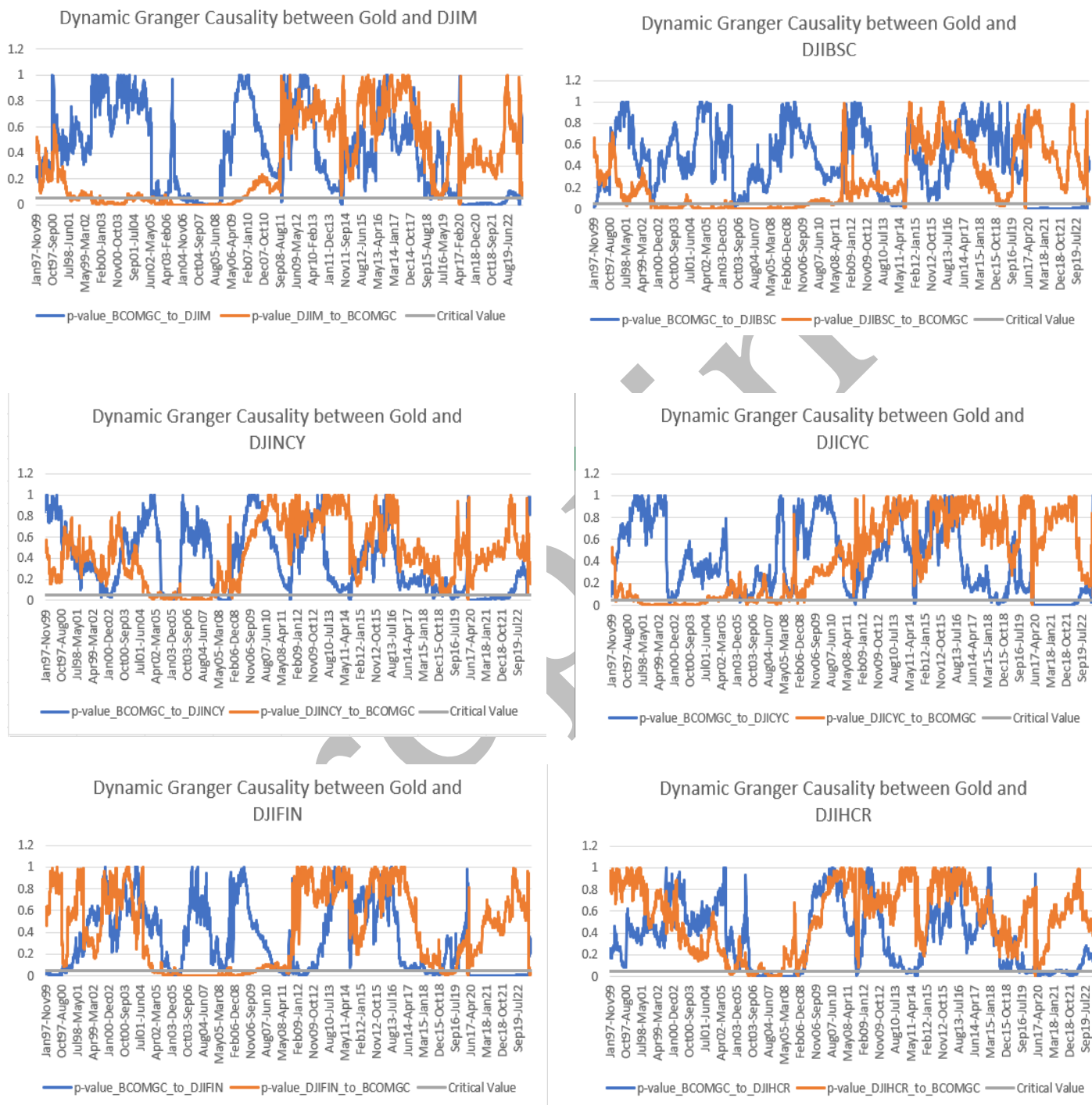
Dynamic Granger Causality between Gold and DJIM

