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*The causal relationship between Financial development
and Economic Growth in Arabic Countries: Panel and Frequency
Domain Analysis*

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Abstract

This investigation aims to scrutinize the causal association between economic growth and financial development in 18 Arabic nations for the period 1980-2020. In contrast of prior studies, this paper uses a new financial development index proposed by Svirydzenka (2016). Hence, this study explores the causal connection between the two variables using frequency domain spectral causality procedure suggested by Breitung-Candelon (2006). Particularly, the results indicated the existence of unidirectional causality running from financial development to economic growth in the panel data. Additionally, the findings explored a mixture results in individual countries study. The findings of this paper offers critical results that could help decision makers to build robust strategies to enhance the economic as well as the financial developments in Arabic region.

Keywords: Financial development, GDP, Arabic region, Frequency domain causality.

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1. Introduction

development size can effect and promote the economic rate, for this reason, the financial sector is one of the most vital key factors of long-run growth. In this vein, theories related to the association among financial development and income go back to the late 1900s when many economists and policy-makers . that finance is an axial determinant (input) for the GDP through the financial intermediation like investments and savings. In addition to this, McKinnon and Shaw (1973) declared that government repression on financial system by various methods as the controlling of interest rate ceilings or the channeling the savings to preferential non-productive sectors can curb the economic development. At the same side, the Nobel laureate Merton Miller (1998) claims that “financial markets contribute to economic growth

Demand following hypotheses: based on Robinson (1952) opinion that argues that income causes financial development “entrepreneur leads and finance follows”.

The study uses the recently developed measure of financial development proposed by Svirydzenka (2016) which accounts for numerous multidimensional features of the financial sector (depth, access and efficiency of both markets and institutions). Finally, the contribution of this paper on the Arabic literature is the use of both panel study to provide a clearer picture about the finance growth nexus as a group, and the use the causality for each country.

For this reason, this study is structured as follows, the literature review are revised in the second section. Section 3 discuss the outcomes and the fourth section offers the concluding remarks.

2. Literature review

many studies verified the four hypotheses of this relationship on a group of countries under Panel data as Ahmed and Ansari (1998) on 3 Asian countries; Khalifa (2002) on 30 developing countries; Fase and Abma (2003); Agbesatafia (2004) on 8 Sub Saharan Africa countries; Apergis et al (2007) on 15 OECD and 50 non-OECD members; Abu-Badr and Abu-Qarn (2008) on 6 MENA countries; Kar et al (2011) on 15 MENA countries; Demetriades and James (2011) on 18 South Asia countries; Mukhopadhyay et al (2011) in 7 Asian countries; Gries et al (2011) on 13 Latin America and Caribbean states; Hsueh et al (2013) on 10 Asian countries; Ayad (2017) on 16 MENA countries; Swamy and Dharani (2018) on 24 advanced counties; Opoku et al (2019) on 47 African countries; Chow et al (2019) on 12 developing countries; Aluko et al (2019) on 33 Sub Saharan Africa countries and many others. However, the results inspired from all these papers is the existence. On the other hand, there are many other papers which tested the four hypotheses focusing on a single country as Kar and Pentecost (2000) on Turkey; Bhattacharya and Sivasubramanian (2003) on India; Hondroyannis et al (2005) on Greece; Chang and Caudill (2005) on Taiwan; Liang and Jian-Zhou (2006) on China; Ang and McKibbin (2007) on Malaysia; Yang and Yi (2008) on Korea; Odhiambo (2008) on Kenya; Shahbaz and Lean (2012) on Tunisia; Adeyeye et al (2015) on Nigeria; and many other papers. Table 1 shows the results and techniques of study is these papers.

Table 1: Related studies of finance growth nexus

Authors	Period	Sample	Econometrics approaches	Results
Ahmed and Ansari (1998)	1973-1991	Pakistan, India, and Sri-Lanka	GC	SLH
Luintel and Khan (1999)	/	10 Unindustrialized nations	GC	FH
Ghali (1999)	1963-1993	Tunisia	Co-Integration analysis	SLH
Gursoy and Al-Aali (2000)	1973-1988	Bahrain, Kuwait and Saudi Arabia	GC	DFH
Kar and Pentecost (2000)	1936-1995	Turkey	Co-Integration analysis	The hypotheses changed according to financial development indicator
Khalifa (2002)	1970-1999	30 Developing nations	GC	FH
Bhattacharya and sivasubramanian (2003)	1970-1999	India	GC	SLH
Fase and Abma (2003)	1974-1999	9 Emerging nations	GC	SLH
Calderon and Liu (2003)	1960-1994	109 industrialised and emerging nations	Geweke causality	FH
Islam et al (2004)		Bangladesh	GC	DFH
Christopoulos and Tsionas (2004)	1970-2000	10 developing nations	Panel GC	SLH
Ghirmay (2004)	1971-2001	13 Sub Saharan African nations	GC	SLH for 8 countries DFH for 6 countries
Agbesatafia (2004)	1965-2000	India	GC	SLH
Chang and Caudill (2005)	1962-1998	Taiwan	GC	SLH
Liang and Teng (2006)	1952-2001	China	GC	SLH
Apergis et al (2007)	1975-2000	65 nations	Panel GC	FH
Ang and McKibbin (2007)	1960-2001	Malaysia	GC	DFH
Yang and Li (2008)	1971-2001	Korea	GC	SLH
Abu-Badr and Abu Qarn	1960-	6 MENA	Toda-Yamamoto-	SLH

