Ball and chain effect: Is Turkey's growth rate constrained by current account deficit?

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ABSTRACT

Persistent and unsustainable current account deficits imply continuous foreign borrowing. In this study, we investigate the causal relationship between Turkish current account deficits (CAD) and growth, by using both traditional Granger and Frequency Domain Causality Tests developed by Breitung and Candelon (BC hereafter) over the period of first quarter of 2002 to the first quarter of 2017, since there is scarcely any definitive empirical study out there yet, systematically exploring the causal relationship between GDP growth and current account over short- and longer run. The results of the study indicate that rising CAD unidirectionally causes growth in both short- and medium-run. Thus, since CAD is financed mostly by short-term debt-creating inflows and Turkey is considered to be the most credit-dependent country across all emerging markets, while Turkey's excessive reliance on foreign credit comes at the cost of extremely volatile real GDP growth rates, our result raises many doubts about sustainability and stability of future growth trajectory in Turkey.

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1. Introduction

Turkish economy entered into a new economic era by initiating neoliberal policies in early 1980s. In the first phase of neoliberal policies, the freely floating exchange rate system was adopted, restrictions on interest rates were lifted and the role of the state in economic activity got diminished. Subsequently, starting in 1984, there was a gradual move towards trade liberalization, followed by increasingly uncontrolled liberalization of the capital account (i.e. cross-border capital movement) in 1989.

After liberalization of capital account, the country has experienced large inflows of capital and became increasingly dependent on them to be able to achieve even a modest economic growth. In fact, as summarized in [1], the liberalization of the capital account has pushed the economy onto an unstable and risky path, thereby substantially contributing to and fully exposing the fragility of domestic financial system. Hasty liberalization was arguably caused by the short(er)-term capital inflows, ensuing sudden stops, snappy reversals in direction of capital movement and a surge of external debt, thus additionally stirring up arbitrage-seeking and short-term capital ('hot money') flows. Further still, peculiar trait that additionally complicates Turkey's macroeconomic odds is the fact that – unlike other highly indebted European countries – it does not only fall a victim of excessive government borrowing but also suffer from clearly unsustainable and worsening corporate indebtedness [2]. In other words, capital account liberalization has effectively contributed to

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considerable increase in both external and internal instability. As a result, since 1989, Turkish economy has suffered from three "sudden stops" during which external financing quickly desiccated and significant drops in GDP growth occurred — in 1994, 2001 and 2008 [3].

On the other hand, especially from 2002 onwards, Turkey has been experiencing a decade-long, economic boom led by credit, mainly enabled by 'cheap' dollars and euros provided by international markets and funded by the government-backed Credit Guarantee Fund (CGF) loan scheme, with strong domestic demand leading to a deterioration of the current account deficit. According to the latest Article IV consultation with the IMF, a large part of this credit was used to finance investments especially on non-productive sectors, such as in the real estate market. Rising consumption and investment along with a low savings rate inevitably resulted in a large current account deficit. This large current account deficit was accompanied by a rise in non-resident portfolio inflows, causing an increase in the Turkey's reliance on volatile short-term capital inputs, i.e. 'hot money,' equivalent to approximately 75% of the current account deficit. As is indicated in [4] and [5], the growth rate in Turkey has been mostly determined by the build-up of external debt accompanied by a persistently large current account deficit. Indeed, at the time of writing, Turkish public debt stands at astounding 170 percent of country's GDP, lira keeps plummeting whereas over half of the borrowing is in foreign currency terms and hence bears considerable FX risk with further less favourable short-term debt composition [2].

The large and persistent CADs have become a chronic condition and one of the most striking features of Turkish economy throughout the 2000s. This observation constitutes the starting point of our paper, which essentially questions whether the relationship between CAD and growth is a short or longer-run phenomenon for Turkish economy in the 2000s, since the ballooning CAD apparently endangers the sustainability of this growth. Heavy reliance of Turkey on foreign short-term capital flows to finance its CAD makes Turkey's economy vulnerable to external shocks, sudden stops and capital flow reversals. Consequently, it is equally important for policy makers in Turkey to understand current account balance movements, assess the current account balance (hereafter CAB) sustainability, and induce changes through policy measures as well as gauge its effects on key macroeconomic variables such as growth.

Since there is scarcely any definitive empirical study out there yet, systematically exploring the causal relationship between GDP volatility as measured by the annual growth rate of GDP and current account over short- and longer run, in this paper we venture to analyse the short and long run causalities between CADs and growth for Turkey. The paper is organized as follows. The next section provides an introduction and theoretical considerations; the third section explains methodology utilized; the following section explains data used in the study and presents the empirical results, while the fifth section concludes.