Dynamic Granger Causality between Gold and DJIBSC

Dynamic Granger Causality between Gold and DJINCY

Dynamic Granger Causality between Gold and DJICYC

Dynamic Granger Causality between Gold and DJIFIN

Dynamic Granger Causality between Gold and DJIHCR

Fig.1.2: Dynamic Granger Causality between Silver and the Islamic Indices

Granger Causality between Silver and DJIM

Granger Causality between Silver and DJIBSC

Granger Causality between Silver and DJINCY

Granger Causality between Silver and DJICYC

Granger Causality between Silver and DJIFIN

Granger Causality between Silver and DJIHCR

Fig 1.3: Dynamic Granger Causality between Zinc and Islamic Indices
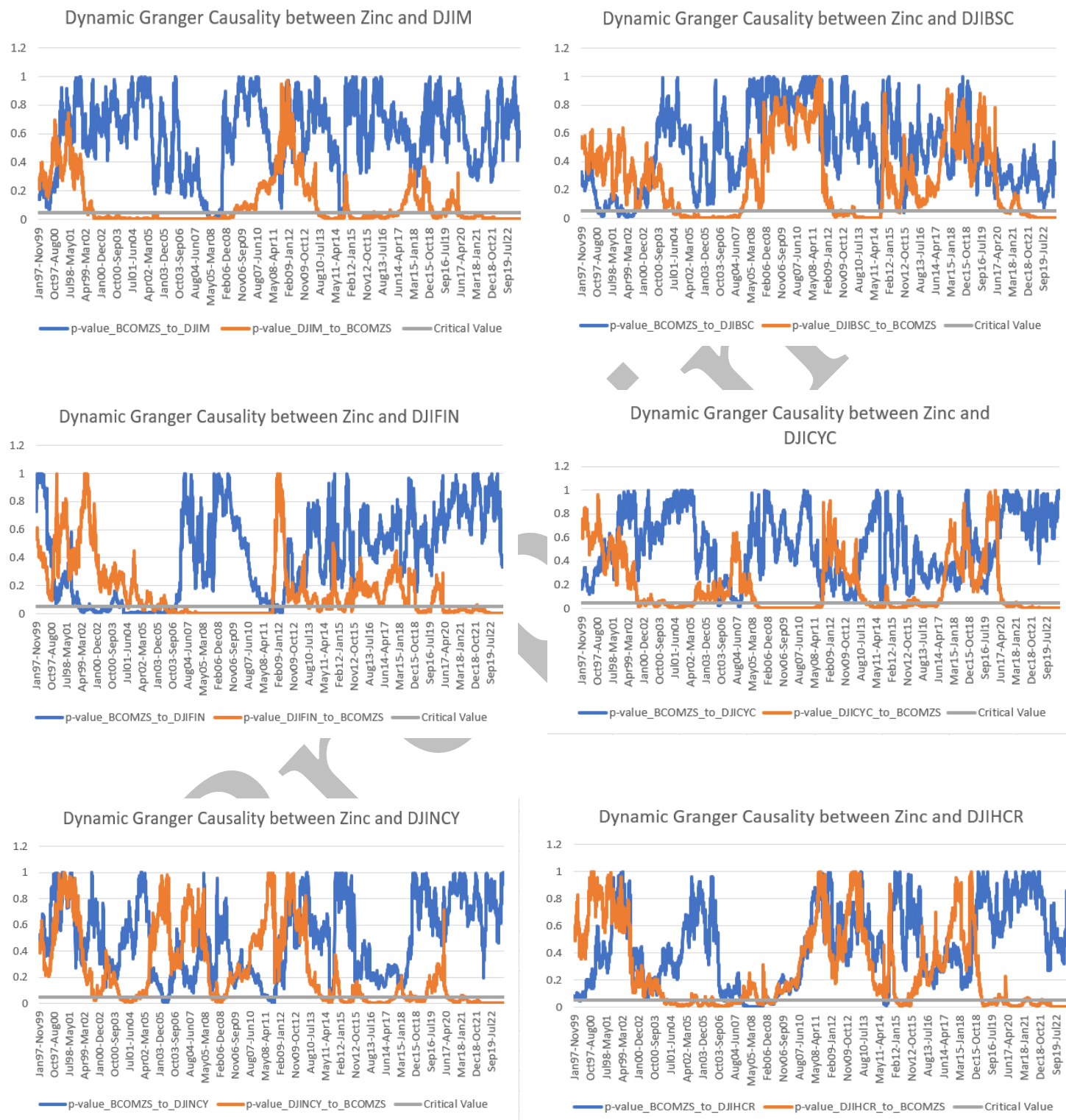
Dynamic Granger Causality between Zinc and DJIM

Dynamic Granger Causality between Zinc and DJIBSC

Dynamic Granger Causality between Zinc and DJIFIN

Dynamic Granger Causality between Zinc and DJICYC

Dynamic Granger Causality between Zinc and DJINCY

Dynamic Granger Causality between Zinc and DJIHCR

Fig 1.4: Dynamic Granger Causality between Aluminium and Islamic Indices
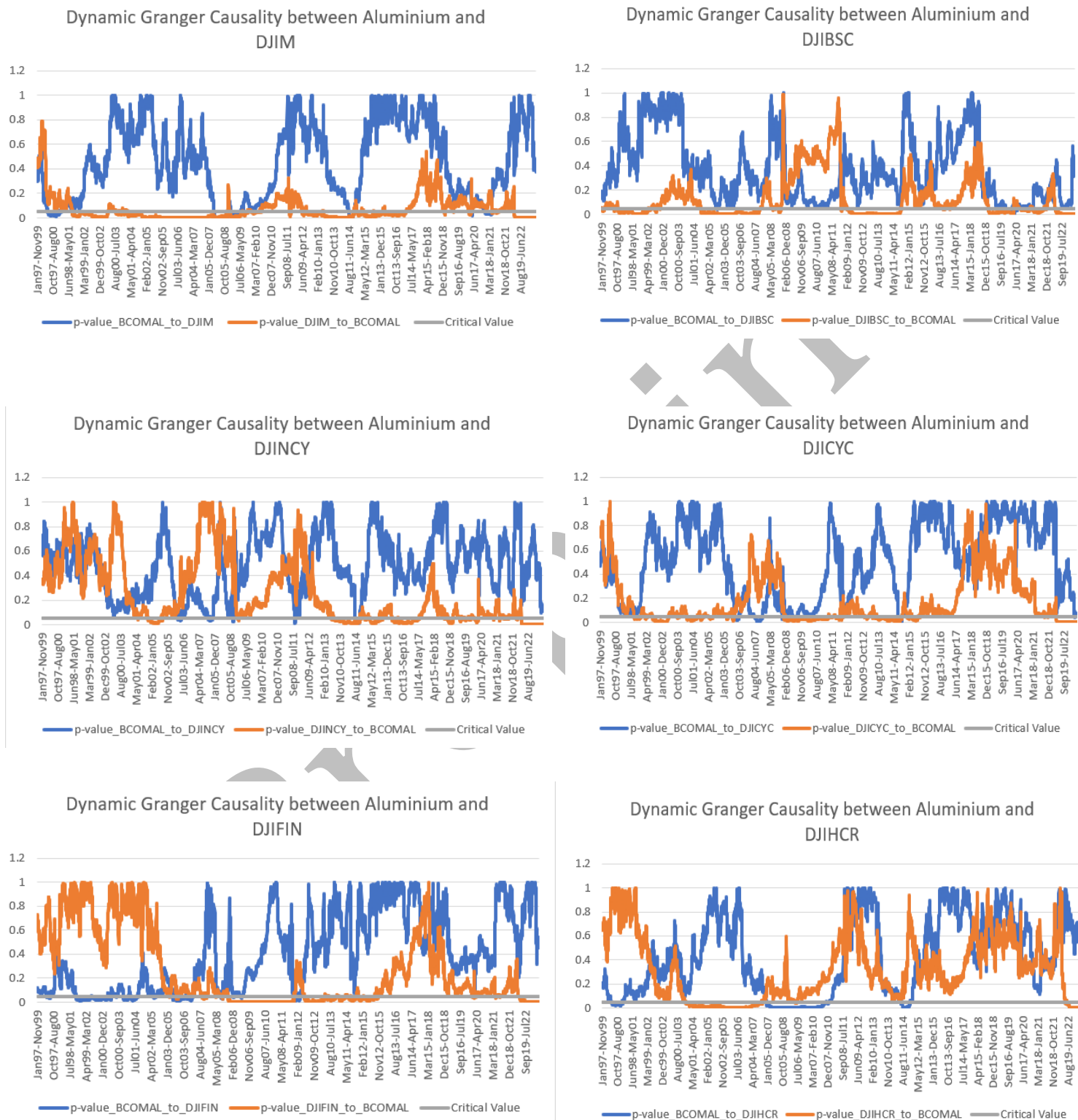
Dynamic Granger Causality between Aluminium and DJIM

