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The Evolution of Commodity Trios Prices and Causality Equation: In Structural Break Perspective

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ABSTRACT

This paper aims to examine the evolution of the commodity trios prices and relation among in structural break perspective for the period of 1991-2020. We used factor analysis, linearity, structural break, unit-root, cointegration tests and causality method were applied. Bai-Perron (2003) test results show industrial materials, energy and food price have one break at 2003, 2004, and 2005, respectively. To catch changing causality equation parameters clearly, it was used the moving sub-break range as 2003-2008. In post-break range, equation parameters obviously differed. In pre-break range, energy and food price have a in-directional effect on materials price, but, directional in post-break range. Lastly, in post-break range, the link among commodity trios have bi-directional relation between all commodity duos unlike pre-break range.

Keywords: Commodity Price, Time Series, Factor Analysis, Cointegration, Causality
JEL Classifications: Q02; C32; C38

1. INTRODUCTION

Commodities are tradible natural sources, which one of the production factors. Industrial raw materials, energy and agricultural production constitutes the primary categories of commodity (Matos and Wagner, 1998) and also named commodity trios. Commodity price series behaviour and relation among them are becoming increasingly complex and dynamic. Commodity prices are affected by economic, financial, geopolitical, technological and climatic events. Natural sources, belonged to the countries established on it, are distrubuted unequally geogpraphically. Therefore, the current world economic system includes source rich and poor countries. Source rich countries, generally exporter countries, name the game and lead world economic activity by hand using some market mechanism or jeopolitic action to manage maximization problem. It causes endless crises generation process as a facit circle. During the facit circle, it is important that understanding commodity prices and causal equation to manage risk and make decision for both of source rich and poor countries.

Commodity trios prices have a causal relationship based on production process and transportation cost. Energy commodities have a crucial role for industrial and agricultural production. Industrial raw materials, particularly metals depend on energy by smelting, transportation, mining, and production process. The relation between agricultural production (food) and industrial raw materials can be explained by using biofuel in transportation, mining, and the production process.

IMF Commodity Energy Price Index, IMF Commodity Industrial Inputs Price Index and FAO Food Price Index series calculated by international institutions, presented in Graph 1, are the most popular monitoring tools for the commodity trios price behaviour. Commodity trios price behaviour is shaped by supply and demand side factors/events.

Commodity prices traded within a range in 90's. Beginning of the 2000's, expansionary monetary policy implemented by central banks to fight resession contributed rising commodity prices. OPEC

Table 1: IMF structural classification of commodities and codes and definition of commodity price variables

Commodities blocks[1]	Commodities variables sub-blocks[1] (Commodity Trios)	International ınstitutions commodity price ındexes[2]		The contents of ınternational ınstitutions commodity price ındexes[3]	Proxy variables of commodity trios[4]	
		Code	Source and Name	Name	Code	Source and Name
Non-Fuel	Industrial Input Raw Materials (shortly Materials)	CIIPI	IMF Commodity Industrial Inputs Index 2005=100	Agricultural Raw Materials: Timber, Cotton, Wool, Rubber, and Hides indexes Metals: Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium indexes	COPP	IMF Copper Price
	Food and Beverage (Food)	FPI	FAO Food Index 2014-2016=100	Meat, Dairy, Cereals, Oils, Sugar Indexes	CPI	FAO Cereal Price Index
Fuel	Fuel (Energy)	CEI	IMF Commodity Energy Index 2005=100	Oil (WTI, Brent), Natural Gas (Henry Hub), Coal indexes	WTI	IMF Texas Intermediate (WTI) [5]

[1]IMF Structure of Commodities, [2]International Institutions Commodity Price Indexes used for determining variables sets from its contents, creating graphs and summary statistics in the study, [3]The Contents of International Institutions Commodity Price Indexes used to determine proxy variables from its contents in the model, [4]Proxy Variables instead of Commodity Trios determined using by Factor Analysis, the implication results can be see at Results section, [5]US crude oil price

Table 2: Factor analysis results: Eigenvalues and factor loading for contents of ındustry ınputs prices