(2008)	2204	nations	Dolado-Lutkepohl causality	
Odhiambo (2008)	1969-2005	Kenya	GC	DFH
Odhiambo (2009)	1987-2006	South Africa	GC	DFH
Kar et al (2011)	1980-2007	15 MENA nations	Bootstrap panel GC	NH
Gries et al (2011)	1960-2004	13 Latin America and Caribbean nations	GC	DFH
Hassan et al (2011)	1980-2007	168 developed and developing nations	Toda-Yamamoto-Dolado-Lutkepohl causality	FH
Bangake and Eggoh (2011)	1960-2004	71 nations	Panel GC	FH
Demetriades and James (2011)	1975-2006	18 Sub Saharan African nations	Panel GC	DFH
Shahbaz and Lean (2012)	1971-2008	Tunisia	ARDL and GC	FH
Hsueh et al (2013)	1980-2007	10 Asian nations	Bootstrap panel GC	SLH for 6 countries FH for Malaysia and NH for 3 countries
Menyah et al (2014)	1965-2008	21 Sub Saharan African nations	Bootstrap panel GC	NH
Nain and Kamaiah (2014)	1990-2010	India	DiksPanchenko causality	FH
Swamy and Dharani (2018)	1983-2013	24 Advanced nations	Panel GC	FH
Tan et al (2017)	1996-2010	3 ASEAN nations	Geweke causality	SLH
Opoku et al (2019)	1980-2016	47 African nations	Frequency domain spectral causality	NH
Chow et al (2019)	1950-2014	12 developing nations	Granger and Hiemstra Jones causality	FH
Aluko (2019)	1990-2015	33 Sub Saharan African nations	Dumetriscu-Hurlin panel causality	SLH
Nguyen et al (2022)	1980-2020	22 emerging markets	panel Granger-causality	FH
SLH: supply leading hypotheses. DFH: demand following hypotheses. FH: feedback hypotheses. NH: neutrality hypotheses. GC: Granger causality				

The main result obtained from table1 is the scarcity of studies in the case of Arabic countries especially as a group under panel data, also, a few Arabic countries have been studied individually

like Egypt, Tunisia, Saudi Arabia, Bahrain and Kuwait, although there are some studies that included some Arabic countries under MENA countries, African countries or developing nations.

3.1.1. CSD test

Table2: CSD tests results

Tests	FIN		GRW	
	Statistic	Probability	Statistic	Probability
Breusch Pagan LM test	1646.541	0.000	1770.930	0.000
Pesaran scaled LM test	85.380	0.000	92.490	0.000
Bias corrected scaled LM	85.136	0.000	92.247	0.000
Pesaran CD	25.011	0.000	14.357	0.000
FIN: Financial development; GRW: Economic Growth				

3.1.2. Panel unit root test

Table3: Unit root tests results

Tests	FIN		Δ FIN		GRW		Δ GRW	
	Statistic	Prob	Statistic	Prob	Statistic	Prob	Statistic	Prob
CAD	-2.274	0.62	-3.668	0.00	-1.976	0.96	-2.915	0.00
F		4		0		0		3
	statisti	Cv5	statisti	Cv5	statisti	Cv5	statisti	Cv5
CIPS	-2.728	-2.62	-6.162	-2.62	-2.017	-2.62	-4.876	-2.62
Δ : signifies the first differences; *** the significance at 1, 5 and 10%; Cv 5 denotes the critical value at 5% significance level.								

Table4: Westerlund outcomes

Tests	Statistic	Z-value	Probability
G_t	-2.757	-2.120	0.017**
G_a	-18.802	-4.404	0.000***
P_t	-9.584	-0.723	0.235
P_a	-12.155	-2.274	0.011**
***: denotes the significance at 1, 5 and 10%.			

3.1.4. Causality investigation

As mentioned previously, the main target of this paper is to investigate the causal link among the two variables to inspect which hypothesis is held between the four hypotheses. Hence, Dumitrescu-Hurlin (2012) test (DH) is applied to detect the causalities in panel data. Notably, the outcomes disclose that financial development homogeneously causes economic growth at 5% significance level. This finding supports the supply leading hypotheses. Hence, in Arabic nations as group the financial development is a vital determinant of income. In other words, financial development could be used as key factor to predict the economic growth in the long run term.

