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THE EFFECT OF TERMS OF TRADE ON CURRENT ACCOUNT BALANCE: HARBERGER-LAURSEN-METZLER EFFECT IN ARABIC COUNTRIES.

Ayad Hicham
Department of Economics Sciences, the University center of Maghnia, Algeria
Email: a_hichem210@hotmail.fr

Abstract:
The contribution of this paper is investigating the Harberger-Laursen-Metzler effect in the context of 18 Arabic countries since it's the first time to test it in Arabic countries over the period 2000-2017, and was tested by using the Westerlund (2007) co-integration and Dumitrescu-Hurlin (2012) causality analysis in addition to the random effects model, empirical analysis shows that there is no evidence of HLM effect for all the samples in short run term and there is no long-run relationship between the variables, but there is a bi-directional causal relationship between terms of trade and current account balance in the middle income countries in the long run term.

JEL classification: C23, F14, F41.
Key words: HLM effect, Terms of Trade, Current Account Balance.

1. Introduction

In September 2000, and as an answer to the question of why is it futile to be against globalization? Kofi Annan (the 7th person to hold the post of United States secretary general since 1946 between 1997 and 2006) said that: "it has been said that arguing against globalization is like arguing against the lows of gravity (low for Newton and Einstein)", according to this declaration it's very clear the importance of globalization in the modern era, especially international trade, where we cannot imagine the existence of one country across the world economically isolated, this is why the international trade and in general globalization has become a buzzword around the world, where there is no doubt about the positive impact of international trade on economic growth, in addition, Husain (2000), show that the beneficial impact of globalization through its four components (international trade,

financial integration, international labor flows and the technical change) takes place primarily through rapid economic growth which leads to the poverty reduction.

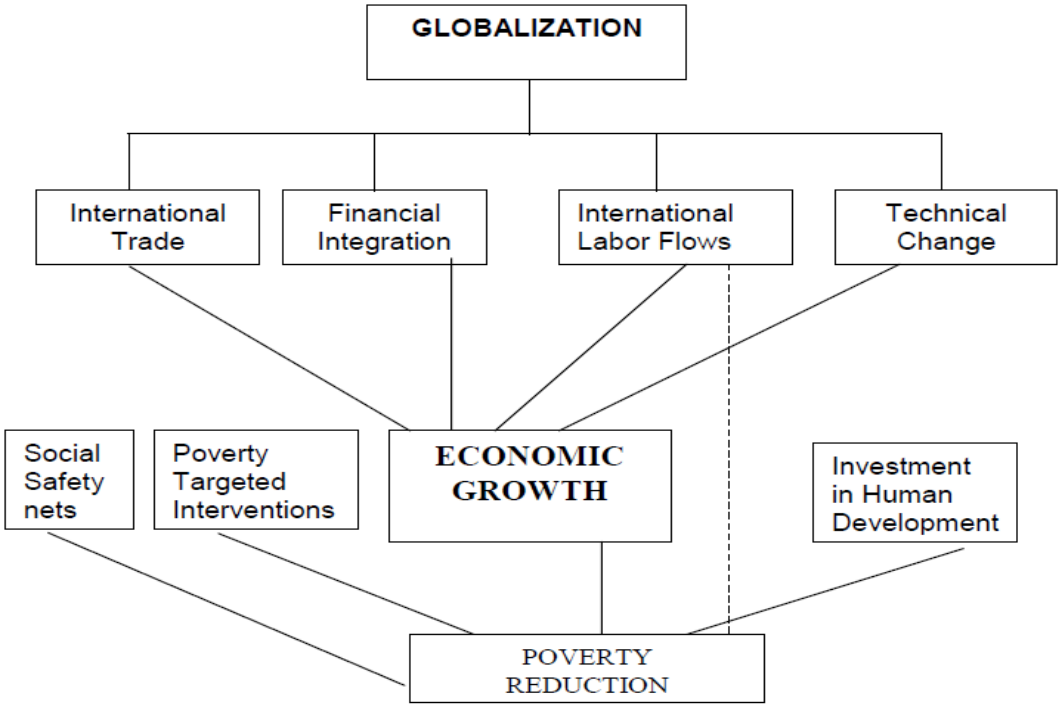

Fig. 1 – globalization, economic growth and poverty nexus.