Variables	Factor1	Factor2	Factor3	Factor4	Factor	Eigen-value	Difference	Proportion	Cumulative
Copper	0.990	−0.070	0.002	−0.081	F1	7,7687	6,1843	0,6805	0,6805
Aluminumm	0.826	0.446	0.076	−0.079					
Iron-ore	0.839	−0.398	−0.007	0.165					
Tin	0.910	−0.329	−0.073	0.077					
Nickel	0.815	0.468	0.176	−0.092					
Zinc	0.810	0.233	−0.235	−0.383					
Lead	0.954	−0.081	−0.129	−0.051					
Uranium	0.802	0.322	0.147	0.034					
Wool	0.795	−0.308	−0.323	0.031					
Rubber	0.865	−0.175	0.352	0.140					
Cotton	0.395	−0.552	0.343	−0.013	F2	15.844	0.623	0.139	0.819
Hides	0.018	0.270	0.608	0.099	F3	0.962	0.477	0.084	0.904
Timber	0.403	0.477	−0.334	0.500	F4	0.485	0.207	0.043	0.946

LR test: İndependent versus saturated: Chi-square (78)=514,66 Prob>Chi-square=0.000

Table 3: Factor analysis: Factor Loadings for Food Price Index FAO (Meat, Dairy, Cereals, Oils, Sugar Price Index)

Variables	Factor1	Factor2	Factor3	Factor	Eigenvalue	Difference	Proportion	Cumulative
Meat	0.870	0.150	0.172	F1	4.181	4.043	0.973	0.973
Diary	0.916	−0.202	0.090					
Cereals	0.982	−0.094	0.010					
Oils	0.951	−0.064	−0.188					
Sugar	0.843	0.246	−0.076					

LR test: independent versus saturated: Chi-square (3)=241.27 Prob>Chi-square=0.0000

behaviour cycle changed as the price-defense strategy again, after 9/11 2002 terrosist attack and 2003 Gulf US-Iraq War. Barsky and Kilian (2004) conclude that the changes of policy by OPEC are not exogenous, but respond to the state of the oil market and global economy. In the same way, Lavaller (2004) conclude that it is possible for OPEC members revenues by adopting a strategy. Energy, industrial materials and food price series were broken up in 2003, 2004, and 2005, respectively, due to 9/11 terrorist attack and 2003 US-Iraq war and shifted mean upside and more volatile. It can be characterized by some other factors as climate change, droughts, rising non-food agricultural production post-Kyoto (2006), income growth and changing trading behaviour with high frequency trading AI algorithm. Commodity prices up trend, deteriorated with 2008 financial crisis and 2010 European Dept Crisis.

This paper examine the time series properties of commodity trios prices, selected proxies by factor analysis method. We applied Brock et al. (1996) was used to address linearity/non-linearity of variables. Bai-Perron (2003) structural break tests, Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Zivot Andrews (1992) allowing by one structural break, and Clemente-Montañés-Reyes (CMR) with two structural breaks unit-root tests and Johansen cointegration and VAR Granger causality test were applied.

Table 4: Factor analysis: Energy price ındex: Oil (WTI), coal, natural gas (Henry Hub)

Variables	Factor1	Factor2	Factor	Eigenvalue	Difference	Proportion	Cumulative
OIL	0.942	0.056	F1	1.783	1.411	0.888	0.888
COAL	0.842	−0.326					
NG	0.432	0.512	F2	0.372	0.519	0.185	1.073

LR test: independent versus saturated: Chi-square (3) = 48.75 Prob>Chi-square=0.0000

Table 5: Unit root test results

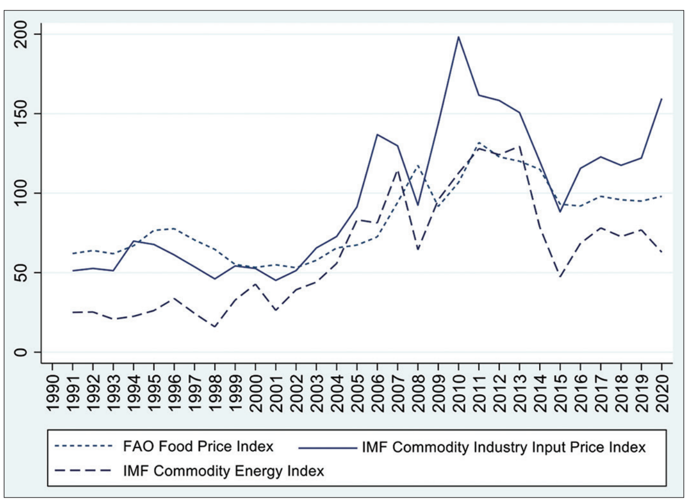
	Dickey-fuller test	Phillips-perron test	Zivot andrews unit-root test with one structural break				Clemente-montañés-reyes unit-root test with two structural break			
	Trend	Trend	Trend	Break point	Constant and trend	Break point	Additive outlier		Innovational outlier	
							Min t	Opt. Break	Min t	Opt. Break
Level										
COPP	−1.290 (0.633)	−1.126 (0.704)	−2.830	2011	−3.994	2005	3.547* (0.002)	2007 2010	5.021* (0.000)	2004 2011
WTI	−1.624 (0.470)	−1.533 (0.517)	−3.570	2011	−4.413	2014	10.281* (0.000)	2003 2014	4.910* (0.000)	2003 2012
CPI	−1.564 (0.501)	−1.537 (0.515)	−2.480	2012	−4.161	2007	10.421* (0.000)	2007 2014	4.744* (0.000)	2005 2014