Table5: Dumitrescu-Hurlin test outcomes

Direction of causality	W-bar	Z-bar	Probability
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	statistic	statistic	
GRW does not granger cause FIN	3.175	1.921	0.054
FIN does not granger cause GRW	5.044	6.457	0.000

3.2. Individual time series examination

3.2.1. Integration order scrutiny

Table 6: Individual unit root test results (PP test):

Countries	FIN			ΔFIN			GRW			ΔGRW		
	1	2	3	1	2	3	1	2	3	1	2	3
Algeria	-2.433	-2.610	0.129	-	-	-	-0.215	-1.289	1.176	-3.304**	-3.365**	-
				9.379***	9.298***	9.509***						3.108***
Bahrain	-1.437	-2.321	0.977	-	-	-	-1.131	-2.558	0.145	-	-4.842**	-
				6.928***	7.623***	6.498***				5.016***		5.015***
Comoros	-3.016	-5.071	0.958	-	-7.59***	-	-1.546	-1.449	-0.206	-	-	-
				7.576***		7.008***				7.288***	7.590***	7.370***
Djibouti	-4.493	-3.147	-0.009	-	-	-	-1.546	-1.449	-0.206	-	-	-
				5.650***	5.860***	5.582***				7.288***	7.316***	7.370***
Egypt	-1.507	-2.098	5.790	-	-	-	-0.588	-2.024	1.424	-	-	-1.995**
				4.943***	4.886***	4.948***				3.644***	3.760***	
Jordan	-2.004	-1.747	0.154	-	-	-	-1.379	-1.669	0.196	-	-3.977**	-
				5.605***	5.711***	5.652***				4.026***		4.092***
Kuwait	-2.611*	-2.793	-0.008	-	-	-	-1.326	-2.393	0.232	-	-	-
				5.020***	4.949***	5.086***				6.841***	6.737***	6.894***
Lebanon	-1.498	-1.946	0.309	-	-	-	-1.525	-1.893	1.103	-	-	-
				5.854***	5.499***	5.620***				7.993***	8.971***	7.464***
Libya	-2.622*	-2.641	0.048	-	-	-	-	-	-0.776	/	/	/
				8.575***	8.451***	8.695***	3.722***	3.662**				
Mauritania	-2.493	-2.640	0.023	-	-	-6.865**	-0.486	-2.135	0.640	-	-	-
				6.741***	6.674***					5.603***	5.919***	5.619***
Morocco	-0.208	-2.028	1.710	-	-	-	0.299	-3.526*	5.937	-	-	-
				6.521***	6.506***	6.065***				11.87***	11.71***	7.257***
Oman	-1.634	-2.516	1.426	-	-	-	-	-2.276	1.224	-	-	-
				5.255***	5.274***	4.782***	4.283***			3.751***	4.850***	3.829***
Qatar	-1.391	-2.569	1.968	-	-	-	-0.799	-2.407	0.374	-	-	-
				8.041***	8.135***	7.344***				4.920***	4.991***	4.967***
Saudi Arabia	-1.271	-2.051	1.055	-	-	-	-	-	-0.878	/	/	/

				6.658***	6.639***	6.217***	4.348***	4.45***					
Sudan	-2.395	-2.923	-0.191	-	-	-	1.399	-2.0406	2.954	-	-	-	
				7.979***	7.831***	8.065***				4.974***	7.567***	4.196***	
Syria	--	-	-0.082	/	/	/	-2.125	-2.041	-1.433	-	-	-	
	3.733***	3.68**								6.031***	6.009***	6.067***	
Tunisia	-1.738	-2.987	-2.683	-	-	-	0.148	-2.064	4.873	-	-	-	
				10.67***	24.54***	8.986***				5.870***	5.856***	4.149***	
Emirates	-0.5886	-2.024	1.424	-	-	-	-2.013	-2.196	-1.935	-	-3.911**	-	
				4.683***	4.577***	4.506***				3.728***		3.415***	

1: denotes equation with constant; 2: equation with constant and trend; 3: equation without constant and trend; ***: significance at 1,5 and 10% significance level

3.2.2. Co-integration test

Table 3: Individual co-integration test outcomes (JJ test):

tests	Algeria			Bahrain			Comoros			Djibouti			Egypt		
	trac	c- val	pro b	trac	c- val	pro b	trac	c- val	pro b	trac	c- val	pro b	trac	c- val	pro b
None	7.18	15.4	0.55	11.2	15.4	0.19	16.5	15.4	0.03	21.2	15.4	0.00	22.5	15.4	0.00
	2	9	6	2	9	8	9	9	4	1	9	6	1	9	3
At most	1.61	3.84	0.20	1.82	3.84	0.17	3.30	3.84	0.06	5.30	3.84	0.02	1.51	3.84	0.21
1	0	1	4	3	1	6	1	1	9	4	1	1	0	1	9
	Jordan			Kuwait			Lebanon			Mauritania			Morocco		
None	9.40	15.4	0.32	12.8	15.4	0.11	9.10	15.4	0.35	8.98	15.4	0.36	8.07	15.4	0.45
	5	9	9	8	9	9	5	9	5	7	9	6	9	9	7
At most	3.55	3.84	0.05	1.30	3.84	0.25	2.62	3.84	0.10	0.99	3.84	0.31	0.08	3.84	0.77
1	3	1	9	8	1	2	0	1	5	1	1	9	4	1	1
	Oman			Qatar			Sudan			Tunisia			Emirates		
None	15.9	15.4	0.04	14.3	15.4	0.07	11.4	15.4	0.18	18.2	15.4	0.01	20.6	15.4	0.00
	5	9	2	6	9	3	2	9	6	3	9	8	2	9	7
At most	6.67	3.84	0.00	0.56	3.84	0.45	0.40	3.84	0.52	0.19	3.84	0.66	0.98	3.84	0.32
1	3	1	9	6	1	1	6	1	3	0	1	2	8	1	0

Trace denotes the trace statistic; C-val denotes the critical value at 5% and Prob symbolises the probability of the test.

