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Current Account Determinants in Jordan: An ARDL Approach

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Abstract

As one of the major indicators of assessing the external sector performance of any country, this paper empirically investigates the determinants of current account for Jordan. To this end, I rely on the estimation of a time series Auto-Regressive Distributed Lag (ARDL) model over the period 1994-2020. Consistent with the literature, I show that the fiscal deficit, trade openness, oil prices and the reserve changes are key determinants of the current account of Jordan. The relationships exposed in this paper complement the empirical literature by providing new evidence from a developing country like Jordan.

Keywords: Jordan, ARDL, Current account, Determinants.

1. Introduction

The successive crises that have arisen in the world and the middle east region in recent decades, the most recent of which were the financial crisis, the Arab spring, and the Corona pandemic, have led to aggravate the imbalances in the external sector in most countries in the world. Therefore, following up on developments in this sector, especially the behavior of the current account balance (CAB) reveals important results to ascertain the extent of the external sector strength in any economy and the efficacy of the adopted economic policies tools such as foreign reserves and fiscal spending to support sustainable economic growth.

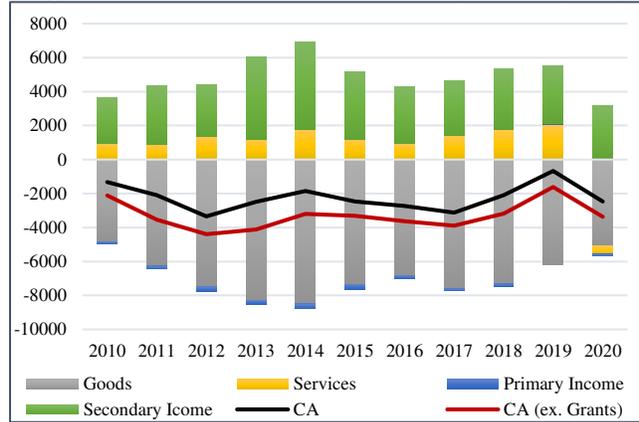
Persistent current account imbalances in many countries, especially the developing ones, stirred the concern among international institutions such as the International Monetary Fund (IMF) and the World Bank (WB), policymakers, and economists to make a clear comprehension of the CA imbalances role in macroeconomic insights. The determinants of a country's CA imbalances, whether these imbalances are structurally normal or need fundamental policy shifts to correct them are central issues to the debate on CA imbalances (Kwalingana & Nkuna, 2009). In addition, defining the determinants of the CA is one of the earliest steps to assess the sustainability of the current account deficit in the external sector assessment methodologies recently used.

Keeping in mind that the Jordanian economy is one of the small developing open economies, the surrounding conditions will affect it profoundly through the current account. Therefore, the adopted economic policies should be based on scientific evidences and studies, in order to assess its deficit sustainability and define the proper procedures to correct the imbalances to avoid balance of payment (BOP) crises and financial crises.

* The paper represents the author's views and does not represent the views of the institution in which the researcher works or its board of directors and the institution does not bear responsibility for what is stated in it.

The Jordanian current account is in a persistent deficit since 2005. Goods account represents the largest share in it, followed by the secondary account. Although the services share has recently increased, it has turned into a deficit in 2020 due to the consequences of Corona pandemic. In 2019, the CA deficit, including grants, reached the lowest level during the past fifteen years, 2.1% of GDP. However, the pandemic and its consequences: the lockdown and deteriorating global demand adversely affected the external sector, in particular, travel receipts and workers' remittances (the main buffers for the CAB). The CAD, including grants, widened to reach 8.0% of GDP.

Figure 1: Jordanian Current Account (millions of JD)



This study is organized into six sections. After the introduction, the following section includes the theoretical background discussion and then the literature review. The fourth section contains the methodology, data sources and the empirical model. Results are given in section five. Finally, conclusion and recommendations are discussed in section six.

2. Theoretical Background

In theory, there are several models explain the behavior of the CAB. Each model gives different predictions about the determinations of the CAB and the sign and magnitude of the relationships among the current account fluctuations and its determinants. Three well-known basic frameworks are commonly used to model the behavior of the current account and to assess the external sector; these are the elasticities approach and the absorption approach.

