Twin deficit in MENA countries: an empirical investigation

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This paper tests the relationship between current account and budget deficits in eight MENA countries using time-series data for the period 1990-2012. The paper uses cointegration analysis, error correction modelling and Granger causality test under a vector autoregression framework. The results show that the direction of causality for the MENA countries is mixed. The findings confirm that current account deficit causes budget deficit for Kuwait and Egypt, whereas the reverse causality is true for Saudi Arabia supporting the twin deficit hypothesis. The results show also that there is no relationship between two deficits for other countries supporting Ricadian equivalence hypothesis (REH).

Keywords: Twin deficit, fiscal deficit, current account deficit, Granger Causality
JEL Classifications: H6, C5 H62, H6, F32

1. Introduction

Persistent fiscal and current account deficits are a major policy concern in developing and developed countries as well as in emerging economies. This is because large fiscal deficits may lead to crowding-out of private investment if they cause interest rates to rise. The causal

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relationship between budget deficit (BD) and current account deficit (CAD) is widely known as "the twin deficits hypothesis". In an attempt to study the twin deficits problem, numerous researchers have theoretically and empirically investigated the possible linkages between BD and CAD. The two major strands of the twin deficits analysis are the conventional or Keynesian approach and the Ricardian approach (Forte and Magazzino, 2013).The Keynesian approach states that BD causes CAD, and argues that fiscal deficit comes into being due to expansionary fiscal policy which enhances local expenditures or absorption for imports, therefore, the continuous increase in imports will start increasing the trade deficit (Abell, 1990; Bahmani-Oskooee, 1992,1995; Normandin, 1999; Vamvoukas, 1999; Hatemi and Shukur, 2002; Salvatore, 2006).

From the above, the Keynesian proposition can be summarized that there exists a unidirectional Granger causality that runs from BD to CAD. However, causality from the CAD also may exist. This outcome occurs from deterioration in the current account that leads to the BD increases. This is especially true for developing countries that depend on foreign direct investment as a way to improve their economic growth. In other words, the budgetary position of a country will be negatively affected by large capital inflows or through debt accumulation. This reverse causality running from CAD to BD is termed as Current Account Targeting Hypothesis (CATH) by Summers (1988). Abell (1990), Kearney and Monadjemi, (1990), Khalid and Guan (1999), Kouassi et al (2004), Marashdeh and Saleh (2006), Marinheiro (2008), Katircioglu et al 2009; Kalou and Paleologou (2012) , Sobrino (2013) and Nikiforos et al (2015) found support for the CATH. Other studies show that there is bi directional Granger causality between current account and government budget deficit (Arize and Malindretos, 2008; Magazzino, 2012; Xie and Chen, 2014).

On the contrary, the Ricardian Equivalence Hypothesis (REH) proposed by Barro (1989) argues that there is no relationship between the two deficits. In other words, BD do not result in CAD. It is shown that changes in government revenues or expenditures have no real effects on the real interest rate, investment, or the current account balance (Miller and Russek, 1989; Dewald and Ulan, 1990; Enders and Lee, 1990; Kaufmann et al, .2002; Xie and Chen, 2014). Any fiscal contraction or expansion induces inter temporal reallocation of savings, leaving the current account balance unchanged (Kosteletou, 2011).

Existing empirical evidence on the twin deficit hypothesis is mixed and largely inconclusive. Early work, based on simple single equation models, includes Milne (1977), Bernheim (1988), Bryant, Holtham, and Hooper (1988). These authors report a positive relationship between the two deficits, supporting the hypothesis. More recent studies often use vector autoregressive (VAR). Darrat (1988), Abell (1990), Kalou and Paleologou (2012), Tiwari et al (2015) supports the hypothesis. However Enders and Lee (1990) find no significant association between the deficits. Kim and Roubini (2008), Corsetti and Müller (2006) report a negative relationship.

Other studies find that the existence of twin deficits is investigated by regime-dependent impulse response functions and forecast error variance decompositions based on a multivariate two-regime threshold VAR (TVAR) model. In this context, Çatık, Gökand and Akseki (2014) suggest that the dynamics between the current account and budget account variables are affected by macroeconomic activity: Twin deficits are only the case in the upper regime, when the economy operates above its potential level. When the economy is in the lower regime, budget and trade deficits show divergent movements.