3. Conclusion

The causal association among economic growth and financial development was examined in Arabic countries, both time series and panel data analysis for the period 1980-2020 was engaged. In this scrutiny, we verified the causal link between the two variables by focusing on Dumitrescu-Hurlin (2012) panel Granger causality in the panel data and Breitung-Candelon (2006) in frequency domain spectral causality in the time series data using a new composite financial development index presented by Svirydzenka (2016). The empirical results support unidirectional causality running from financial development to economic growth in panel data analysis. This result implies that the expansion of financial development can stimulate the economic growth supporting Schumpeter (1911) opinion (supply leading hypotheses). On the other hand, time series results support the neutrality hypotheses in eight countries and the supply leading hypotheses in six countries. These results imply that financial development and economic growth are independent in most of the Arabic countries or a unidirectional causal relationship running from financial development to economic growth in the long run term. Accordingly, our findings suggest that the efforts of Arabic governments in the finance-growth nexus still very limited in most of the countries.

3. Appendix

Algeria

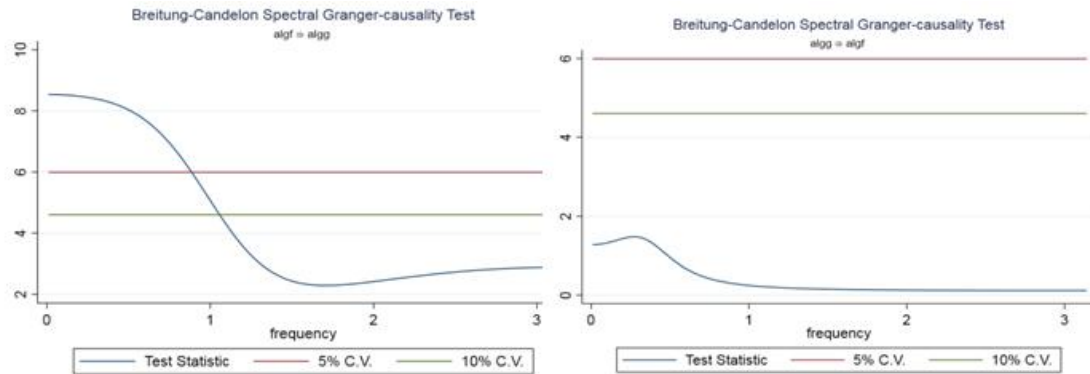


Figure 1: Causal relationship for Algeria.

Bahrain

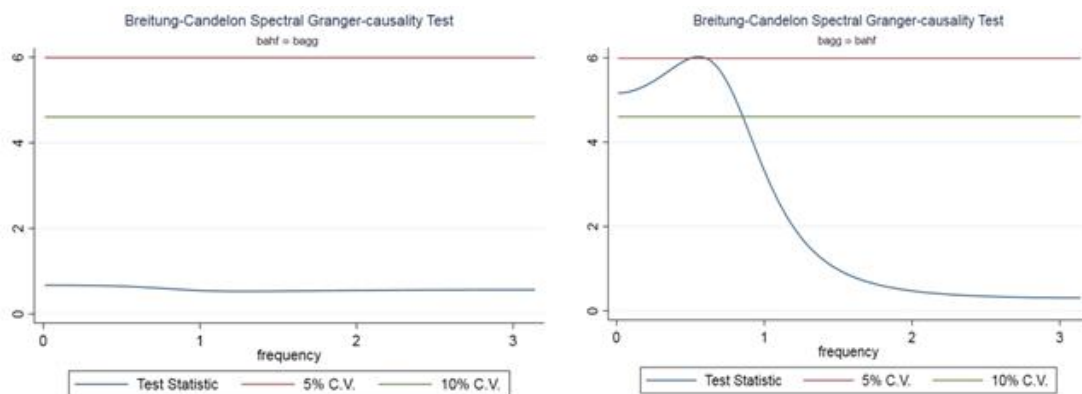


Figure 2: Causal relationship for Bahrain.