Dickey-Fuller, Philip-Perron unit root test: (), MacKinnon approximate *P* value for Z (t). Zivot and Andrews unit root test: Critical values for both 1%: −5.57 5%: −5.08 10%: −4.82, and trend 1%: −4.93 5%: −4.42 10%: −4.11

Table 6: Structural break test in level series of commodity prices with R

Bai-Perron (2003)	Structural break point (for one break)
WTI	2003
COPP	2004
CPI	2005

Graph 1: Commodity trios price ındexes calculated by ınternational ınstitutions



Source: FAO, IMF, WorldBank

2. LITERATURE REVIEW

The relationship among energy, materials and food prices have been investigated in related literatures. Tyner (2010) searched the relationship between energy and agricultural production prices and found a low correlation before 2005, with a peak and strengthening of the correlation in mid-2008. Chen et al. (2010) studied the relationship between oil prices and grain prices and observed an impact of oil prices on grain prices. Pala (2013) studied the relation between food and energy price by Granger causality and they found the relation between crude oil and food price equation has changed after 2008 break. Pala (2018) examined energy and food price relation in Kyoto (2006) perspective and found there is uni-directional running from food price to energy price in post-Kyoto (2006) sub-sample. Zhang and Tu (2016) examined the effects of oil price shocks on China's metal markets. The findings revealed significant symmetric impacts of crude oil price shocks on the metal markets. Ezeaku et al. (2021) examined the volatility of commodity prices during the COVID-19 pandemic using SVAR modeling. The results showed that copper prices initially responded positively to crude oil price shocks and then exhibited a negative response thereafter. Ji and Fan (2012) examined the influence of the crude oil market on non-energy commodity markets using a bivariate EGARCH model. The results revealed there are volatility spillover effects from the crude oil market to non-energy commodity markets. Jiang et al. (2018) explored the dynamic dependence among crude oil, agricultural raw materials, and metals using the wavelet squared coherence approach. The results showed that the oil market lags behind agricultural raw material markets but leads metal markets, while metal markets change in parallel with agricultural raw material markets. Kaulu (2021) analyzed the effects of crude oil prices on copper and maize prices using VAR and VECM models. The study did not find Granger causality running from crude oil prices to copper and maize prices.

Nelson and Plosser (1982) advocated that all macroeconomic time series have a unit root. But, Perron (1989) suggested that time series have changing pattern of it permanently due to some unique economic events. Bai-Perron (2003) are defined as a single-group change point model in the sense that all the parameters subject to the structural changes have the structural shifts at the same dates. Doornik (2022) said that "all the testing papers referenced so far take a technical approach, deriving the asymptotic properties of the proposed tests." They focus on Yang (2017) study, discussed that trend break selection in the underspecified case is not consistent. They proposes to date a broken trend in the differenced model. Doornik (2022) the underspecified model is consistent again in that case. Doornik (2022) found that Bai-Perron (2003) algorithm valid in level in model 2, and also differenced model 2 and differenced model 3.

This paper aims to fill the gap in the literature concerning the relationship between food, energy, and materials prices, analysing data generation process, structural break and relations among commodity trio prices, in break perspective. We prefered to use newly best proxy variable generated by factor analysis method, it has never been used before related literature.

3. METHODS AND DATA

Factor analysis method is to identify a reduced number of variables from a larger set. We prefered total variance explain criteria as 60% level and entering factor loading value criteria as up to 0.5. Brocke et al. (1996) linearity test, Bai-Perron (2003) structural break test and Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Zivot Andrews (ZA) with one structural break, and Clemente-Montañés-Reyes (CMR) with two structural breaks linear unit-root tests were applied. To determine the optimal lag length for cointegration, Akaike (AIC), Hannan and Quinn (HQIC), Schwarz's Bayesian Information Criteria (SIC), and Final Prediction Error Criteria (FPE) test was used. The linear Johansen Cointegration and VAR Granger causality test were applied.