Terms of trade is one of most important proxies in trade openness, the objective of this proxy is to measure the ratio of domestic exports prices relative to imports prices, and its known as TOT (Terms Of Trade) index, where the TOT index can be calculated via different variations as follows:

1. Definition of the terms of trade in consideration of barter:

1.1. Net barter terms of trade (N): obtained by equating export prices to describe the sale and purchase of goods and services.

$$N = Px/Pm$$

Where: Px is the export price index and Pm is the import price index.

1.2. Gross barter terms of trade (G): is the ratio of import quantity index to export quantity index.

$$G = Qm/Qx$$

Where: Qm is the import quantity and Qx is the export quantity.

1.3. Income terms of trade (I): to indicate the purchasing power of exports since the importing capacity of the country is explained regarding exports.

$$I = Dx/Px = (Px/Pm)Qx$$

Where: Dx is the export value index.

2. Definition of terms of trade considering factor exchange:

2.1. Single factorial terms of trade (S): it shows the gains from foreign trade as a sign of economic prosperity.

$$S = (Px/Pm)\,Vx$$

Where: Vx is the index of export productivity.

2.2. Double factorial terms of trade (D): to show the amount of imports will be imported despite the change in exports.

$$D = (Px\ /\ (Pm)(\ Vx)/Vm)$$

Where: Vm is the index of import productivity.

3. Definition of terms of trade considering utility:

3.1. Real cost terms of trade (R): the increase in the index of disutility of exports indicates that real cost of each unit for import increases.

$$R = S.E$$

Where: E is the index of the amount of disutility per unit productive resource used in producing exports.

3.2. Utility terms of trade (F): to measure technical and utility coefficients of imports and exports.

$$F = R(U_0^m/U_0^a)$$

Where: (U0m / U0a) is the index of relative utility of import and domestic goods foregone to produce exports.

By return to 1950, Prebisch and Singer (1950) examined the assumption that the TOT of primary commodities should improve over time, and the main result of this study is that the TOT of the primary product producing Third World had deteriorated and would continue to deteriorate as long as they specialized in primary product (like in Arabic countries), and this result is called the PS hypothesis (Prebisch-Singer hypothesis), on the other hand, and in the same year (1950), we found two classical studies, Harberger (1950) and Laursen and Metzler (1950), these two studies have confirmed that a deterioration of TOT index can affect directly the current account balance, economic growth, savings, investments and the real income

especially in the small economies, and this what called the HLM effect (Harberger-Laursen-Metzler effect).

The problem in the Arabic countries is that the 22 countries are exporting countries of raw materials especially fuels (Oil and Gaz) and some minerals (Iron, Phosphate, Aluminum, Zinc and Gold), that means the dependence of these countries on their exports prices and this is an important indicator of the ease of transmission of TOT shocks to the national economy for each country, especially when we know that there is no diversified export basket that allows the replacement to avoid this shocks.

Table 1: the TOT index for Arabic countries 2006-2015

Country	2006	2010	2015	Country	2006	2010	2015
Algeria	1.15	0.96	1.09	**Mauritania**	1.21	1.76	1.51
Bahrain	0.99	1.08	1.25	**Morocco**	0.97	0.97	1.03
Egypt	0.98	0.84	0.92	**Oman**	1.07	0.96	0.95
Jordan	1.00	1.05	0.95	**Saudi Arabia**	1.09	1.04	1.36
Kuwait	1.24	0.82	0.99	**Sudan**	1.13	1.04	1.14
Lebanon	0.98	0.98	0.98	**Syria**	0.76	0.96	0.58
Tunisia	0.99	0.93	0.93	**Emirates**	0.88	1.04	1.07

Source: Data Market Database 2018.