Djibouti

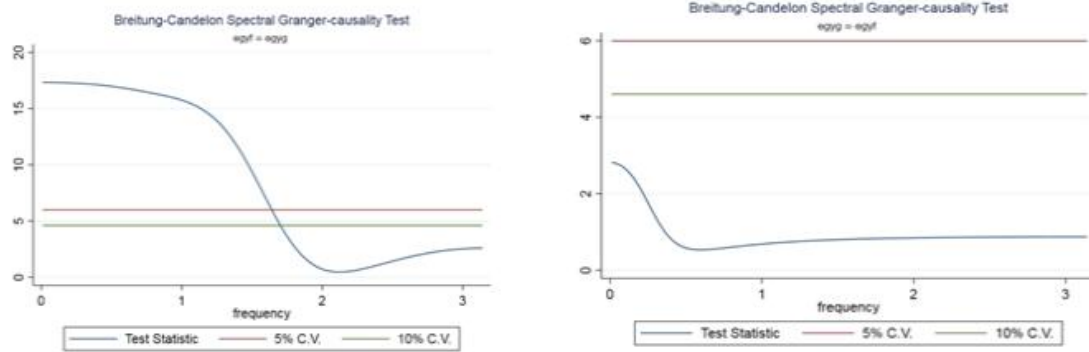
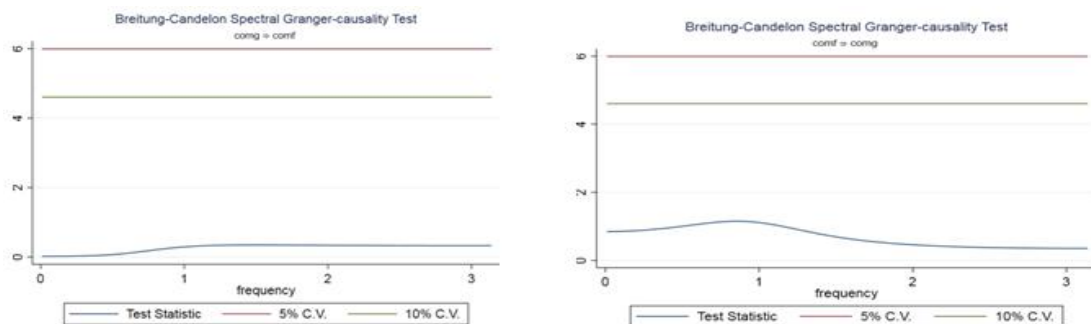


Figure 4:
Causal

relationship for Djibouti.



Egypt

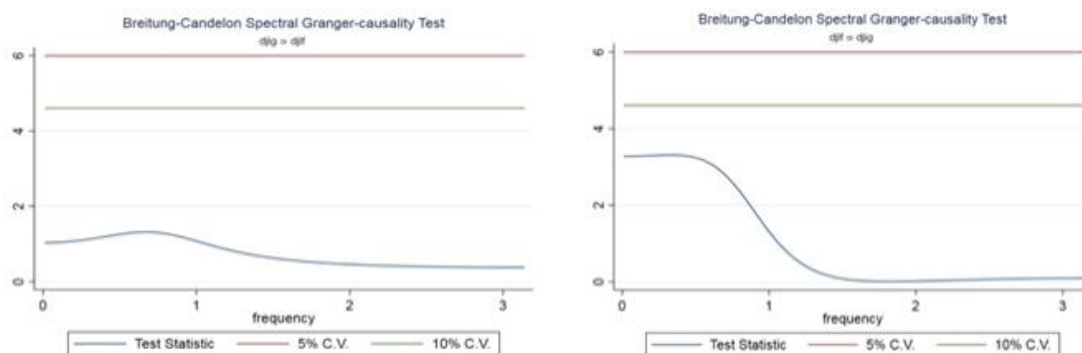


Figure 5: Causal relationship for Egypt.

Jordan

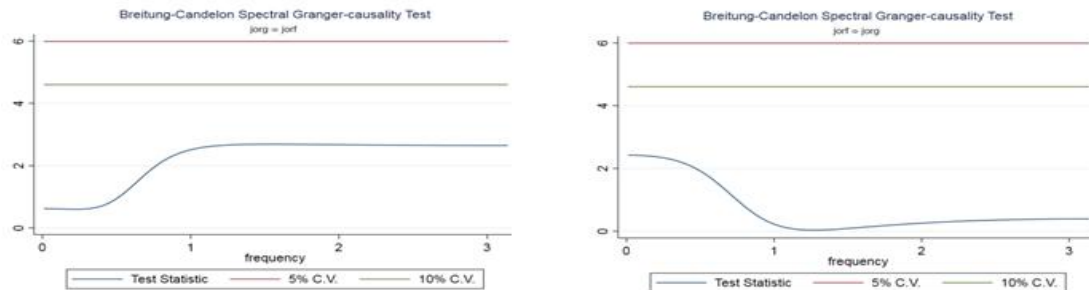


Figure 6: Causal relationship for Jordan.