Dynamic Granger Causality between Aluminium and DJIBSC

Dynamic Granger Causality between Aluminium and DJINCY

Dynamic Granger Causality between Aluminium and DJICYC

Dynamic Granger Causality between Aluminium and DJIFIN

Dynamic Granger Causality between Aluminium and DJIHCR

Fig 1.5: Dynamic Granger Causality between Copper and Islamic Indices

Dynamic Granger Causality between Copper and DJIM

Dynamic Granger Causality between Copper and DJIBSC

Dynamic Granger Causality between Copper and DJINCY

Dynamic Granger Causality between Copper and DJICYC

Dynamic Granger Causality between Copper and DJIFIN

Dynamic Granger Causality between Copper and DJIHCR
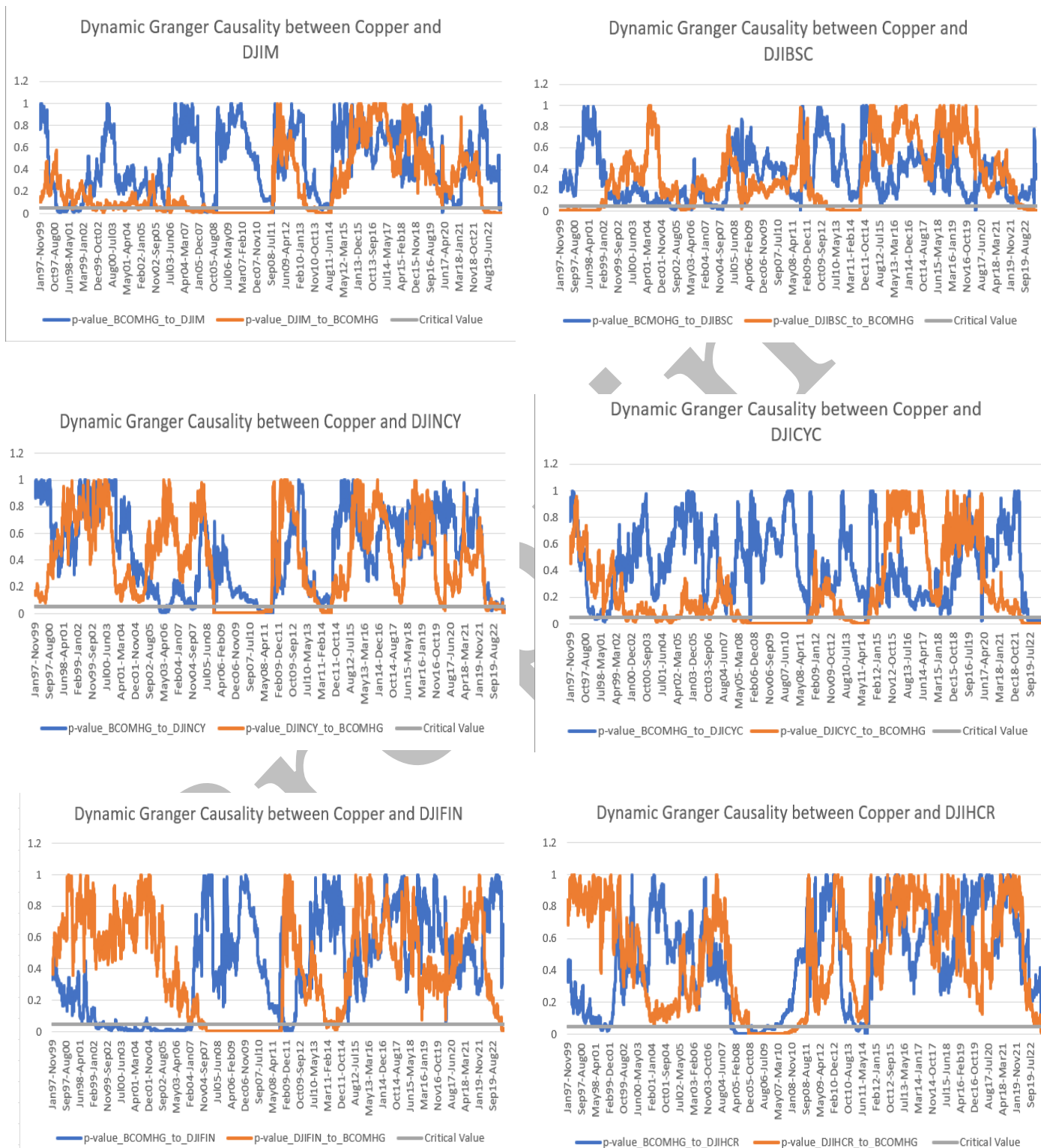
Impulse Response Function