This paper attempts to fill the gap of the scarcity if we don't say the lack of the studies on TOT effect on the current account balance and economic growth in the case of Arabic countries, in this study we try to bridge this gap by using an econometric examination for the period 2000-2017 for the most Arabic countries depending on the panel data analysis, for this reason, the paper consists of four sections, introduction of study presented in section one, then the literature review in section two passing by data and methodology of study in section three and finally section four is for the results and discussion.

2. Literature review

Since 1950, the HLM effect and the effect of TOT index on current account balance and economic growth have played an important role in the discussion about trade policies even in developed or developing countries, there are many studies in this case as Alexander (1952), Tsiang (1962), schmid (1976), Findlay and Rodroguez (1977), Buiter (1978), Mussa (1979), Bruno and sachs (1997) and Dornbush (1980), and the main observation in all these studies is the rising of the papers to examine the HLM effect after the Oil prices increases began in the early seventies, but on other hand, it is necessary to refer to the Obstfeld (1980 and 1982) explanations where he showed that TOT movements and deterioration can lead to an increase

in savings then an improvement in the current account balance, but in general, there are conflicting results derived from various studies as follows.

2.1. Positive effect from TOT to current account balance (CAB)

There are several studies that shown that an increase in TOT index have positive and beneficial effects on CAB.

Table 2: studies related on the positive effect from TOT to CAB

N^0	Authors	Countries	Period	Empirical analysis
1	Khan and Knight (1983)	32 non-oil prucing developing countries	1973-1980	Ordinary Least Squares (OLS)
2	Fry (1986)	14 Asina developing countries	1961-1983	2SLS etimation
3	Razin (1993)	21 developing countries	1960-1989	OLS etimation
4	Arize (1996)	16 countries	1973-1992	Co-integration analysis
5	Kouassi et al (1998)	Ivory Coast	1960-1995	Co-integration and Causality analysis
6	Otto (2003)	55 small open developed countries	1960-1997	SVAR model
7	Misztal (2010)	Poland	1995-2009	VAR model
8	Islam et al (2013)	Bangladesh	1985-2011	ARDL model
9	Erauskin and Garbeazabal (2017)	21 developed and 16 developing countries	1970-2009	Dynamic panel estimations
10	Muntasir (2018)	14 South and southeast Asia countries	2000-2016	Panel fixed effect model and co-nitegration analysis
11	Shafiullah et al (2018)	5 SAARC countries	1980-2015	PMG-ARDL and Dumetriscu-Hurlin causamity analysis
12	Ucan and Unal (2018)	Turkey	2005-2017	Co-integration and Causality analysis

2.2. Negative effect from TOT to current account balance (CAB)

In this case there is a few studies that found the opposite HLM effect when there is a negative effect from TOT to CAB.

Table 3: studies related on the negative effect from TOT to CAB

N^0	Authors	Countries	Period	Empirical analysis
1	Bleaney and Greenaway (2001)	14 Sub-Saharan Africa countries	1980-1995	Panel fixed effect model
2	Chinn and Prasad (2003)	18 developed and 71 developing countries	1971-1985	Panel estimations
3	Agenor and Aizenman (2004)	Non-oil exporters Sub-Saharan Africa countries	1980-1996	Arellano-Bond GMM method

2.3. No relationship between TOT and current account balance (CAB)

As we said before most of the empirical studies have shown that the HLM effect is held everywhere, but there are some studies that have found opposite results.