Kuwait

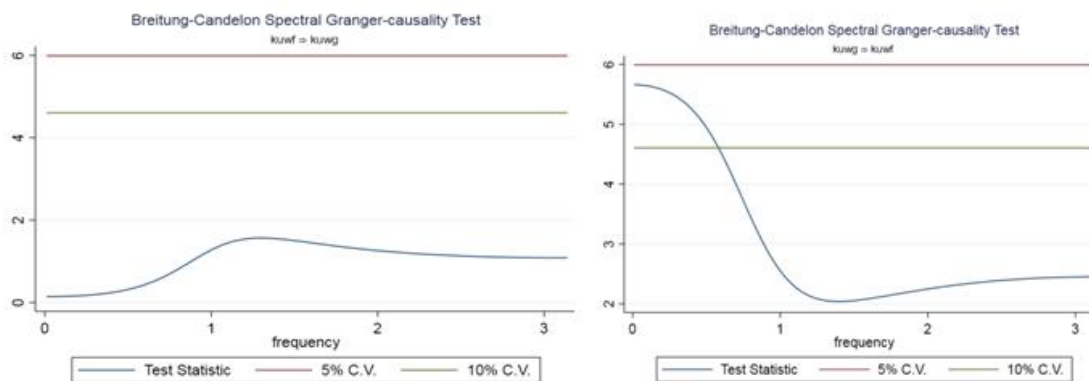


Figure 7: Causal relationship for Kuwait.

Lebanon

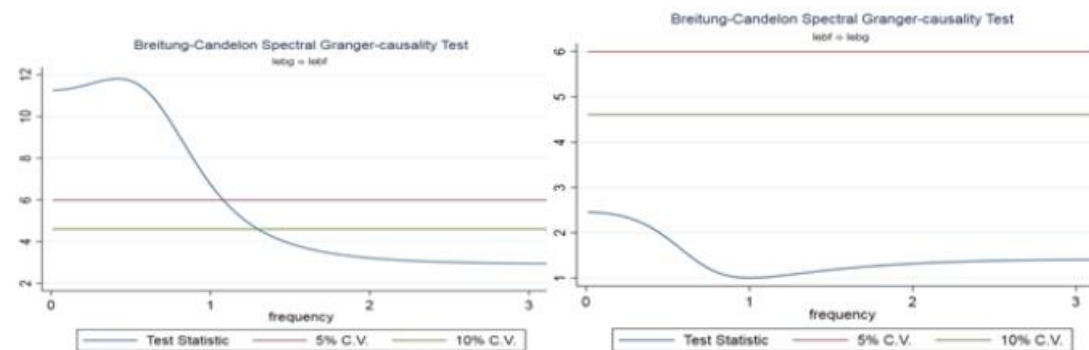


Figure 8: Causal relationship for Lebanon.

Libya

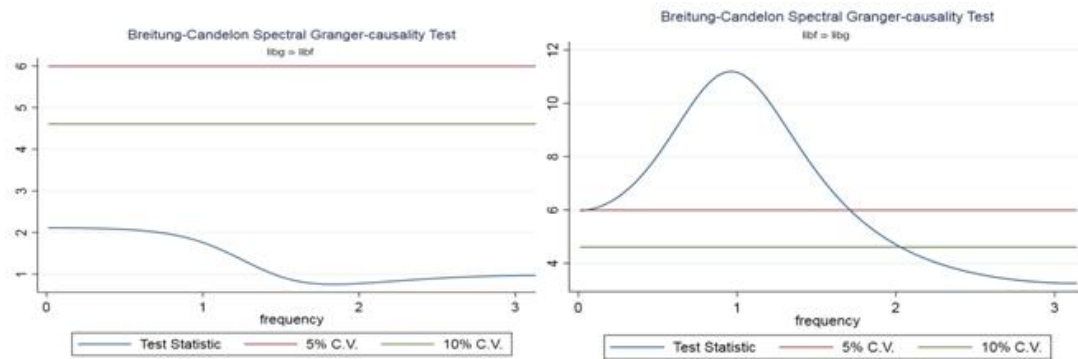


Figure 9: Causal relationship for Libya.

Mauritania

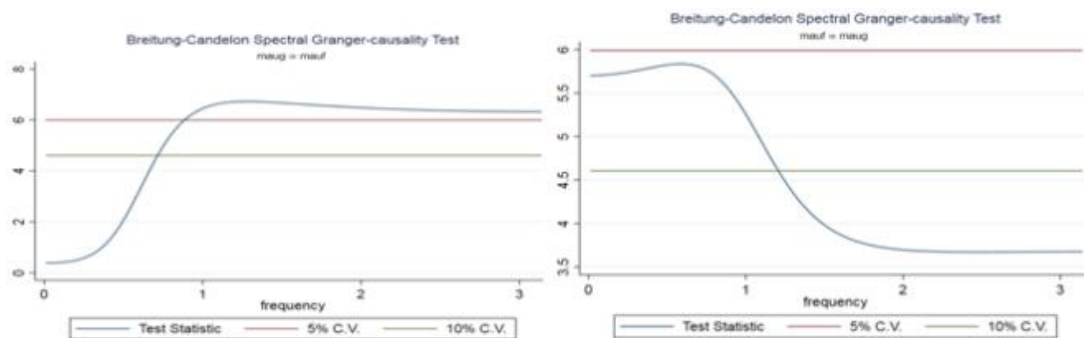


Figure 10: Causal relationship for Mauritania.