We used structural classification of commodities sub-blocks defined by IMF and FAO. IMF structural classification of commodities, international commodity price indexes, all contents of the indexes and selected proxy variables represent at Table 1. All data cover the period of 1991-2020 and collected from IMF, FAO and NYMEX.

4. RESULTS

We applied factor analysis method on contents of international institutions commodity price indexes to select the best proxy variables. Factor analysis results are presented in Tables 2-5. Total variance explaining ratios of commodity trios factor groups, F1, have bigger than acceptancy criteria level of 60%. We selected IMF copper price, WTI US oil price, and FAO Cereal Price Index, have the highest factor loading value, as a proxy variables instead of commodity trios; materials, energy and food price, respectively.

We applied the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), Zivot Andrews (ZA) allowing by one structural break, and Clemente-Montañés-Reyes (CMR) with two structural breaks unit-root tests for IMF Copper Index, IMF WTI price and FAO Cereal Index. The results, presented in Table 6, indicates that the null hypothesis of a unit root cannot be rejected at the level. All series have a unit root in level. But, it is usefull and necessary that to examine data in terms of possible structural break dates. ZA and CMR test results indicates that the null hypothesis of unit root can be rejected, it suggests that all series stationary with break.

We used Bai-Perron (2003) structural break tests and the results represents at Table 7. The results verified in 2003 Gulf Warbreak in WTI price. The break reflected by ones year lagged on materials and food prices, 2004 and 2005.

Table 8 presents the outcomes of the Brock et al. (1996) non-linearity test for full sample, pre and post-break sub-sample, generated by Bai and Perron (2003) structural break test. The test results indicate that the series follow non-linear process in full sample. Otherwise, when BDS test was applied for sub-samples generated by break date points, AR(1) model residuals are not correlated and the price series follow a linear process for pre and post-break period. All series follow linear process for pre-and post-break samples.

The FPE (Akaike, 1969), AIC (Akaike, 1973), HQIC (Hannan and Quinn, 1979), and SBIC (Shwartz, 1978) criteria suggest lag lengths of 2, 3, 2, and 1, respectively. If there are conflicting results, we follow AIC, suggested by Pesaran and Pesaran (1997). It was selected as 3 for the optimal number lag length.

Table 9 shows Johansen's cointegration test results. The trace statistics evidence of the presence of at least one cointegrating vector among and long-run relationship among energy, food and materials prices proxy variables.

The results of unit-root tests show that the series are with break stationary. We generate vector autoregression model taking into account possible breaks as 2003-2004-2005, changing period. We generated sub-samples with moving break range by 2003-2008

Table 7: BDS non-linearity test for full sample and sub-break samples

Variables	Full sample	Epsilon/dimension	2	3	4	5	Series form
COPP	1991-2020	4301.75	0.098* (0.000)	0.187* (0.000)	0.252* (0.000)	0.269* (0.000)	Non-linear
CPI		41.85	0.105* (0.000)	0.181* (0.000)	0.223* (0.000)	0.239* (0.000)	Non-linear
WTI		43.88	0.096* (0.000)	0.168* (0.000)	0.218* (0.000)	0.233* (0.000)	Non-linear
	Sub-samples						
WTI	1991-2003	6.55	−0.006 (0.973)	−0.025 (0.3336)	−0.047 (0.0645)	−0.126* (0.000)	Linear
	2004-2020	27.54	0.051* (0.000)	0.013 (0.3692)	−0.016 (0.3073)	−0.012 (0.3995)	Linear
COPP	1991-2004	716.45	−0.059* (0.002)	−0.020 (0.5035)	−0.046 (0.2031)	−0.078* (0.037)	Linear
	2005-2020	1822.48	0.030 (0.061)	0.041 (0.107)	0.045 (0.133)	0.065 (0.0361)	Linear
CPI	1991-2005	10.08	0.067 (0.009)	0.062 (0.1542)	0.063 (0.2593)	0.055 (0.3798)	Linear
	2006-2020	36.76	0.028 (0.056)	−0.004 (0.8598)	0.021 (0.5184)	0.038 (0.3195)	Linear

*represent 5% significance levels

Table 8: Johansen linear cointegration test (in level)