Table 4: studies related on non relationship between TOT and CAB

N^0	Authors	Countries	Period	Empirical analysis
1	Bahmani and Alse (1995)	24 developed and developing countries	1970-1990	Co-integration analysis
2	Bouakez and Kano (2008)	Australia, Canada and United Kingdom	1962-2001	PVM model
3	Nor and Hamori (2008)	G-7 countries	1971-2003	Panel co-integration analysis
4	Tayyaba and Saira (2012)	Pakistan	1980-2012	SVAR model

III. Data and Methodology

III.1. Data and the model

In this paper, we econometrically examine the HLM effect using annual data covering the period 2000-2017 for 18 Arabic countries (Algeria, Bahrain, Comorros, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Tunisia, Emirates and Yemen), the data have been taken from World Bank database (2018), using the model as follows:

$$CAB_{i,t} = a_0 + a_1 TOT_{i,t} + a_2 GNS_{i,t} + a_3 TRA_{i,t} + \varepsilon_{i,t}$$

Where: CAB refers to current account balance as a percentage of GDP, TOT the terms of trade index (2000=100), GNS is the gross national saving as a percentage of GDP and TRA is the trade openness as a percentage of GDP, finally ε is the random error.

III.2.Methodology

III.2.1. Westerlund panel co-integration test

Westerlund (2007) and Persyn and Westerlund (2008) developed four new panel co-integration tests that are based on structural rather than residual dynamics and, therefore, do not impose any common-factor restriction, this procedure tries to test the null hypothesis of no co-integration by inferring whether the error-correction term in a conditional panel error-correction model is equal to zero, in addition the new tests are all normally distributed and are general enough to accommodate unit-specific short-run dynamics, unit-specific trend and slope parameters, and cross-sectional dependence, two tests are designed to test the alternative hypothesis that the panel is co-integrated as a whole, while the other two tests the alternative that at least one unit is co-integrated, so, the rationale here is to test for the absence of co-integration by determining whether Error Correction exists for individual panel members or for the panel as a whole, for this reason we estimate the following equation:

$$\Delta GDP_{i,t} = \alpha_i^{GDP} + \lambda_i^{GDP}(GDP_{i,t-1} - \beta_i^{GDP} TOT_{i,t-1} - \gamma_i^{GDP} CAP_{i,t-1} - \vartheta_i^{GDP} LF_{i,t-1} - \omega_i^{GDP} TRA_{i,t-1} + \sum_{j=1}^{n} \theta_{i,j}^{GDP} \Delta GDP_{i,t-j} + \sum_{j=1}^{n} \varphi_{i,j}^{GDP} \Delta TOT_{i,t-j} + \sum_{j=1}^{n} \rho_{i,j}^{GDP} \Delta CAP_{i,t-j} + \sum_{j=1}^{n} \tau_{i,j}^{GDP} \Delta LF_{i,t-j} + \sum_{j=1}^{n} \zeta_{i,j}^{GDP} \Delta TRA_{i,t-j} + \mu_{i,j}$$

Where λ is the error correction term (ECT) and μ is the white noise, here we have four test statistics (G_a, G_t, P_a and P_t), the two tests G_t and P_t are computed with the standard errors of λ estimated in a standard way, while G_a and Pa are based on Newey and West (1994) standard errors, to run this tests all variables are assumed to be I(1), this test (Westerlund 2007, 2008) examine co-integration is present by determining whether ECT (λ) is present for individual panel members and for the panel as a whole.

III.2.2. Dumitrescu-Hurlin Panel non-causality test (2012)

The general pair of panel Granger causality models is given by:

$$y_{i,t} = \alpha_{0,i} + \alpha_{1,i} y_{i,t-1} + \cdots + \alpha_{l,i} y_{i,t-1} + \beta_{1,i} x_{i,t-1} + \beta_{l,i} x_{i,t-1} + \varepsilon_{i,t}$$

$$x_{i,t} = \alpha_{0,j} + \alpha_{1,j} x_{j,t-1} + \cdots + \alpha_{l,j} x_{j,t-1} + \beta_{1,j} y_{j,t-1} + \beta_{l,j} y_{j,t-1} + \varepsilon_{j,t}$$