The elasticities approach (the BOP approach) observe the CA as the gap between exports and imports, which are determined by exchange rates, interest rates, relative prices, and the output gaps in current account adjustments (Metzler, 1948).

$$CAB(Y, REER, Y^w, \dots) + FAB(r-r^w, REER, \dots) = \Delta R$$

Whilst the absorption or structural approach (saving-investment approach), derived the current account from the national account identity and considers as the gap between aggregate saving and aggregate investment (public and private) perspective and smooths consumption over time by lending or borrowing abroad (Alexander, 1959; and Phillips et al., 2013).

$$Saving(NFA, Y, r, \dots) - Investment(Y, r, \dots) = CA(Y, REER, Y^w, \dots)$$

The third one is the monetary approach that see the current account as a monetary phenomenon and is determined by spontaneous supply and demand of money. Any disequilibrium that emerges in the markets for goods and financial assets or in the money market will be fully reflected in the

balance of payments. The changes in the money supply would lead to a proportional change in international reserves. In addition, the changes in money demand would lead to changes in international trade (Mundell, 1963).

$$M^s (m^*(R+D)) = M^d = (Y, r, P)$$

Where CAB is the current account balance, FAB is financial account balance, and R is the international reserve assets. M^s is the money supply and M^d is the demand for money. Y is indicate the output, REER is the real effective exchange rate, r is the interest rate, NFA is net foreign assets, P is the domestic price inflation rate, m is the money multiplier, and D is domestic financial asset. The superscript w denoting the counterpart foreign or world variables. Noting that there are other factors may shift the main variables such as demographics and external debt (Phillips et al., 2013).

3. Literature Review

The determinants of a country's CA imbalances, whether these imbalances are structurally normal or require fundamental policy shifts are central issues to the debate on CA imbalances (Kwalingana & Nkuna, 2009). In addition, the definition of the determinants of the CA is one of the earliest and most important steps for assessing the sustainability of the current account deficit in the external sector assessment methodologies that recently used by international institutions (Phillips et al., 2013). These determinants are chosen based on various theories and methodologies. The relationships between these determinants and the CAB behavior may be formed through different channels like saving and investment. Moreover, these relations may be affected by many endogenous and exogenous influences, in addition to differences in territories, the degree of development, its pillars and even the time-period concerned.

The CAB determinants could be distinguished to internal and external. For the external ones, the oil prices represent a significant exogenous factor affect the CA whether the country is a net exporter or importer of energy. Most of the conclusions indicate that higher oil prices improve the CA for oil exporting and non-oil exporting countries through workers' remittances, grants flows and/or international tourism (Aristovnik, 2007; Morsy, 2012; and Batdelger & Kandil, 2012). The corresponding output or demand could be another factor; most of the literature used it to validate the stages of development hypothesis. Aristovnik (2008), Batdelger & Kandil (2012), and Loayza et al., (2016) used the GDP of corresponding region to each study case.

According to the domestic determinants, most of the studies concluded at least one indicator related to government performance, Kwalingana & Nkuna (2009); Morsy (2012); and Bollano & Ibrahimaj (2015) used the fiscal balance to validate the twin deficit phenomenon. Almost all the literature support the twin deficit phenomenon, that is, the CA deficit and fiscal deficit are notably tied. According to the investment channels, many indicators have been used in the literature; Aristovnik (2007) used the total investment, Brissimis et al., (2012) used the private investment, while Ariyani et al., (2018) and Feriyantoa (2020) used the FDI. The results show that investment variables have negative effects on the CA movements, as the literature assent. Other important

factor is the external trade that can be represented by terms of trade and trade openness, Chinn & Prasad (2003); Aristovnik (2007); and Fayaz & Sandeep (2016) and many others adopted the openness in their regressions, as the external trade constitute a significant proportion in the CA. The literature has consensus about the negative affect of the trade openness on the CAB. The financial factors are used to enhance the regression fitness such money supply, Net Foreign Assets (NFA) and reserve changes. Aristovnik (2007) and Feriyantoa (2020) used the money supply, Chinn & Prasad (2003), Morsy (2012), and Fayaz & Sandeep (2016) used the NFA, while Phillips et al., (2013) used reserve changes. The literature show that increasing NFA or foreign reserves will lead to the betterment of the CA performance.