Another strand of the literature examines the cointegrating relationship between the CAD and the BD that is implied by the twin

convergence hypothesis. Cointegration techniques being able to account for possible structural breaks and so to detect more exactly the existence of a long-run relationship between the two deficits (Bagnai, 2006; Grier and Ye, 2009). Dibooglu (1997) was able to detect such a cointegrating relationship. Daly and Siddiki (2009) find a long-run relationship between BD, real interest rate and CAD in 13 out of 23 countries (OECD), whereas the number of countries with apparent long-run relationships is dramatically reduced when regime shifts are not permitted. They argue that, when structural breaks are taken into account, it seems to be the countries with a more extensive financial infrastructure in which the twin deficits are less likely to be conjoined. A step further, Holmes (2011) tested the relationship in question by means of the threshold cointegration approach, allowing for different regimes in the short-run dynamics. He concluded in favor of positive cointegrating relationship between the current account and budget balance. This supports the notion of a Keynesian twin deficits relationship. Trachanas and Katrakilidis (2013) also examine the relationship between the fiscal and CAD of five European countries. The results of the Hansen cointegration test support the validity of twin deficits for four countries. More recently, Ahmad et al (2015) investigates the relationship between the BD and the CAD using the threshold cointegration approach of Hansen and Seo (2002) for nine African countries. They find a long-run positive cointegrating relationship for six out of the nine countries examined, while the relationship is negative for the other three. This provides qualified support for the twin convergence hypothesis. Ravinthirakumaran et al (2016) doesn't detect any cointegration relationship between BD and CAD for SAARC[2] countries. While, Ahmad and Aworind (2015) *find* that there *exists* a *long-run relationshi*p between the two deficits for a sample of twelve African countries using ARDL approach.

[2] South Asian Association for Regional Cooperation.

It is no surprise that the number of studies empirically examining the twin deficits hypothesis is quite high as it is a very important and interesting topic for policy analysts. As discussed previously, empirical results on the direction of the causal relationship between BD and CAD have been rather mixed. We review some of the highly influential studies on the twin deficits hypothesis, for developing, emerging and developed countries. Table 1 summarizes the findings of these studies. As can be seen, the findings on the direction of causality between BD and CAD are mixed. Some studies support the causality from BD to CAD, confirming the twin deficits hypothesis. Other studies support causality from CAD to BD, while few studies support bi-directional causality or do not find causality in either direction.

This paper contributes to this literature by investigating relationship between these two deficits in a sample of eight MENA countries (Tunisia, Morocco, Egypt, Jordan, Oman, Iran, Kuwait and Saudi Arabia). These countries, especially non-oil countries have experienced both the current account and the fiscal deficits that led to an introduction of economic reforms to address these deficits among others[3].

The next section presents the analytical framework of the twin deficits hypothesis. Section 3 introduces the econometric methodology that we employ, discusses the sources and definitions of the data used. Section 4 draws some conclusions and policy implications.

[3] Another reason for including these countries is availability of necessary data required for the analysis.

Table 1

Twin deficit in the literature

Author	Country and period	Methodology	Results
Abell (1990)	USA, 1979-1985	Granger causality test	BD causes CAD
Hatemi and Shukur (2002)	USA, 1975–1998	Bootstrap Granger causality test	BD causes CAD for 1975–1989 CAD causes BD for 1990–1998
Fidrmuc (2003)	10 OECD countries, 1970–2001	Johansen's cointegration test and Granger causality test	Twin deficits emerged in the 1980s, but not in the 1990s
Baharumshah , Lau, and Khalid (2006)	ASEAN, 1976-2000	Structural VAR	BD causes CAD
Kim and Kim (2006)	Korea, 1970–2003	Toda and Yamamoto (1995) test	CAD causes BD
Acaravci and Ozturk (2008)	Turkey, 1987-2005	ARDL bounds testing approach	BD causes CAD
Marinheiro (2008)	Egypt, 1974–2003	Johansen's cointegration test and Granger causality test	CAD Granger causes BD
Sobrino (2013)	Peru, 1980-2012	Granger causality–wald test Toda and Yamamoto's (1995) modified Wald test	Reverse causality between two deficit
Trachanas and Katrakilidis (2013)	Portugal, Ireland, Italy, Greece, Spain, 1971–2009	Gregory and Hansen's (1996) test and Schorderet's (2003)	The evidence is in favor of the "twin deficits hypothesis by using asymmetric cointegration test