To further ascertain the safe-haven attributes of the precious metals, the impulse response function (IRF) is used as the direction of the relationship observed from the Impulse response function will be able to determine the safe haven ability or lack thereof of the precious metals. The data considered for the impulse response function is similar to the static granger causality for the phase 1 and phase 2 Covid-19 stages however now the IRF incorporates both phase 1 and phase 2 to outline the overall effect in the shocks of the variables during the financial crisis period.

As said earlier, if a positive shock on the Islamic index has a positive impact on the precious metal's return, then the metal is neither a diversifier nor a safe haven for the Islamic index. However, if a positive shock on the Islamic index has a negative impact on the precious metals then the precious metal can either be considered a diversifier or a safe haven depending on if the economy is stable and not stable respectively. If a negative shock on the Islamic index negatively impacts the return on the precious metals, the metals cannot be considered a safe haven nor a diversifier. Similarly, if a negative shock impacts the precious metals in a positive manner then the precious metal can be considered a safe haven or a diversifier.

Gold's results were very interesting when comparing it to the results of other tests. When looking at the graphs depicting the gold results, there is evidence that for the four stock indices; DJIM, DJIBSC, DJINCY and DJICYC, that shocks of gold have a positive relationship to these Islamic indices over the Covid period. An increase in the shocks of gold would lead to either increases or decreases in the Islamic indices however the result is a permanent positive change and therefore in the financial crisis period, gold is not a safe haven asset for the aforementioned Islamic indices. This can be explained again by the uncertainty of the lockdowns exhibited during the period. On the contrary, for the two indices of DJIFIN and DJIHCR, gold is seen to have a positive relationship as well as a negative relationship. There is no permanent relationship examined in the two graphs and this shows that at some period there is no relationship between gold and the two Islamic indices and thus gold exhibits a short term safe-haven attribute for the finance and the healthcare indices.

Silver develops a similar trend to gold in that for two of the indices; DJICYC and DJINYC, there is a permanent positive relationship between silver and the indices showing that it is not a safe-haven asset for the indices however for the other 4 indices, DJIM, DJIBSC, DJIFIN and DJIHCR,

there is a majority positive relationship however there are periods where the relationships are negative and thus silver can act as a safe-haven asset for the 4 Islamic indices however only on a short term basis.

Zinc on the other hand portrays a contradictory result to prior results. In the prior result, Zinc was shown to not have correlation with the Islamic indices showing that it acts as a safe haven asset for the Islamic indices. The Impulse response function however shows that for DJINCY and DJIBSC, there is a relationship between zinc and the Islamic indices and even for the other Islamic indices observed, there are instances where a positive relation is evident. The indication of zinc being a short term safe-haven asset again is attributed to uncertainty in the market in terms of lockdown and production.

Aluminium and copper share very similar trends in that they start off at a positive relationship between the metals and the Islamic indices however they develop a negative relationship as time progresses. This can be clarified by the idea that at the start of the Covid pandemic period, there was an indication that there was an economic slowdown for not only aluminium and copper, the other precious metals considered in this paper. As time progressed and the economy started improving (however still in a crisis period), the demand for these metals started improving and thus led to attaining a higher safe-haven asset value. The exception to this is the index DJICYC for both aluminium and copper where the relationship is negative the whole covid period considered thus indicating that both metals are safe haven assets for that particular index.