The literature is rich in panel studies as well as the time series studies. According to a panel and cross sectional studies, Aristovnik (2008) tested the short-term empirical link between the CAD and set of variables proposed by the literature for the emerging economies of Eastern Europe & the former Soviet Union from 1992 to 2003. Morsy (2012) examined the main determinants of the medium-term CAB for oil-exporting countries using a panel dataset for 28 oil-exporting economies over the 1970-2006 period. Bollano & Ibrahimaj (2015) investigated the determinants of CAs for a sample of 11 Central and East European Countries outside the Euro area over the period 2005Q1 to 2014Q4. Ariyani et al., (2018) analyzed the factors that influence the export activity in the ASEAN region countries such as Indonesia, Singapore, Thailand, Malaysia, Philippines & Vietnam during 2001-2016 by using annual data.

Many studies examine the economic relationship between the CAB and its determinants focusing on individual countries. Bitzis et al., (2008) considered the evidence from Greece; they investigate empirically the factors that have affected the Greek CAB, primarily after the EMU accession over the period 1995Q1-2006Q4. Kwalingana & Nkuna (2009) identified the long run and short run determinants of Malawi's CAD using annual data from 1980 to 2006. Batdelger & Kandil (2012) studied the role of public and private imbalances in the behavior of the CAB in the United States Using neoclassical intertemporal model for seasonally adjusted annual data 1960-2004. Fayaz & Sandeep (2016) tried to enrich the existing literature on the trends, patterns and determinants of CAD in India since 1996Q2 to 2013Q4. Feriyantoa (2020) investigated the relationship between exchange rate, domestic Money Supply, real GDP, and FDI on Indonesia's CAB in the short and long term during the period 2000-2017.

The examination of the relationship between the CA and its determinants for Jordan have been still insufficiently explored in the literature. The main available efforts are the following; a study based on panel-regression techniques by Aristovnik (2007), which examine the short & medium term empirical link between the CAB & a set of economic variables proposed by theoretical and empirical literature to 17 MENA countries during the period 1971-2005. In addition, a study based on a cross section and panel regression techniques by Chinn & Prasad (2003) that empirically investigate the medium-term determinants of CAs in 18 industrial countries and 71 developing countries, based on structural approach highlights the determinants of saving and investment for the period 1971-1995.

4. Methodology

This paper develops a model that incorporates the three theoretical views mentioned above for the analysis of Jordanian current account. Therefore, the empirical part adopts the Auto-Regressive Distributed Lag (ARDL) model that developed by Pesaran et al., (2001). Considering the current account (CA) as a function of a set of economic variables proposed by theoretical and empirical literature. In order to assess the long- and short-term macroeconomic relationships between the CA and its determinants in Jordan, the following basic formulation is specified:

$$\Delta CA_t = \alpha_0 + \sum_{j=1}^j \beta_0 \Delta CA_{t-j} + \sum_{j=0}^6 \beta_{it-j} \Delta X_{it-j} + \sum_{i=1}^6 \beta_{it-1} X_{it-1} + \varepsilon_{it}$$

Hereby, CA_t is the current account balance that obtained from the Central Bank of Jordan (CBJ). X_{it} is a vector of variables including FISCAL_BALANCE the fiscal balance that obtained from the Ministry of Finance (MOF), this variable is considered to influence the CAB through saving, investment in the goods market as stated in the absorption approach. OPENNESS is the external trade openness rate, which calculated by dividing the summation of exports and imports by the nominal GDP and obtained from CBJ, and this variable is considered to affect the CAB through interest rates and relative prices as stated in the elasticities and the monetary approaches. OIL_PRICE is the growth rate of crude oil prices that obtained from Federal Reserve Economic Data (FRED). GLOBAL_GDP is the growth rate of global nominal GDP that obtained from World Bank's database World Development Indicators (WDI) and is considered to affect the CAB through saving and investment channels. RESERVE_CHANGE is the change in foreign reserves that obtained from the CBJ and is considered to influence the CAB through the monetary policy as stated in the monetary approach. GCF is the gross capital formation from WDI and is considered to affect the CAB through the investment channels. The parameter α_0 is the constant, β_i and β_0 represent a vector of coefficients to be estimated. ε_{it} is the error vector. The subscript t , j , and i represent the time, number of lags, and number of variables respectively.

As stated before, the main objective of this study is to analyze the empirical relationship between the current account and its determinants for Jordan using annual data covering the period of 1994 to 2020 by one of the key empirical tools in macroeconomics, the Auto-Regressive Distributed Lag (ARDL) model. As it is well known, the results are sensitive to the lags order in the auto-regression, time-period, the type of selected variables, and to other factors. The adopted model is suitable for predictions and its conclusions are useful for policy makers.