Xie and Chen (2014)	11 OECD countries 1980-2010	The bootstrap panel cointegation and SUR cointegration approaches	Bi-directional causality between the CAD and the BD for eleven OECD countries
Çatık, BGök and Akseki (2015)	Turkey, 1994-2012	TVAR model	BD causes CAD
Neaime (2015)	Lebanon, 970-2013	VAR and Granger causality test	Uni-directional causal relationship, in the short run, between the BD and CAD
Nikiforos, Carvalho and Schoder (2015)	Greece, 1980-2010	Granger causality test	Causality ran from the CAD to the BD
Ravinthirakumaran Selvanathan and Selvanathan (2016)	SAARC countries, 1980-2012	VAR and Granger causality test	BD causes CAD for Pakistan and Sri Lanka, whereas the reverse is true for Bangladesh, India and Nepal.

2. The analytical framework

To examine the causal relationship between BD and CAD, by using the national account identity for an open economy, we present a model for comparing the twin deficits hypothesis against the Ricardian equivalence hypothesis (Fidrmuc, 2003; Bagnai, 2006). Equation (1) below indicates how domestic output (*Y*) is divided between private consumption (*Cp*), private investment (*Ip*), government expenditure for consumption and investment purchases (*G*), exports and imports of goods and services (*X* and *M*, respectively).

$$Y = Cp + Ip + G + X - M \quad (1)$$

If we assume that net income and transfer flows is negligible, then

CAB is equal to the trade balance (X – M). One can rewrite identity 1 by defining BD as the sum of government expenditure less tax revenue (*T*), and the CAD of the balance of payments (*CAB*), together with private savings (*Sp*) as follows:

$$BD = G - T \quad (2)$$

$$CAB = X - M \quad (3)$$

$$Sp = Y - T - Cp \quad (4)$$

Using the above equations, a direct relationship between the two deficits can be specified as:

$$BD = CAB + (Ip - Sp) \quad (5)$$

Equation (5) states that the BD (or surplus) is equal to the CAD (or surplus) plus the excess of investment over private savings.

Suppose that the government fixes spending (*G*), and cuts taxes (*T*) thereby creating a deficit.

Looking at the macroeconomic identity (5), we can see that two extreme cases are possible. If we assume that difference between private savings and investment is stable over time, the fluctuations in the BD will be fully translated to CAD and the twin deficits hypothesis will hold. The second extreme case is known as the Ricardian Equivalence Hypothesis, which assumes that a change in the BD will be fully offset by a change in savings and BD would not cause a twin deficit.

3. Twin deficits in MENA countries: econometric analysis

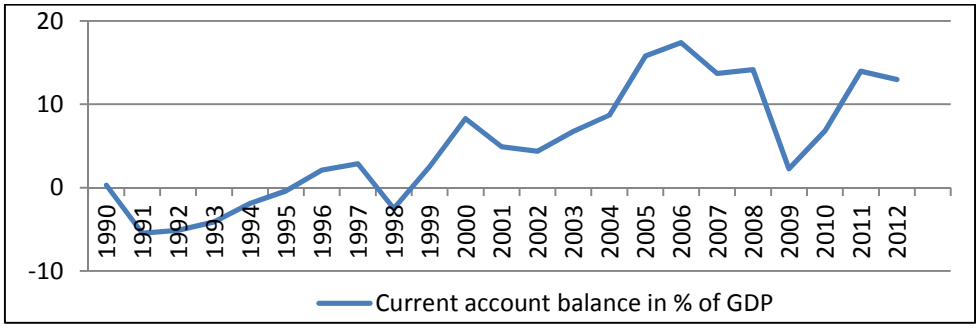
Since early 1990s, the MENA region witnessed an unprecedented increase in both the CAD and BD. Figure 1 shows that the CAB of the MENA region generally increased after the 1990s. During the earlier years of 1990, the MENA average was negative. But after the

second half of 1990s in particular, the CAB showed an increasing trend. Only in 2009, through the negative effect of the 2008 crisis, the CAB was negative. After the crisis, the MENA region achieved a positive balance. This shows that in general, that the CAB of MENA countries during their process of integration process to global was positive (Christiansen and Erdoğdu, 2015).