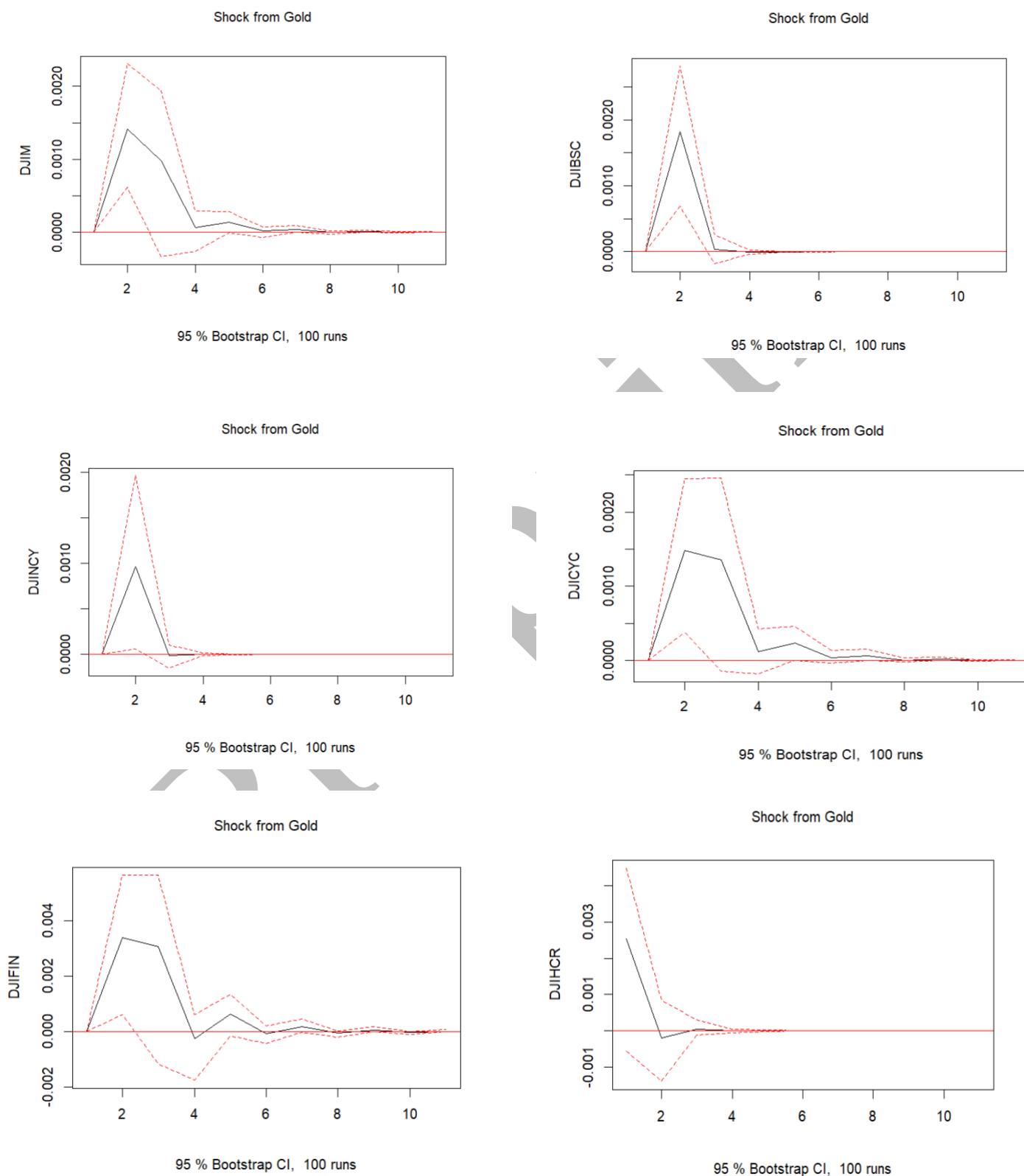## *Fig.2.1: Impulse response of Islamic Indices on shocks from Gold*