While Granger causality tests the following hypothesis:

$$\alpha_{0,i} = \alpha_{0,j}, \alpha_{1,i} = \alpha_{1,j}, \dots, \alpha_{l,i} = \alpha_{l,j}, \forall\, i, j$$

$$\beta_{1,i} = \beta_{1,j}, \dots, \beta_{l,i} = \beta_{l,j}, \forall\, i, j$$

But the Dumitrescu-Hurlin (2012) tests the causality for this hypothesis:

$$\alpha_{0,i} \neq \alpha_{0,j}, \alpha_{1,i} \neq \alpha_{1,j}, \dots, \alpha_{l,i} \neq \alpha_{l,j}, \forall\, i,j$$

$$\beta_{1,i} \neq \beta_{1,j}, \dots, \beta_{l,i} \neq \beta_{l,j}, \forall\, i,j$$

And the pair of Homogeneous Non-Causality (HNC) null and alternative hypothesis is:

$$H_0: \beta_i = 0\ \forall\ i\ with\ (\beta_i = \beta_{1,i} = \beta_{1,j} = \cdots = \beta_{l,i} = \beta_{l,j}$$

$$H_1: \begin{cases} \beta i \neq 0\ \forall i = 1, \dots, N1 \\ \beta i \neq 0\ \forall i = N1+1, N1+2, \dots, N \end{cases}$$

The average statistic $W_{N,T}^{HNC}$ hypothesis can be written as follows:

$$W_{N,T}^{HNC} = \frac{1}{N}\sum_{i=1}^{N} W_{i,t}$$

Where $W_{i,t}$ is the individual Wald statistic values for cross section units, and the average statistic $W_{N,T}^{HNC}$, which has asymptotic distribution for T > N, associated with the null of HNC hypothesis, is defined as:

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2K}}\left(W_{N,T}^{HNC} - K\right)T, N$$

IV. Results

In this paper and to get clear idea about the HLM effect in Arabic coutries we test 4 panel samples, the first is the full sample (Panel A) and high income countries sample (Panel B), the middle income countries sample (Panel C) and finally the low income countries sample (Panel D).

IV.1. Unit root tests

In the case of unit root tests in panel data Maddala and Wu (1999), Hadri (2000), Breitung (2000), Choi (2001), Levin et al. (2002) and Im et al. (2003) claim that the cross section independence should be hold to run the panel unit root tests, but if there is a cross section dependence in the sample, this tests fail to test the unit roots and should apply SURADF, CADF, PESCADF and CIPS unit root tests, so, before checking the unit roots we must apply the cross section independence tests, and from the results obtain from table (5) there is no evidence of any cross section dependence for all series in the four samples according to Pesaran CD test.

Table 5: cross section independence test

variables	Panel A		Panel B		Panel C		Panel D	
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
CAB	4.88	0.000	2.72	0.006	3.17	0.001	2.36	0.003
TOT	24.27	0.000	13.18	0.000	4.45	0.000	3.97	0.000
GNS	6.27	0.000	8.78	0.000	4.03	0.000	-2.31	0.020
TRA	14.84	0.000	7.42	0.000	5.57	0.000	3.54	0.000

Now as the second step in testing the unit root tests we aplly two diffecrent tests (Levin, Lin and Chin(LLC) and Im, Pesaran and Shin W-stat (IMPS)) and the results are summarized in the following table, and the main result obtained from the table is that all the variables are I(1) so we can use the Pedroni test and Westerlund test for co-integration to test the long run relationship.

Table 6: the unit root tests results

		CAB		TOT		GNS		TRA	
	Tests	Level	1st diff	Level	1st diff	Level	1st diff	Level	1st diff
Panel A	**LLC**	-0.82	-5.83**	3.34	-4.65**	0.44	-3.16**	-1.71	-2.96**
	IMPS	1.28	-3.96**	3.42	-2.00**	1.31	-3.37**	3.19	-1.80**
Panel B	**LLC**	2.39	-2.35**	6.80	-2.40**	1.26	-3.89**	0.15	-3.38**
	IMPS	1.65	-1.25**	3.84	-1.34**	2.26	-1.89**	0.17	-2.34**
Panel C	**LLC**	-1.63	-2.64**	-0.22	-4.11**	1.76	-4.23**	-2.36	-4.80**
	IMPS	0.31	-1.91**	0.50	-1.87**	1.48	-2.90**	-1.03	-2.99**
Panel D	**LLC**	-0.56	-5.73**	0.84	-3.62**	-0.56	-2.85**	-0.73	-4.85**
	IMPS	1.21	-3.94**	1.35	-1.83**	-0.56	-2.91**	1.87	-2.82**