Morocco

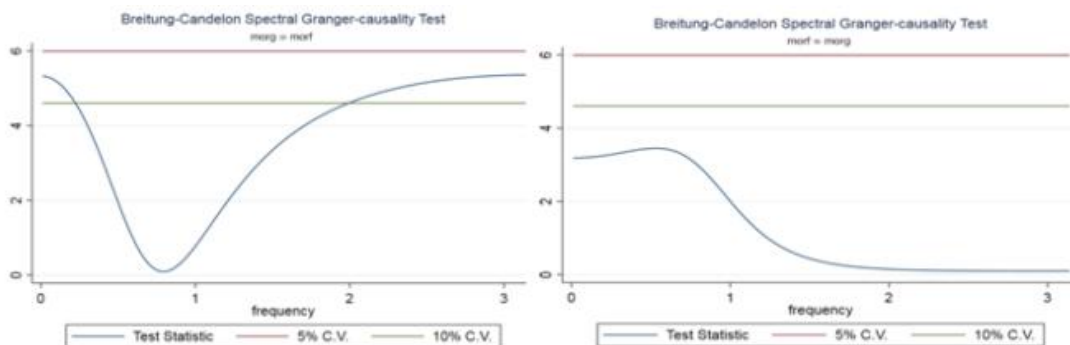


Figure 11: Causal relationship for Morocco.

Oman

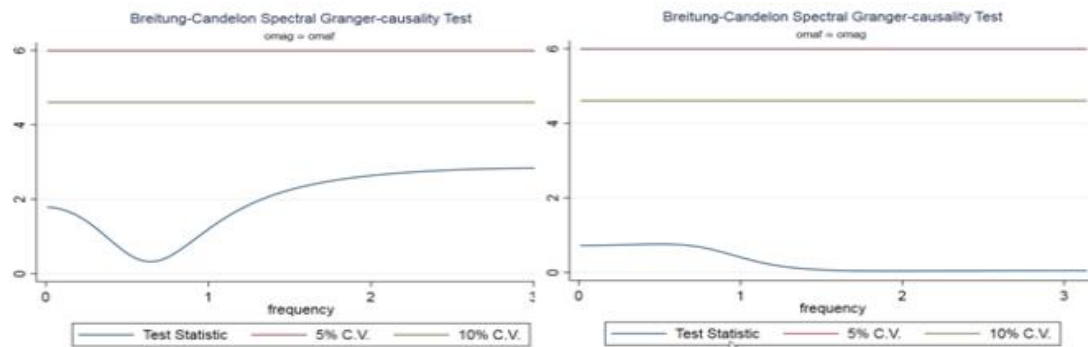


Figure 12: Causal relationship for Oman.

Qatar

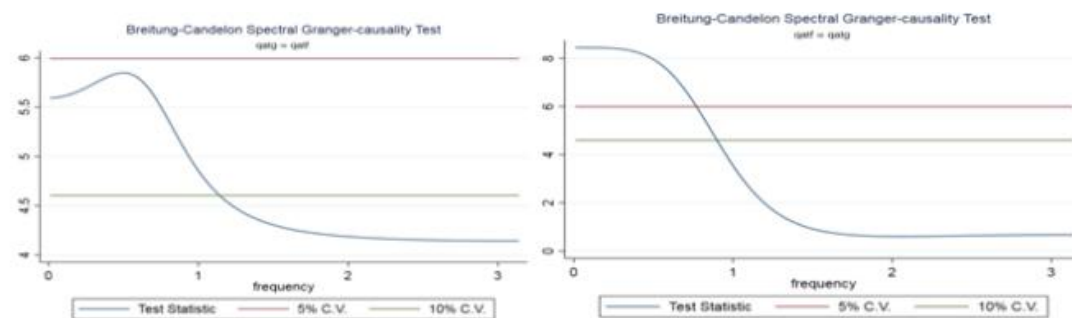
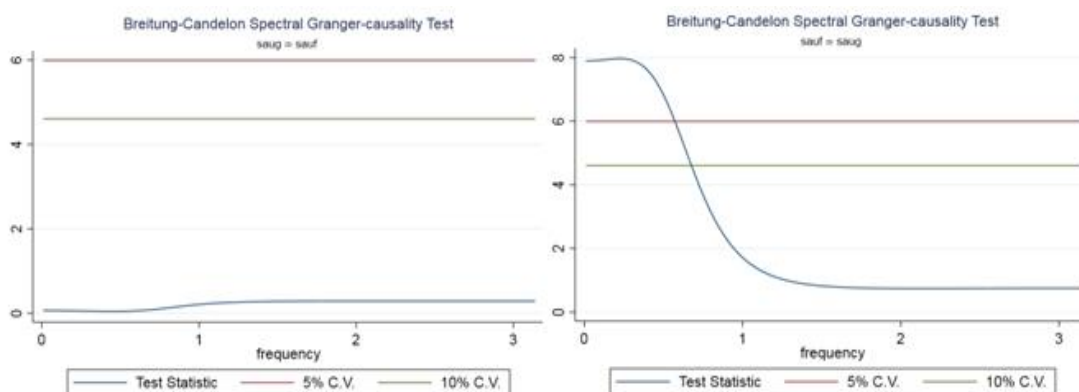


Figure 13: Causal relationship for Qatar.