Shock from Gold

95 % Bootstrap CI, 100 runs

Shock from Gold

95 % Bootstrap CI, 100 runs

Shock from Gold

95 % Bootstrap CI, 100 runs

Shock from Gold

95 % Bootstrap CI, 100 runs

Shock from Gold

95 % Bootstrap CI, 100 runs

Shock from Gold

95 % Bootstrap CI, 100 runs

Fig.2.2: Impulse response of Islamic Indices on shocks from Silver
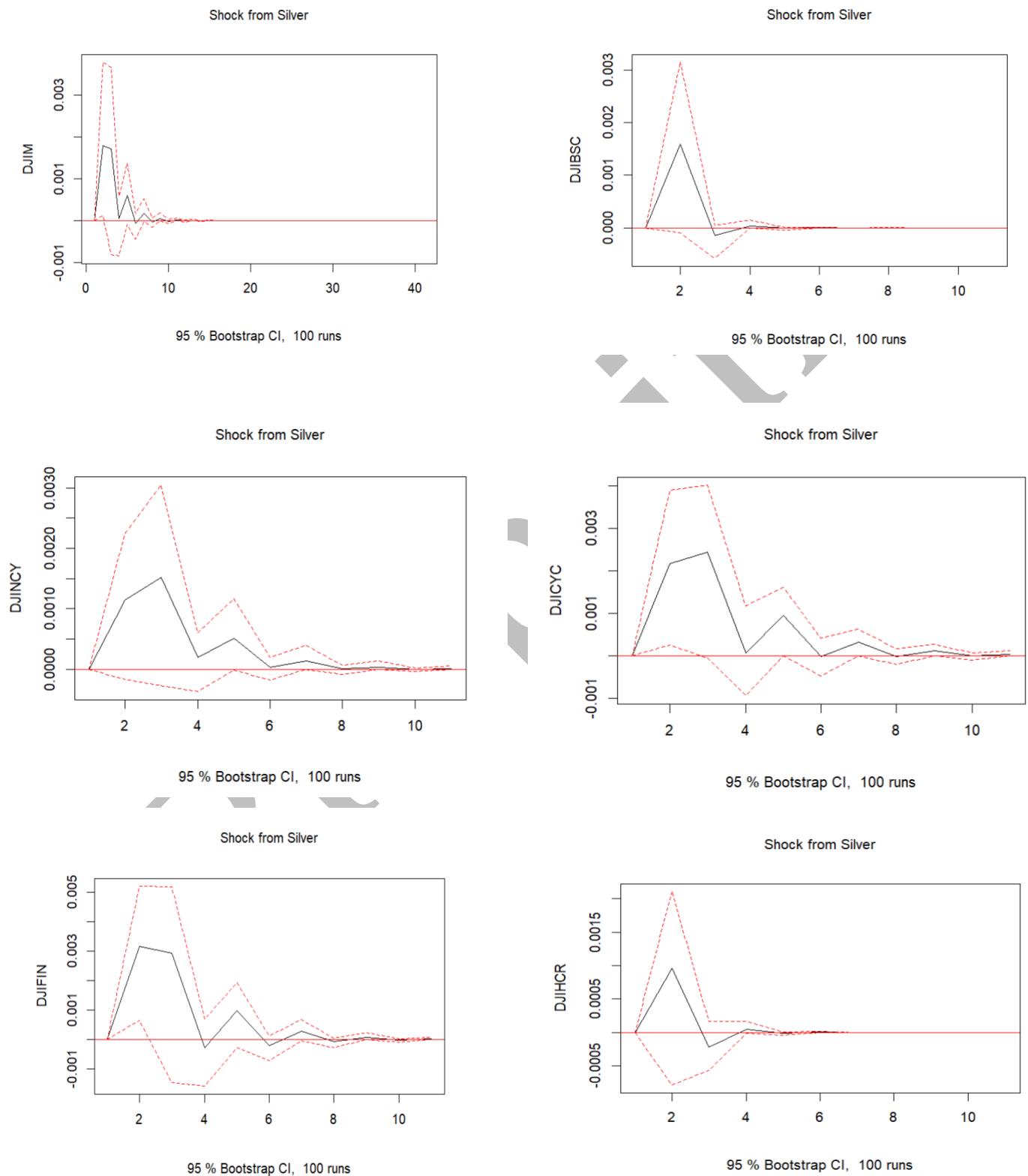
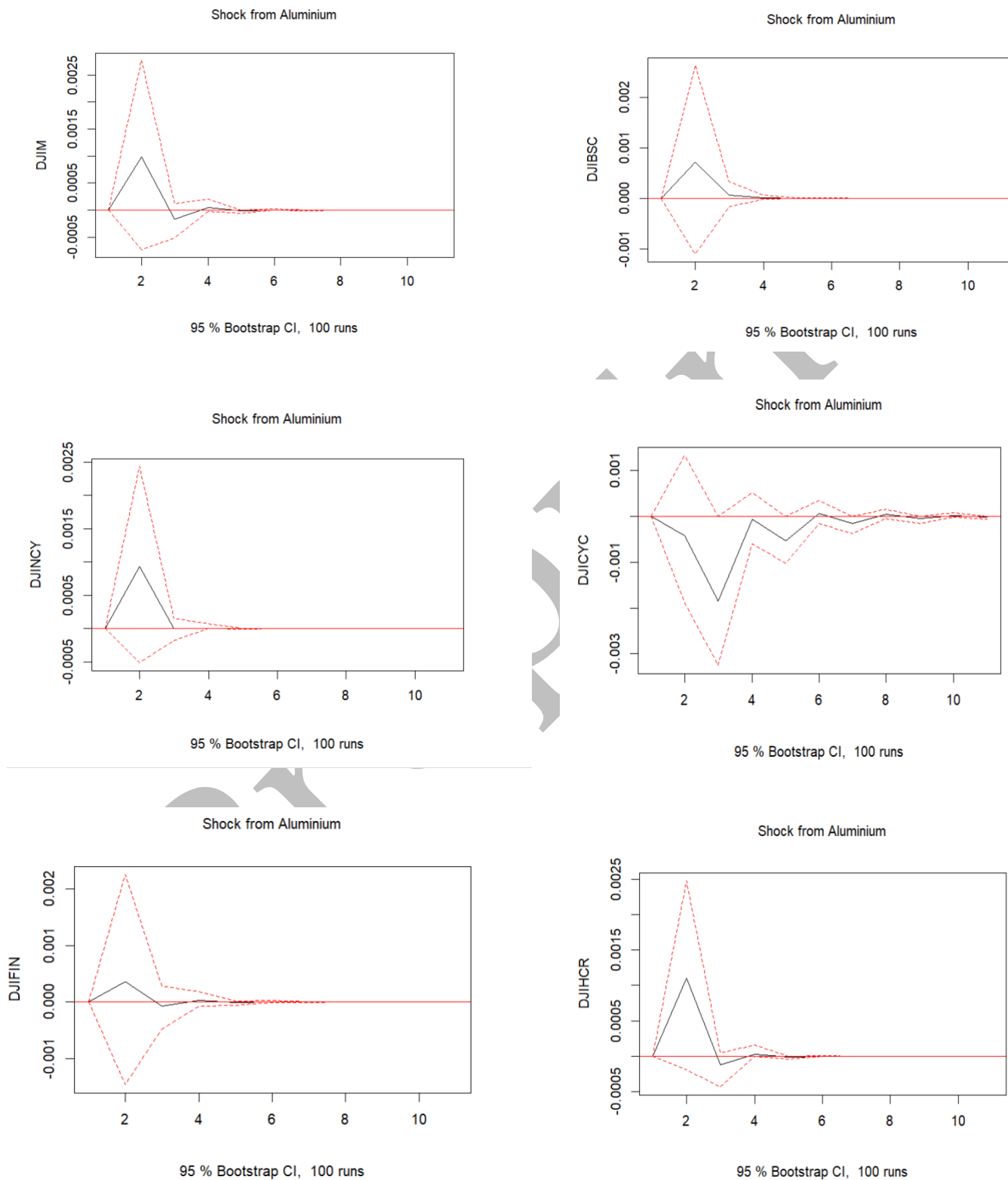## Fig.2.3: Impulse response of Islamic Indices on shocks from Zinc