Besides, the increase in public spending of oil importers during the period of political turmoil and the system of subsidies have resulted in high BD and public debts. The overall BD to GDP ratio in these countries remains wide at 10 percent in 2014 and 9.1 percent in 2015. Due to the high government spending resulting from the subsidies and the need to calm social unrest, the BD in many oil importers are higher than 5 percent of the GDP. This is increasing the public debt burden. The high level of BD leaves these countries vulnerable to economic or political shocks. Although the fiscal situation is better in the oil exporting countries, the outlook may deteriorate in the upcoming period in line with the decline in oil prices. According to IMF (2015), fiscal balances are also severely affected by lower oil prices.

Figure 1

Current Account Balance of MENA countries



Source: World Economic Outlook Database (IMF, 2014)

The objective of this section is to examine the validity of the twin deficit hypothesis using time series data for our sample of eight MENA countries (Tunisia, Egypt, Morocco, Iran, Oman, Jordan, Saudi Arabia and Kuwait). In this paper, we not only examine the empirical validity of the twin deficits hypothesis for our sample but also determine the direction of causality. The findings of this empirical analysis will help to formulate appropriate policies for some countries facing the tremendous problem of budget and CAD. These empirical tests will also provide cross-country comparisons regarding the presence of any long-run relationship between the two deficits.

3.1. Data and methodology

The empirical investigation in this study is carried out using a panel data set for a sample of MENA countries with annual data over the years 1990–2012. The data utilized in this study for both budget BD and CAB are from the World Bank (WDI), World Economic Outlook (WEO), International Monetary Fund, Ministry of Finance and Central bank of concerned countries. The econometric analysis was performed using the Eviews 8 econometric software.

3.2. Result and interpretations

In order to avoid spurious regression estimation results of the model between BD and CAD, the first step is to test for the stationarity of all the variables. For this purpose, we use the augmented Dickey Fuller (ADF) unit-root test. Even if the time-series variables included in a regression model are non-stationary, it is possible to avoid spurious regression if the variables are cointegrated. The Johansen and Juselius (1990) maximum likelihood method is then used to identify the number of cointegrating vectors. The next step is to form an error correction model (ECM) to see the short-run dynamics and the long-run relationship simultaneously. Granger causality tests are then applied in both single equation and vector autoregressive (VAR) to

identify the causal relationship and its direction between the two deficits for the sample countries.

3.2.1. Unit root test results

The first step in testing a causal relationship between two or more series is to test the time series properties of the data. First, we test the stationarity (or non stationarity) of the series used in this analysis. Table 2 provides the results of the unit root test for both series (BD and CAD) for all eight sample countries. Non-stationarity of either deficit cannot be rejected at 1% significance level in seven of the eight countries considered.

Table 2

ADF unit-root test results

	BD to GDP ratio		CAD to GDP	
	Level	1st Difference	Level	1st Difference
Tunisia	0.0725	0.001***	0.5347	0.0016***
Egypt	0.8119	0.000***	0.2669	0.0043***
Morocco	0.2587	0.0005***	0.7389	0.0003***
Jordan	0.2885	0.0000***	0.3532	0.0054***
Oman	0.3571	0.0018***	0.1028	0.0024***
Iran	0.1107	0.0001***	0.1204	0.001***
Saudi Arabia	0.1894	0.000***	0.8375	0.002***
Kuwait	0.000***		0.0059***	

*** Significant at 1 per cent level.

The results indicate the presence of unit roots in the original series in level form for seven countries and that they are all stationary in their first differences. Thus, all variables are integrated of order one, I(1). The results indicate also that the BD and the CAD are stationary in level for Kuwait.