Proxy variables	Null/alternative	Trace statistics	5% critical value
COPP, WTI CPI, Lags (3)	r=0/r≥1	18.833*	29.68
	r≤1/r≥2	8.326	15.41

*presents 5% statistically significancy

Table 9: Linear granger causality test for full and moving break sub-samples

Ho hypothesis	Chi-square-statistics	P-value	Causality direction	Chi-square -statistics	P-value	Causality direction
Case: diff erence stationary, with difference series						
		Full Sample (1991-2020)				
CPI does not cause COPP	1.538	0.674	-			
WTI does not cause COPP	4.1127	0.250	-			
COPP does not cause CPI	55.552*	0.000	COPP→CPI			
WTI does not cause CPI	21.879*	0.000	WTI→CPI			
COPP does not cause WTI	14.832*	0.002	COPP→WTI			
CPI does not cause WTI	10.418*	0.015	CPI→WTI			
Case: break stationary, with level series, comparing moving break date sub-samples						
Break Date: 2007		1991-2007			2008-2020	
CPI does not cause COPP	2.919	0.404	-	24.427*	0.000	CPI→COPP
WTI does not cause COPP	11.921*	0.008	WTI→COPP	13.262*	0.000	WTI→COPP
COPP does not cause CPI	147.11*	0.000	COPP→CPI	27.39*	0.000	COPP→CPI
WTI does not cause CPI	67.128*	0.000	WTI→CPI	25.576*	0.000	WTI→CPI
COPP does not cause WTI	14.287*	0.003	COPP→WTI	50.706*	0.000	COPP→WTI
CPI does not cause WTI	6.4871	0.090	CPI→WTI	56.126*	0.000	CPI→WTI
Break Date: 2006		1991-2006			2007-2020	
CPI does not cause COPP	7.213	0.065	-	9.733*	0.021	CPI→COPP
WTI does not cause COPP	29.22*	0.000	WTI→COPP	3.192	0.363	-
COPP does not cause CPI	106.76*	0.000	COPP→CPI	17.275*	0.001	COPP→CPI
WTI does not cause CPI	63.447*	0.000	WTI→CPI	19.746*	0.000	WTI→CPI
COPP does not cause WTI	28.471*	0.000	COPP→WTI	40.959*	0.000	COPP→WTI
CPI does not cause WTI	15.409*	0.001	CPI→WTI	30.659*	0.000	CPI→WTI
Break Date: 2005		1991-2005			2006-2020	
CPI does not cause COPP	3.115	0.374	-	9.530*	0.023	CPI→COPP
WTI does not cause COPP	15.362*	0.002	WTI→COPP	2.749	0.432	-
COPP does not cause CPI	364.62*	0.000	COPP→CPI	30.873*	0.000	COPP→CPI
WTI does not cause CPI	377.80*	0.000	WTI→CPI	21.973*	0.000	WTI→CPI
COPP does not cause WTI	24.936*	0.000	COPP→WTI	32.613*	0.000	COPP→WTI
CPI does not cause WTI	18.993*	0.000	CPI→WTI	25.839*	0.000	CPI→WTI
Break Date: 2004		1991-2004			2005-2020	
CPI does not cause COPP	3.123	0.373	-	0.818	0.845	-
WTI does not cause COPP	4.310	0.230	-	0.416	0.937	-
COPP does not cause CPI	2980.0*	0.000	COPP→CPI	47.570*	0.000	COPP→CPI
WTI does not cause CPI	1294.3*	0.000	WTI→CPI	20.887*	0.000	WTI→CPI
COPP does not cause WTI	32.186*	0.000	COPP→WTI	23.446*	0.000	COPP→WTI
CPI does not cause WTI	31.382*	0.000	CPI→WTI	18.328*	0.000	CPI→WTI
Break Date: 2003		1991-2003			2004-2020	
CPI does not cause COPP	21.362	0.523	-	0.625	0.474	-
WTI does not cause COPP	20.130	0.134	-	0.321	0.361	-
COPP does not cause CPI	390.212	0.000	COPP→CPI	21.470*	0.000	COPP→CPI
WTI does not cause CPI	64.963*	0.000	WTI→CPI	19.211*	0.000	WTI→CPI
COPP does not cause WTI	34.458*	0.000	COPP→WTI	25.446*	0.000	COPP→WTI
CPI does not cause WTI	14.382*	0.000	CPI→WTI	17.271*	0.000	CPI→WTI
Break Date: 2003-2008 (except)		1991-2003			2008-2020	
CPI does not cause COPP	3.1236	0.373	-	24.427*	0.000	CPI→COPP
WTI does not cause COPP	4.3108	0.230	-	13.262*	0.004	WTI→COPP
COPP does not cause CPI	2980.00	0.000	COPP→CPI	27.390*	0.000	COPP→CPI
WTI does not cause CPI	1294.3*	0.000	WTI→CPI	25.576*	0.000	WTI→CPI
COPP does not cause WTI	32.186*	0.000	COPP→WTI	50.706*	0.000	COPP→WTI
CPI does not cause WTI	31.382*	0.000	CPI→WTI	56.126*	0.000	CPI→WTI
				24.427*	0.000	CPI→COPP