Shock from Zinc

DJIM

95 % Bootstrap CI, 100 runs

Shock from Zinc

DJIBSC

95 % Bootstrap CI, 100 runs

Shock from Zinc

DJINCY

95 % Bootstrap CI, 100 runs

Shock from Zinc

DJICYC

95 % Bootstrap CI, 100 runs

Shock from Zinc

DJIFIN

95 % Bootstrap CI, 100 runs

Shock from Zinc

DJIHCR

95 % Bootstrap CI, 100 runs
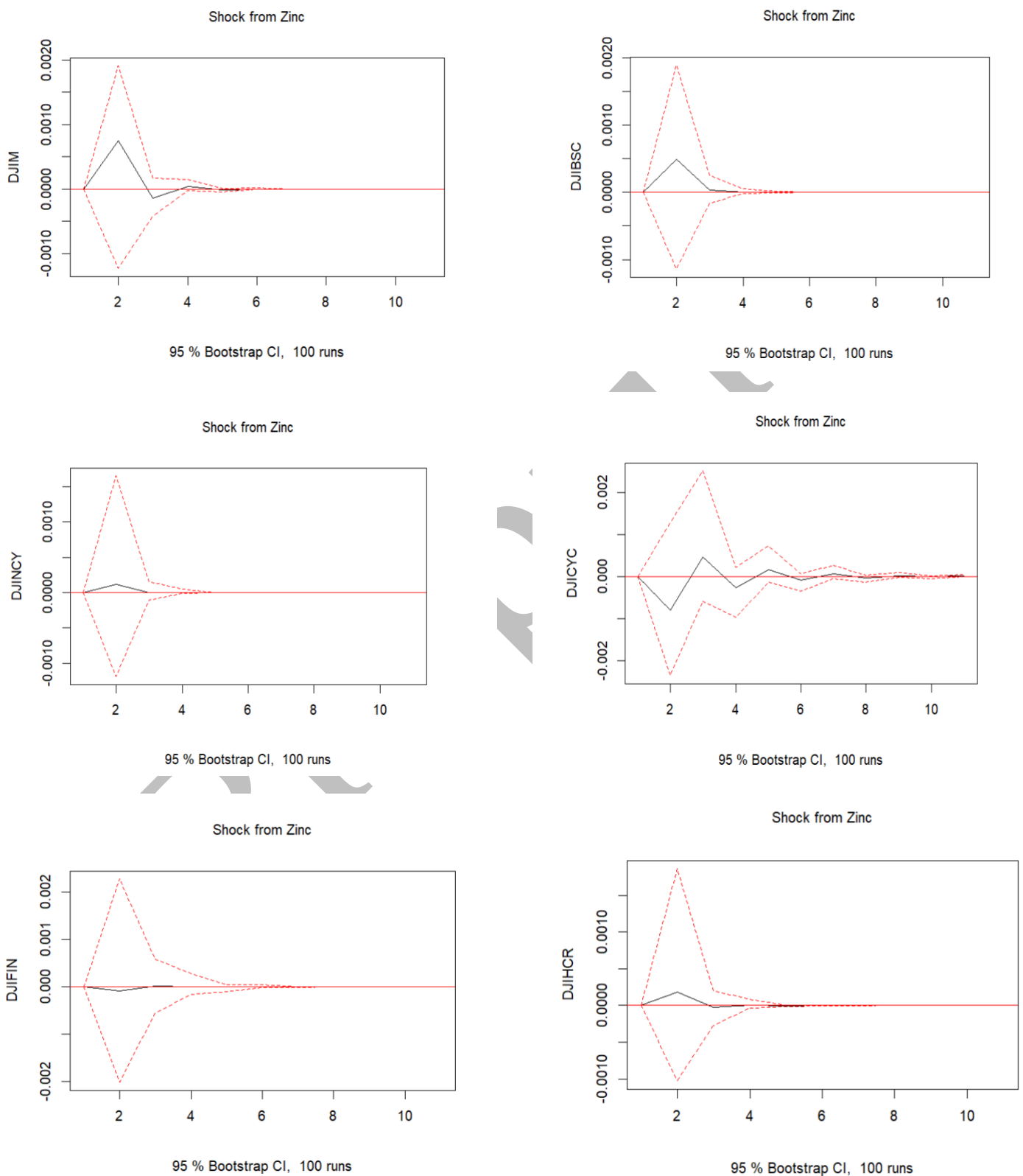
Fig.2.4: Impulse response of Islamic Indices on shocks from Aluminium