3.2.2. Cointegration test results of CAD and BD

Since for seven countries, both the BD and CAD series are I(1), we need to test whether they are cointegrated. This is important in determining whether causality tests should be performed in levels or first difference. If the series have unit roots but are not cointegrated then the causality test will be performed in first difference. However, if the series have unit roots and are cointegrated, then we will perform the causality tests in levels or will develop an error-correction model to determine the presence and direction of a causal relationship between the two series. We use the Johansen (1988) and Johansen and Juselius (1990) cointegration technique, which determines the number of cointegrating vectors for any set of I(1) variables based on the Trace and Maximum Eigenvalue tests. We perform cointegration test on both of the following equations:

$$CAD_t=\alpha_1+\alpha_2 BD_t+\mu_t$$

or

$$BD_t=\beta_1+\beta_2 CAD_t+\eta_t$$

The results are reported in Table 3. These results suggest that the two series (BD and CAD) are not cointegrated for Tunisia, Morocco, Jordan and Saudi Arabia. The series show a long-term relationship (are cointegrated) for Iran, Egypt, Kuwait and Oman, because the null of no cointegration cannot be rejected at the 5 percent level. Based on these results, further tests of Granger causality for Tunisia, Morocco and Jordan are performed using data in first difference, while tests for Iran, Egypt, Kuwait and Oman are based on levels.

Table 3

Johansen Cointegration Test

	Eigenvalue	Trace Statistic	5per cent critical Value	Prob**	Max-Eigen Statistic	5per cent critical Value	Prob**
Oman							
None *	0.628949	23.6390	15.49471	0.0024	20.81972	14.2646	0.0040
At most 1	0.125633	2.81935	3.841466	0.0931	2.819358	3.84146	0.0931
Egypt							
None *	0.636363	21.4966	15.49471	0.0055	21.24359	14.2646	0.0034
At most 1	0.011977	0.25304	3.841466	0.6149	0.253043	3.84146	0.6149
Iran							
None *	0.421017	16.3369	15.49471	0.0373	11.47611	14.2646	0.1319
At most 1	0.206632	4.86081	3.841466	0.0275	4.860818	3.84146	0.0275
Jordan							
None *	0.243252	7.56627	15.49471	0.5129	5.853219	14.2646	0.6321
At most 1	0.078336	1.71305	3.841466	0.1906	1.713056	3.84146	0.1906
Morroco							
None *	0.303011	10.2870	15.49471	0.2593	7.580686	14.2646	0.4229
At most 1	0.120915	2.70634	3.841466	0.0999	2.706347	3.84146	0.0999
Tunisia							
None *	0.488450	15.5701	15.49471	0.0487	14.07651	14.2646	0.0535
At most 1	0.068655	1.49363	3.841466	0.2217	1.493632	3.84146	0.2217
Kuwait							
None *	0.938094	67.8561	15.49471	0.0000	58.42483	14.2646	0.0000
At most 1	0.361804	9.43129	3.841466	0.0021	9.431298	3.84146	0.0021
Saudia Arabia							
None *	0.148784	4.05310	15.49471	0.8992	3.221778	14.2646	0.9309
At most 1	0.040714	0.83132	3.841466	0.3619	0.831322	3.84146	0.3619

3.2.3. Results of causality test

Next, we test for the possibility of a causal relationship between BD and CAD as well as the direction of such causality, if any. The first set of causality results is summarized in Table 4. These results do not

support any causal relationship between BD and CAD for Tunisia, Morocco, Iran, Jordan and Oman. However, the results suggest that in Egypt and Kuwait, there is a unidirectional causal relationship running from the CAD to the BD at 5% significance levels, which provides evidence of the current account targeting phenomenon, this claim can be rationalized on the grounds that deterioration in CAD leads to a slower rate of economic growth that, in turn, may lead to increases in the BD. These results validating the reverse hypothesis in support of Summers (1988), Khalid and Guan (1999), Marinheiro (2008), Ashemzadeh and Wade (2009) for Egypt and Merza et al (2012) for Kuwait. A natural explanation for this reverse causality result rests on the endogeneity of the budget balance to the fluctuations in domestic output. Firstly, a capital inflow tends to lead to a real appreciation of the exchange rate, which in turn deteriorates the trade balance. Alternatively, a negative exogenous shock, for instance a taste shock, may lead to a decrease in exports or an increase in imports. The induced deterioration in the external balance, reflecting the substitution of domestic production by (relatively cheaper) imports, has a negative impact on domestic output, leading to decreased tax revenues and to a deterioration of the budget balance. Secondly, the government could resort to a fiscal stimulus in an attempt to mitigate the negative impact of a CAD on domestic output. In this case, the CAD is causing an economic slowdown, which increases government spending and reduces tax revenues. Alkswani (2000) confirm the same result for Saudi Arabia, an economy that is similar to Kuwait in that it is oil based economy. He implies also that for commodity-based exporters, this causality should hold as well, because an increase in export revenues improves fiscal revenues. Otherwise, our result shows, that for Saudi Arabia there is a unidirectional causal relationship running from the BD to the CAD at 5% significance levels, which provides evidence of the twin deficit. Our results are in line with the conventional view and resemble the findings of