** denotes significant at 5% level.

IV.2. Co-integration test

Given the absence of cross sectional dependence and the I(1) series obtained from unit root tests, we are ready to proceed the Westerlund (2007) co-integration test which allows us to dealing with large degree of heterogeneity both for long run co-integration relationship and the short run dynamics, The Westerlund (2007) test has the null hypothesis of no co-integration by inferring whether the error correction term (ECT) in a conditional panel error correction model (ECM) is equal to zero and the alternative hypothesis depends on the specific test, while, the Gt and Ga test examine the alternative hypothesis that at least one unit

is co-integrated, and the Pt and Pa tests have the alternative hypothesis that the panel is co-integrated as a whole, and the results obtained from table (7) is that there no evidence of any long-run relationship among the variables for all the samples which mean there no co-integration relationship between the variables so we cannot run the PECM model, therefore we will depend on fixed and random effects models.

Table 7: Westerlund co-integration test results

tests	Panel A			Panel B		
	Stat	**Z-value**	**Prob.**	**Stat**	**Z-value**	**Prob.**
G_t	-1.324	0.932	0.865	-1.521	0.921	0.625
G_a	-2.658	1.698	0.752	-2.125	1.598	0.521
P_t	-2.345	0.543	0.896	-2.800	0.623	0.465
P_a	-3.075	0.912	0.714	-3.120	0.892	0.965
tests	**Panel C**			**Panel D**		
	Stat	**Z-value**	**Prob.**	**Stat**	**Z-value**	**Prob.**
G_t	-1.521	0.785	0.912	-1.512	0.734	0.524
G_a	-2.125	1.412	0.900	-2.256	1.445	0.802
P_t	-2.365	0.765	0.985	-2.278	0.707	0.812
P_a	-2.982	0.953	0.725	-2.614	0.901	0.743

IV.3. Panel estimation results

Follwing the co-integration test results, we should apply the fixed or random effects model to estimate the relationship between the variables, bu the question here is which model (fixed or random) is appropriate, for this reason at first we must run the Hausman test to choice between the two models, and we conclude that the optimal model for all samples is the random effects model when we accept the null hypothesis (probabilitis > 0.05).

Table 8: Hausman test

Panel A		**Panel B**		**Panel C**		**Panel D**	
Statistic	probability	Statistic	probability	Statistic	probability	Statistic	probability
3.31	0.3458	5.00	0.1720	1.75	0.6261	2.43	0.2365

Given the results on the table (9), the coefficients of TOT index are significant at 5% level, which means there is no effect from TOT index to CAB for all the samples, so we reject the HLM effect in the case of Arabic countries in the period of study and the terms of trade index have no effect on current account balance in both full sample nor the sub samples (high, middle and low income samples).

Tabel 9 : the random effects model results

variables	Panel A		Panel B		Panel C		Panel D	
	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.	Coeff	Prob.
TOT	-0.0003	0.072	-0.0001	0.882	-0.0001	0.510	-0.0014	0.071
GNS	0.0026	0.044	0.0075	0.000	0.0093	0.000	0.0011	0.702
TRA	0.9946	0.000	0.1095	0.031	-0.0133	0.000	0.9976	0.000
Cons	-0.0835	0.000	-0.0255	0.000	-0.0161	0.000	-0.0660	0.000
Wald t	239.50	0.000	66.08	0.000	218.79	0.000	212.43	0.000
R-sq	0.9995	/	0.2975	/	0.8883	/	0.9998	/

IV.4. Panel causality test

In order to check the long run causalities we depend on Dumitrescu-Hurlin non-causality, the findings are reported in table (10), at first, for the full panel the DH causality shows that there is a bi-directional causality in the long run between TOT and CAB and also between TOT and TRA whene there is a uni-directional causal relationship running from TOT to GNS, in the context of the panel B the table reveal that there are no long-run causal associations between all the variables, and the same result is obtained for the panel D except two uni-directional causal relationship running from CAB to TOT and from TOT to TRA, while in the case of panel C it's clear that there are a bi-directional causality between TOT and CAB and two uni-directional causality running from TOT to GNS and from TRA to TOT.