Fig.2.5: Impulse Response of Islamic indices on shocks from Copper
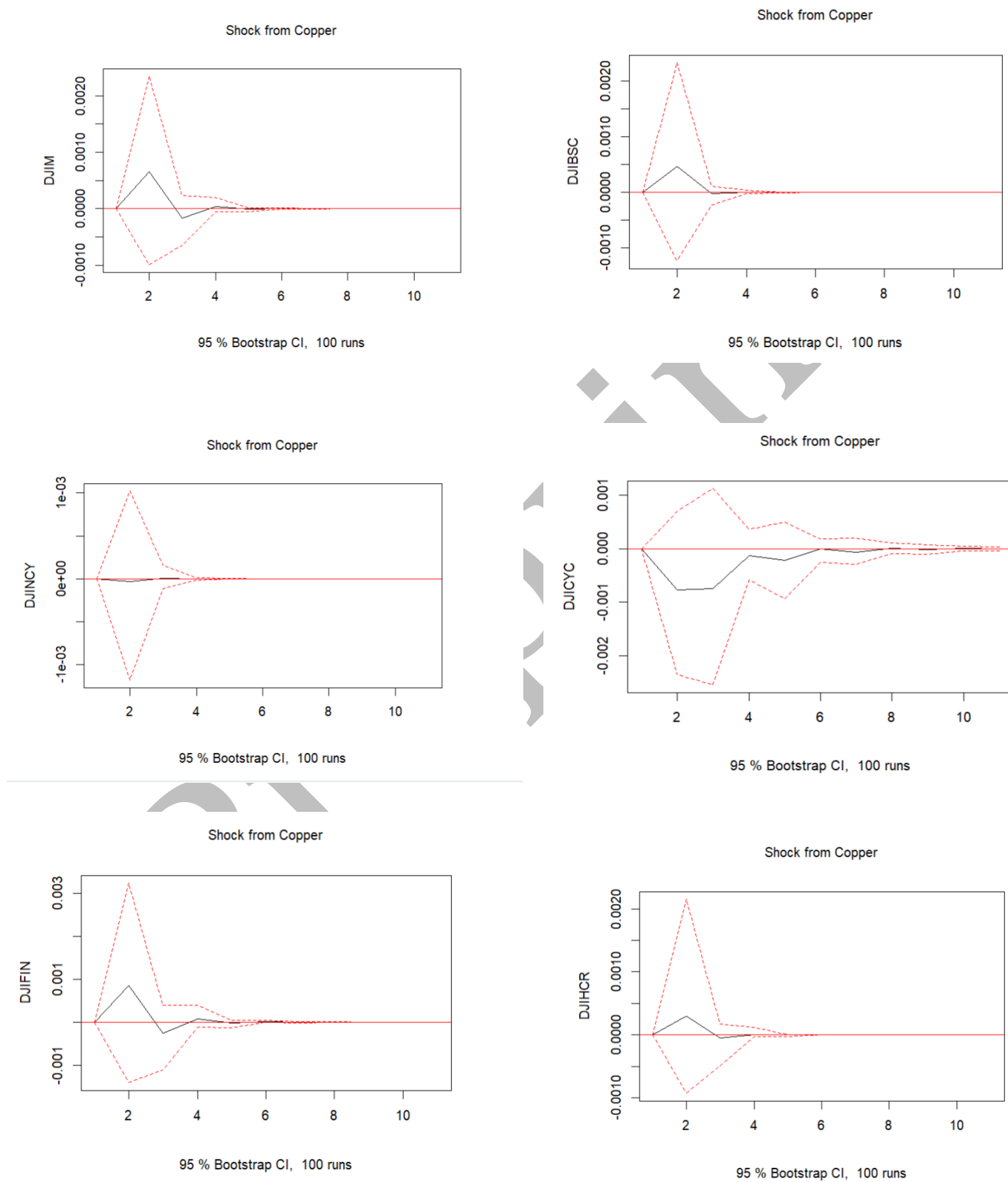
CONCLUSION

The main aim of the study was to explore the relationship between the Islamic indices and the returns on the precious metals. Specifically, the ability of the precious metals being a safe haven asset on the Dow Jones Islamic stock index during times of economic downturns i.e the Covid-19 pandemic. This was done through a number of tests and analyses of methodologies mainly being; stationarity testing, static and dynamic granger causality testing and Impulse response functions within a time period of 26 years. The time period as a whole as well as specific time periods of economic downturns were studied. The reason for this is that there was a need to ascertain whether the precious metals were safe-haven assets (economic downturn time period) or whether they were diversifiers. The results of the testing helps increase the existing literature on the topic as most analyses that cover the topic mainly cover specific countries which can have other factors that can affect the results.

The preliminary findings of the granger causality found that gold and silver had exhibited a unidirectional causality with the Islamic indices in that there was a relationship seen between the metals and the indices however not evident from the indices to the metals. Returns for aluminium, copper and zinc were seen to be statistically insignificant therefore not being able to outline an accurate representation of the relationship. This led to the need and use of the Dynamic Granger Causality. The results of the dynamic granger causality test concluded that the returns for gold showed a significant unidirectional causality with majority of the Islamic index returns however index returns such as the World Islamic, Consumer Goods and Healtcare indices only exhibited such returns during the latter stages of the 2000s. Silver had a similar unidirectional relationship as gold on the Islamic index returns. Zinc, aluminium and copper had significant unidirectional causalities with the Islamic indices however there were few windows that bidirectional causalities were observed and those windows coincided with market crashes like the IT bubble between 2001-2003 and the European debt crises spanning from 2007-2010 for example Zinc showed significant bidirectional causalities with the world Islamic index and the Islamic financial sectoral index.

The Impulse Response Function (IRF) and graphs were then used to ascertain whether the relationship between the precious metals and the Islamic indices certify whether the assets were safe haven assets, diversifiers or neither. The IRF showed strong evidence that gold cannot be considered a safe haven asset for four of the six Islamic indices (DJIM, DJIBSC, DJINCY and

DJICYC) however for the Islamic Financial sectoral index and the Healthcare index, there were periods of changes between a positive relationship and a negative relationship further indicating that in the short run, Gold can act as a safe haven asset for the two indices. Silver is similar, however, the short run safe-haven ability of silver was evident for the DJIM, DJIBSC, DJIFIN and the DJIHCR indices however was not a safe haven asset for the remaining two indices.

Zinc however expressed contradictory results to the granger causality results as the granger causality test results portrayed zinc having no relationship with the Islamic index returns however the impulse response function showed that for all the indices, zinc had a partial positive result and partial negative result indicating that zinc can also act as a short run safe-haven asset. Aluminium and copper were two metals that exhibited strong negative relationships during times of economic downturn especially when focusing on the consumer service index.

As a concluding point, there should be a consideration that the results obtained in this research, however have been subjected to reduced indices as there are 10 in total, the results still develop an encouraging example to any investors that are looking to invest on safe haven assets. The results also explore the idea of gold also having the ability to not be a safe-haven asset contrary to popular belief.

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