Eldemerdash et al (2014), who has find that 1% increase in the government fiscal balance to GDP ratio tends to (improve/deteriorate) the CAD to GDP ratio by 0.44–0.89 % in oil countries, in contrast to the non-oil countries where such relationship does not exist. Our results support also Morsy (2009) for oil-exporting countries in which a 1 % increase in the BD to GDP ratio leads to an almost 0.5 % increase in the CAD to GDP ratio.

Table 4

Granger causality test for MENA countries

		Unidirectional causality	Reverse causality	Bidirectional causality
Country	Level/First difference	BD →CAD pvalue	CAD→BD Pvalue	BD↔CAD
Tunisia	Fist difference	0.1969	0.9363	_
Morroco	Fist difference	0.3461	0.9805	_
Egypt	Level	0.3792	0.0026	CAD→BD
Iran	Level	0.1757	0.9688	_
Jordan	First difference	0.7166	0.7972	_
Oman	Level	0.1664	0.6623	_
Saudi Arabia	First difference	0.0154	0.168	BD →CAD
Kuwait	Level	0.0694	0.0124	CAD→ BD

We also perform Granger causality test using VARs, in first differences for Tunisia, Morocco, Jordan, Saudi Arabia since BD and CAD are not cointegrated. Results are reported in Table 5 and support the same evidence reported above.

Table 5

Test of Granger causality in VARs

		Unidirectional causality	Reverse causality
Country	Level/First difference	BD →CAD pvalue	CAD→BD pvalue
Tunisia	Fist difference	0.1629	0.9361
Morroco	Fist difference	0.3199	0.9805
Jordan	First difference	0.7112	0.7945
Saudi Arabia	First difference	0.0033	0.1311

For all other countries, the Granger causality test is carried out using variables in first differences with the error correction term included and the results are reported in table 6. We use the following VEC model by incorporating the error correction term in the standard Granger causality procedure with the variables in first differenced form. According to these results, we can conclude that twin deficit is hold only in Saudi Arabia.

Table 6

Granger causality test results using an error correction model

		Unidirectional causality	Reverse causality
Country	Level/First difference	BD →CAD pvalue	CAD→BD pvalue
Oman	Fist difference	0.0628	0.5347
Iran	Fist difference	0.1565	0.4599
Kuwait	First difference	0.3181	0.0176
Egypt	First difference	0.6303	0.0001

4. Conclusion

This paper examines the twin deficits hypothesis in eight MENA countries using time-series data for the period 1990 to 2012. It contributes to the literature in terms of sample and comparison between oil- and non-oil-producing countries. Results on the Granger test of causality support the existence of a causal relationship between the CAD and the BD for Egypt, Kuwait and Saudi Arabia. The results on the direction of causality are mixed for some countries with evidence supporting that the CAD cause BD for Kuwait (oil countries) and Egypt, which provides evidence of the current account targeting phenomenon. This suggests that current account balance may be intended for improvement in fiscal balance, indicating that the use of current account balance to supervise developments in fiscal balance in these countries may prove effective. Otherwise, the reverse causality is true for Saudi Arabia supporting the twin deficit hypothesis.

In addition, the data does not support any causal relationship for others countries (Tunisia, Morocco, Iran, Oman and Jordan). Based on these findings, we conclude that the Ricardian equivalence hypothesis holds for these five countries over the observation period. In this framework, the absence of the twin deficits relation can exist due to the saving-investment association in the private sector. More clearly, if deterioration in the budget balance is offset by an improvement in the saving-investment balance of the private sector, the current account balance would not change. On the other hand, the current account balance of the transition economies in the study depends not only on the budget balance, but also on other variables like the real interest rate and growth path of the economy which are not used in our study. In general, it could be argued that some of the reasons why the twin deficits does not hold in some of the countries might be attributed to the structural differences across the economies

and the role of productivity shocks in explaining the relationship between the BD and the CAD.

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