ARDL models are considered as flexible models as they estimate the dynamic interaction and long & short run relationships among the variables (Pesaran et al., 2001). They allow us to define the cointegration relationships between different variables in the long-run and the short-run and to define the optimal lags number associated with each variable. The main feature of these models is considering all the interactions of variables without imposing theoretical constraints on them. Preliminary tests are performed to ensure the validity of using ARDL and avoid spurious results.

5. Results

a) Diagnostic tests

Firstly, the stationarity of the time series is analyzed in order to determine the degree of integration for each variable. Among the stationarity tests, Augmented Dickey-Fuller (ADF) test is performed, and the results revealed that some variables are integrated of order zero (I(0)) and other variables are integrated of order one (I(1)) as shown in the table (1) below:

Table 1: Results of the Augmented Dickey-Fuller test of unit root

Variables	level	Exogenous	Statistic	Critical	sign at	Lags
CAB	I(1)	Constant	-4.9759	-3.7378	0.0006	1
FISCAL_BALANCE	I(1)	Constant	-5.6388	-3.7241	0.0001	0
OPENNESS	I(1)	Constant	-3.8490	-3.7241	0.0075	0
OIL_PRICE	I(0)	Constant	-4.0830	-3.7115	0.0042	0
GLOBAL_GDP	I(0)	Constant	-4.4779	-3.7115	0.0016	0
RESERVE_CHANGE	I(0)	Constant	-5.0985	-3.7241	0.0004	1
GCF	I(1)	Constant	-3.2593	-3.7241	0.0282	0

ARDL like other auto-regressive models they are very densely parametrized: if lag length is short, the model may be specified poorly, but if it is long, too many degrees of freedom will be lost. The number of lags should be sufficient for the residuals from the estimation to constitute individual white noises and to avoid poor-quality estimates. Therefore, the ARDL method selected the number of lags for each variable depending on the maximum number of lags, which is two lags for small sized samples depending on different criterions (Narayan, 2004).

Table 2: Lag Order Selection Criteria

Lag	LogL	sequential modified LR test statistic	Final prediction error FPE	Akaike information criterion AIC	Schwarz information criterion SC	Hannan-Quinn information criterion HQ
0	-1104.049	NA	9.43e+29	88.88394	89.22523	88.97860
1	-997.1647	145.3631	1.08e+28	84.25317	86.98345	85.01044
2	-900.0768	77.67032*	7.23e+26*	80.40614*	85.52542*	81.82601*

* indicates lag order selected by the criterion

The next step is to test for the integration among the variables of interest. Co-integration tests aim to test the existence of a long-run equilibrium relationship in multivariate models. Thus, cointegration establishes a strong statistical and economic base for empirical error correction models (ECM). Therefore, F-Bounds test is performed and revealed the existence of long-run equilibrium relationship among the considered variables. The value of F-statistic is greater than the values of critical upper bounds at 1% significance level.

Table 3: F-Bounds Test

Test Statistic	Value	Significant	I(0)	I(1)
F-statistic	8.685846	10%	2.12	3.23
k	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43

* Null Hypothesis: No levels relationship

Conducting various diagnostic tests is an important step in time series modeling. It is necessary to check whether the model has statistical problems such the serial-correlation, heteroscedasticity and non-normal distribution. The results show that there are no problems among the residuals in the model. Which indicate that the model specification and the lag length is fair for the regression.

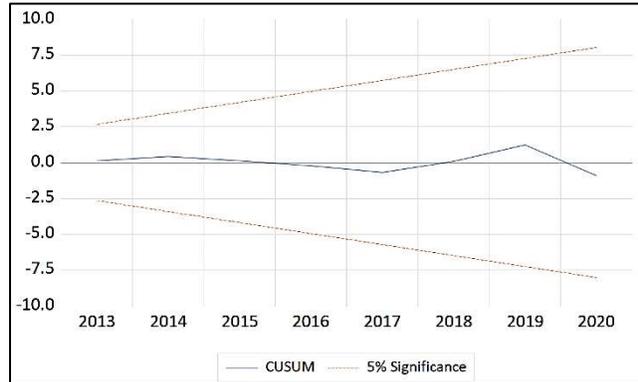
Table 4: Diagnostic tests

	F-statistic	Probability
Breusch-Godfrey Serial Correlation LM test	0.439596	0.6635
Breusch-Pagan-Godfrey Heteroscedasticity test	0.765863	0.6917
The Jarque-Bera Normality test	0.909456	0.6346

* Null hypothesis: No problem.