*Statistically significant at 5% level

range to catch clearly structural changing in model parameters. It was seen slow changing in parameters in range. The results show there are obviously different constant and slope parameters between pre-2003 and post-2008 samples. In cereal price equation, the constant parameter has decreased by approximately 50% in post-2008 period. This means that average price performans of food price, now more related to other commodity prices in the system, not based itself as before. In post-2008 copper price equation, we found that only small lagged copper price has positive effect on cereal price according to pre-2003 sample.

In pre-2003 period, results shows that there is uni-directional causality relation from copper to cereal and WTI crude oil, bi-directional relation between cereal and WTI crude oil. In post-2008 period, all commodity trio prices series have bi-directional causality relation among each two sub-blocks, energy-food, materials-food and energy-materials. We found that parameters and causal relations changed in post-2008. Now, there is a relation running from cereal and WTI crude oil to copper price, bi-directionally. While, in pre-break range, WTI and cereal have in-directional effect on copper, in post-break range sample, directional. And, we found, the changes of series causality relation realized in step by step in breaks range of 2003-2008.

5. CONCLUDING REMARKS

The study aims to investigate time series properties and causal relation among commodity trios prices for the period of 1991-2020. We generate that sub-break samples using by structural break test and try to catch break point of series and causal equation parameters. For a more detailed analysis and capture clues, it would be usefull to select the best proxy from all contents of commodity variables. We generated three proxy variable instead of materials, energy and food prices using factor analysis; as copper, WTI crude oil and cereal price.

Our empirical findings can be summarized as follows. Unit-root test results show that commodity price series are stationary with break. BDS linearity/non-linearity test presents all series are linear in sub-break samples. Bai and Perron (2003) test result exhibits materials, energy and food price series has one important break in 2003, 2004 and 2005, respectively, due to 9/11 and 2003 Gulf War shocks and lagged effect. Johansen's trace test suggest the presence of a long-run relationship among the energy, food, materials prices, existence of cointegration. Finally, we have estimated vector autoregression model taking into account moving break period by 2003-2008. We found that model parameters exhibited changing process with 2003-2008 break range. In pre-2003 period, results shows that there is uni-directional causality relation from copper (materials) to cereal (food) and WTI crude oil (energy), bi-directional relation between cereal (food) and WTI (energy). In post-2008 period, all commodity trio prices series have bi-directional causality relation between all two sub-blocks; energy-food, materials-food and energy-materials. We found that series and causal relations have been changed in post 2003-2008 break range. Now, there is a relation running from cereal (food) and WTI (energy) to copper (materials) price, bi-directionally. While, in pre-break, WTI and cereal have in-directional effect on copper, in post break sample, directional. And, we found, the changes of series causality relation realized in step by step in breaks range of 2003-2008.

From a philosophical point of view, there are two possible options in the face-of crisis/break-producing economic system; to go on to fight inside facit circle or break out. Inside circle, risk management process requires more complex analysis system. Break out's one is related with learning-unstucking ability and evolution process. We need creating an "Unlife Life" quadrant perpective: Learn/Unlearn-Stuck/Unstuck boxes. We need to know what should we know and how can be release old systematics. And need more progress in world internatinal relation to pass advance and allign box/stages. Sustainable source come to the agenda instead of utopic's one "equitable sharing of natural source" Creating unlife-life path for the world economy means that sustainable game. Sustainability is important in materials and food as well as energy source.

This approach can provide further insights into the dynamics of commodity prices and their interdependencies. We show that commodity prices faced to break/s based on the results of mostly source rich countries' excessive interventions in market. Now, commodity prices have moved the new athmosphere, the more under directly effect eachother.

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