Saudi Arabia



Sudan

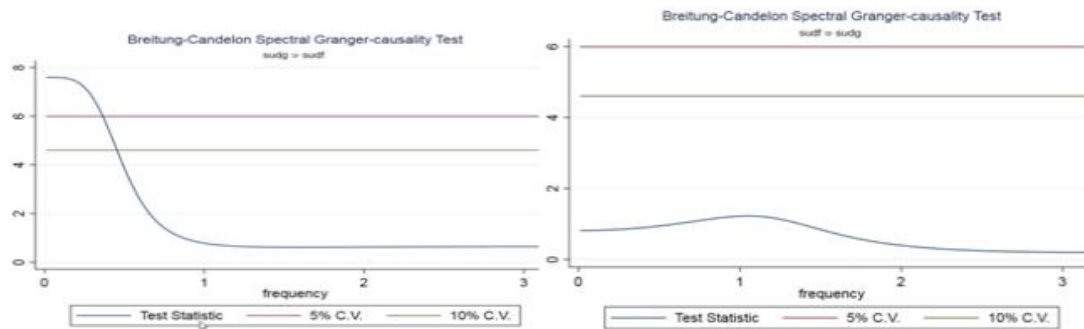


Figure 15: Causal relationship for Sudan.

Syria

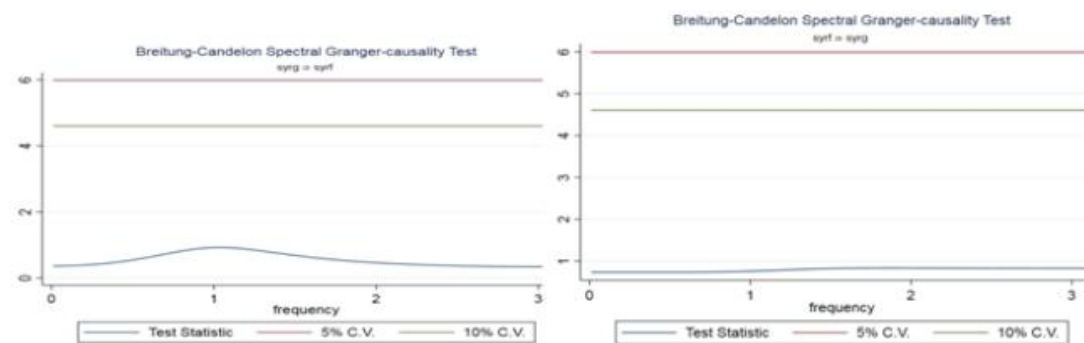


Figure 16: Causal relationship for Syria.

Tunisia

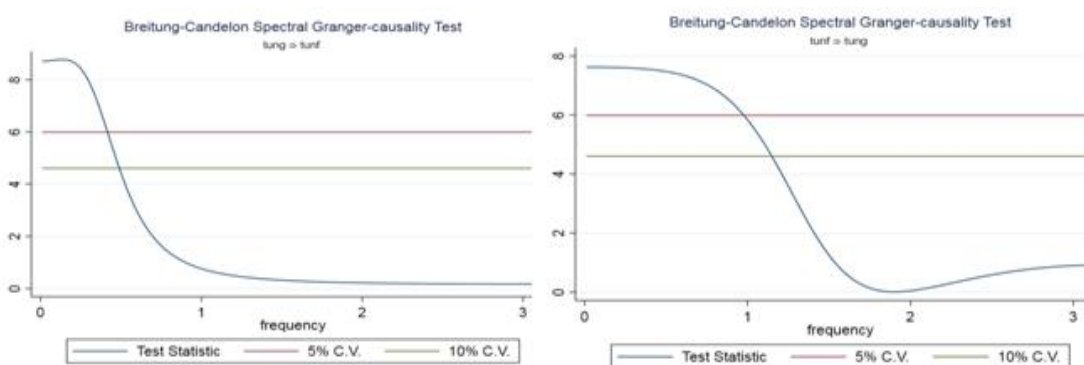


Figure 17: Causal relationship for Tunisia.

Emirates

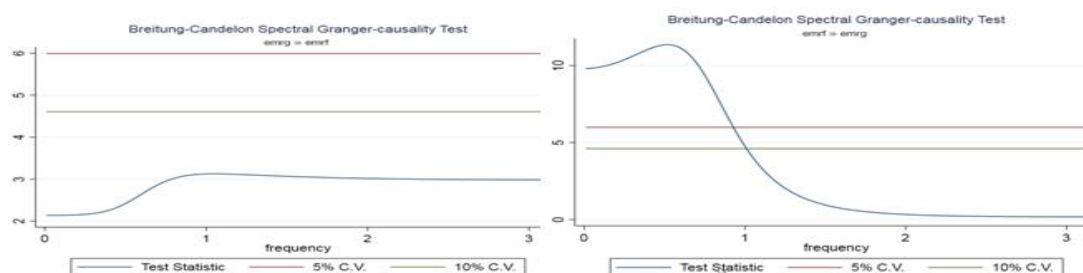


Figure 18: Causal relationship for Emirates.

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