Stability tests examine whether the parameters of the model are stable across various subsamples of the data; that is, is there obvious points at which a break in structure might have taken place or there is no reason a priori to expect a structural break. The CUSUM test is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines (two standard errors). The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines. The test result clearly indicates stability in the equation during the sample period.

Figure 2: CUSUM Stability test



b) Regression results

In general, the results of the short run analysis show that there were short-term imbalances in the analysis of interested variables that corrected in the long-term analysis. The results of the short-term analysis also show that global output growth (GLOBAL_GDP) has a significant positive influence on the current account until the first lag. In addition, the change in the foreign reserve at the Central Bank (RESERVE_CHANGE) has a positive impact on the CAB. While the Gross Capital Formation (GCF) has a significant negative effect on the CA performance.

Table 5: ECM Regression

Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5249.643	508.2319	10.32923	0.0000
D(CAB(-1))	-1.333977	0.174335	-7.651795	0.0001
D(FISCAL_BALANCE)	0.217911	0.172297	1.264737	0.2416
D(FISCAL_BALANCE(-1))	-3.290762	0.442991	-7.428502	0.0001
D(OPENNESS)	38.55589	11.13305	3.463191	0.0085
D(OPENNESS(-1))	48.98507	10.79782	4.536571	0.0019
D(GLOBAL_GDP)	107.5531	12.54066	8.576352	0.0000
D(GLOBAL_GDP(-1))	60.92837	9.511480	6.405772	0.0002
D(RESERVE_CHANGE)	1.154155	0.108215	10.66537	0.0000
D(GCF)	-0.671463	0.104910	-6.400375	0.0002
CointEq. (-1)	-0.525488	0.050943	-10.31512	0.0000
R-squared	0.934845	Mean dependent variance		-91.87720
Adjusted R-squared	0.888306	S.D. dependent variance		806.3015
S.E. of regression	269.4717	Akaike info criterion		14.33099
Sum squared residual	1016610.	Schwarz criterion		14.86729
Log likelihood	-168.1373	Hannan-Quinn criterion		14.47973
F-statistic	20.08720	Durbin-Watson stat		2.125721
Prob. (F-statistic)	0.000001			

The error correction term is negative, thus, that the system is able to converge to the long-run position each time we have a shock in the external sector. The rate of adjustment to the long-run position is intermediate, as evidenced by the size of the coefficient at 0.53

Table 6: Levels Equation

Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FISCAL_BALANCE	5.805536	2.534819	2.290315	0.0512
OPENNESS	-153.8703	71.61039	-2.148714	0.0639
OIL_PRICE	-76.34675	40.00564	-1.908400	0.0928
GLOBAL_GDP	219.6098	152.8432	1.436831	0.1887
RESERVE_CHANGE	3.196902	1.346590	2.374072	0.0450
GCF	1.485598	0.889244	1.670629	0.1333
EC = CAB - (5.8055*FISCAL_BALANCE -153.8703*OPENNESS -76.3468*OIL_PRICE + 219.6098*GLOBAL_GDP + 3.1969*RESERVE_CHANGE + 1.4856*GCF)				

According to the long-term analysis, the results of the analysis, which were identical to the expectations, economic theories, and the empirical literature related to the current account performance and its determinants. The results show a positive and statistically significant impact of the government budget (FISCAL_BALANCE) on the current account, as an increase in the budget by one million dinars may increase the current account by JD 5.8 million, supporting the hypothesis of the existence of the phenomenon of twin deficit in Jordan. This result is similar to what concluded by Morsy (2012) and Bollano & Ibrahimaj (2015) and many others.

The results show a negative and significant influence of trade openness (OPENNESS) on the current account balance, as the increase in openness increases the current account deficit by JD 153.9 million, and the effect may lie due to the large proportion of imports in the volume of foreign trade in Jordan. This has been confirmed by many studies such as Aristovnik (2007) and Fayaz & Sandeep (2016) and others.