Tabel 10: Causality test results

tests	Panel A			Panel B		
	W-stat	Z-stat	Prob.	W-stat	Z-stat	Prob.
TOT causes CAB	2.612	3.024	0.002	1.338	0.194	0.845
CAB causes TOT	3.145	4.161	0.000	0.654	-0.670	0.502
TOT causes GNS	3.048	3.485	0.000	2.322	1.425	0.154
GNS causes TOT	2.056	1.593	0.111	1.784	0.749	0.453
TOT causes TRA	2.605	3.008	0.002	1.689	0.636	0.524
TRA causes TOT	4.111	6.223	0.000	1.246	0.077	0.938
tests	**Panel C**			**Panel D**		
	W-stat	**Z-stat**	**Prob.**	**W-stat**	**Z-stat**	**Prob.**
TOT causes CAB	4.449	4.326	0.000	1.605	0.428	0.668
CAB causes TOT	3.009	2.410	0.015	6.156	5.379	0.000
TOT causes GNS	3.573	2.432	0.015	2.737	1.630	0.103
GNS causes TOT	2.959	1.798	0.073	2.541	1.418	0.155
TOT causes TRA	1.392	0.260	0.794	4.242	3.296	0.001
TRA causes TOT	3.591	3.185	0.001	2.898	1.834	0.066

V. CONCLUSION

This paper has econometrically examined the existence of the HLM effect in 18 Arabic countries according to the effect of TOT (Terms of Trade) index on the CAB (Current Account Balance) including trade openness and gross national savings for annual panel data over the period 2000-2017, using co-integration analysis depending on Westerlud (2007) and non-causality analysis depending on Dumetriscu-Hurlin (2012) test, the aim of this paper is to bridging the gap of lack of studies in this area in Arabic countries.

Results from co-integration for the four samples (full, high income, middle income and low income countries) confirm that there is no long run relationship among the variables, this is what led us to rely on fixed and random effects models (we choice the random effects model according to Hausman test) which showed us that the TOT index does not affect the CAB in all the samples which are a support of the non HLM effect and the CAB in Arabic countries is not sensitive to the terms of trade movements, in this case, the major exports in Arabic countries are the primary commodities which are characterized by low price elasticity of demand, that's what it means the increase in TOT index does not necessarily mean improving the trade balance and the economic growth in the short run, according to Broda (2004), Aguirre (2011) and Uribe and Schmitt-Grohe (2016); the changes in TOT index can affect only the developing economies manifold and this is what the Arabic countries are losing, on the other hand, this gains from the improvements in TOT index (especially from the rising of oil prices from 2011 to 2014) can be lost in the white elephant projects (Pinto (1987), Murphy (1983), Robinson and Ragnar (2005) and Tayyaba (2012)).

On the other hand, the long run non-causality test DH reveals an HLM effect for the full sample and for the middle income countries sample by a bi-directional causal relationship between TOT and CAB and a uni-directional causal relationship running from TOT to GNS, we conclude that the effect of the TOT index on CAB is not an immediate effect.

Depending on these results, we suggest that Arabic countries especially the high income and low income countries (in addition to middle income countries) should focus on diversifying their export basket to stop or at least to decrease the dependence on fuel exports, it should also attain the full benefits from the TOT increases by investing in high-yielding investments.

CONFLICTS OF INTEREST AND PLAGIARISM: The authors declare no conflict of interest and plagiarism.

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