While the results show statistically significant negative effect of the growth of international oil prices (OIL_PRICE) on the current account performance, as an increase in prices will lead to an increase in the current account deficit of JD 76.3 million. This may be attributed to the high cost of energy imports, international transport and the prices of imported goods. Most of the conclusions in literature indicate that higher oil prices improve the CA for non-oil exporting countries through remittances, aid flows and/or international tourism. While in the case of Jordan, it appears that the effect of oil price on imports is stronger than the effect through these channels.

The impact of global output growth (GLOBAL_GDP) was positive on the current account, but it is not statistically significant. The increase in the growth of global output may lead to an increase in global demand and thus a rise in exports. However, the rise in exports is constrained by the elasticity issues of exports structure for the Jordanian economy, almost 50% of Jordanian exports is raw materials and intermediate goods. So, the effect may be is too weak to be significant.

It was also found that there is a positive and significant influence of the change in the foreign reserve at the Central Bank (RESERVE_CHANGE) on the current account balance, as an increase in the reserve by JD 1 million may improve the current account by JD 3.2 million. It is worth to note that this variable is selected as a policy variable adopted to improve the fitness of the model regression. This result is similar to what be found in Phillips et al., (2013).

Finally, the effect of Gross Capital Formation (GCF) or gross domestic investment was positive on the current account performance, but it was not statistically significant. This may be attributed to its positive impact on the CAB through expanding the production base. Thus, increasing exports and its negative impact on the CAB in terms of rising imports at the same time. The result is inconsistent with the literature, which indicate the stronger positive effect of GCF on exports rather than its negative effect on imports.

6. Conclusions and Recommendations

As one of the major indicators of assessing the external sector performance of any country, this paper aims to investigate the determinants of current account for Jordan. To do this, I rely on the estimation of a time series ARDL model over the period 1994-2020. Consistent with the literature, I show that the fiscal deficit, trade openness, oil prices and the reserve changes are key determinants of the current account of Jordan. In particular, the results of the short run analysis confirmed that global output growth and the change in the foreign reserve at the Central Bank have a significant positive influence in the current account, while the Gross Capital Formation has a significant negative effect on the CA performance. Where the results of the long run analysis

confirmed the existence of twin deficit phenomenon in Jordan. Also, the negative impact of trade openness on the CAB; due to the large proportion of imports in the goods account. In addition, the negative impact of international oil prices on the CA performance. Finally, the positive effect of the reserve changes held by the CBJ on the CA, which work as a financial buffer to the BOP. The relationships exposed in this paper complement the empirical literature by providing new evidence from a developing country like Jordan.

Based on the foregoing, decision-makers must consider many avenues. Including: (I) reducing the fiscal deficit, by increasing the tax base, not by raising the level of taxes, and the tax base can be increased by reducing tax evasion, improving the business environment, and many other measures that do not affect the standard of living of Households. (II): Studying the structure of external trade in terms the elasticities of exports and imports and studying ways to develop the structure of the external trade such as reducing the dependence on traditional energy sources and gradual transition to sustainable energy sources. Another procedure is developing the production base to increase the level of capital goods that have a greater return than the raw materials and intermediate goods. (III): Maintaining the strength of the financial position in Jordan, because of its positive effects on macroeconomic stability.

Declarations

- Ethics approval and consent to participate: Not applicable.
- Funding: Not applicable.
- Authors' contributions: Not applicable.
- Acknowledgements: Not applicable.
- Consent for publication:

I transfer to the publisher the non-exclusive publication rights and I warrant that my contribution is original and that I have full power to make this grant. I accept responsibility for releasing this material. This transfer of publication rights covers the non-exclusive right to reproduce and distribute the article, including reprints, translations, photographic reproductions, microform, electronic form (offline, online) or any other reproductions of similar nature.

- Availability of data and materials:

The data related to openness and reserves change are generated & analyzed during this study are available in the CBJ's website, <https://www.cbj.gov.jo/Pages/viewpage.aspx?pageID=66>. The data related to fiscal balance are generated during this study are available in the MOF's website, https://mof.gov.jo/EN/List/General_Government_Finance_Bulletins. The data related to growth of oil prices are generated & analyzed during this study are available in the FRED's website, <https://fred.stlouisfed.org>. The data related to growth of global GDP & GCF are generated and analyzed are available in the WDI's website, <https://databank.worldbank.org/source/world-development-indicators>. Requests for material should be made to the author.

- Competing interests:

I certify that I have NO affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this work.

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