2. CADs: Growth-theoretical considerations and stylized facts

Before the birth of modern economics, mercantilists claimed that running balance of payments surplus was the only way to get rich and sustainably increase one's GDP [6]. However, mercantilists showed gross disregard for import-substitution nuances of growth strategy; and what is more, for the fact that zero-sum game nature of the world trade would cause a rather combustible inequality between surplus and deficit countries, a situation untenable in the long-run, unless tables are turned every now and then. Early theoretical contributions seem to heavily depend on assumptions made and ideological camps they belonged to (e.g. traditional Keynesian vs monetary approach to balance of payments) as well as on the horizon observed. In the short-run with sticky prices and fixed export capacities, or if Marshall–Lerner simply does not hold, growing GDP gives rise to imports while exports remain unaltered, thereby worsening CAB [7]. On the other hand, neoclassical growth theory and international finance lemmas based on it saw a positive relationship between economic growth and CAB, because in their realm income is fuelled by savings (to the extent it is being turned into investment) rather than by dynamizing aggregate demand (consumption).

Be that as it may, [8] and [9], each in his own way, implied that if terms of trade (or real exchange rate) stayed put, income changes would have to come about and force equilibrating CAB adjustments. Now, if we abstract from the short-sighted Lawson's doctrine according to which CAB is of no concern whatsoever, since it simply reflects foreigners' desire to invest in a given host country — so that CADs should be seen as a precursor of growth and signs of thundering success [10], modern international finance defines CAD as an inter-temporal consumption smoothing mechanism which ought to be driven by rational decision making, because it inevitably has to be binding over longer-run [11]. To that end, [9] model was the most outspoken, proposing that national economies cannot possibly grow faster than the rate consistent with CAB equilibrium, unless they are able to finance cumulative CADs, which in principle they are not. Following [12], summary of a model boils down to three equations:

$$B = P_X x - P_M{}^* mE \tag{1}$$

$$x = a(P_X/P_M{}^* E)^{\eta^*} Y_W^{\xi^*} \qquad \eta^* < 0, \xi^* > 0 \tag{2}$$

$$m = b(P_M{}^* E/P_X)^{\eta} Y^{\xi} \qquad \eta < 0, \xi > 0 \tag{3}$$

Here B stands for CAB, Ps are average prices of domestic exports and forex denominated imports, respectively, x and m are export and import in real terms, E is exchange rate, while ξs and ηs are income and price elasticities of demand (domestic or foreign if denoted by asterisk). Therefore, after taking logarithms of (2) and (3), differentiating by time and plugging them into (1), it is fairly straightforward to solve for the sustainable growth in income:

$$y_B = [(1 + \eta^* + \eta)(p_x - p_m - E) + \xi^*]/\xi \tag{4}$$

The first bracket of Eq. (4) captures Marshall–Lerner theorem and underlines the importance of the structure of production as well as economy's appetite for imports as crucial ingredients of growth potential, the second accounts for the influence of the terms of trade (or the real exchange rate), whereas the last two terms depict interdependence of national income elasticities between chief foreign trade partners. Since all the lower-case variables could be treated as growth rates of their upper-case levels, if terms of trade remain unaltered, the whole equation collapses to the so called Thirwall's law or dynamic Harrod trade multiplier [12]. In what followed, many authors attempted to enrich this basic model to include net capital inflows aligned with desirable and sustainable CAD as well as net interest payments due abroad, without changes in the fundamental logic of the model.

On the other hand, in trying to explain growth volatility, [13] empirically investigated the well-known proposition that the international trade and finance may act as stabilizers that help cushion consumers and producers from exogenous economic shocks or may instead magnify them and increase growth variance. Even though their data generally show that financial system acts as stabilizer and that price and wage rigidities are not vital factors of growth volatility, they warn against nonlinearity of CAD and growth relationship: as the amount and channels of international capital inflows multiply, its risk-enhancing potential should be factored in.

Persistent CADs are of much concern for both academics and policy makers, since it is considered to be a crucial indicator of economy's performance. Brzozowski and Prusty [14] assert that, first of all, CADs reflect the savings–investment differential. Secondly, a country's CAB is equal to country's exports minus its imports, indicating the sum of domestic residents' transactions with foreigners. Thirdly, because the CAB determines how a country's stock of net claims on (or liabilities to) the rest of the world is shaped over time, it reveals the inter-temporal preferences of domestic and foreign agents. Finally, the persistent and large CADs and worsening fiscal position of a nation may end up leading to sudden stops or indeed capital flow reversals that may deem necessary a process of rough readjustment in the affected economy, frequently accompanied with severe recessions as was the case in Turkey, especially during the 2000 and 2001 crises.

Even though traditionally Turkey's economy was not generating high CADs before the 2000s, they became her Achilles' foot in the 2000s. Initially, Turkey's CADs had been relatively small (less than 1 percent) and even drizzled with occasional surpluses during the 1990s, particularly in 1994 and 1998. In addition, its CAB was, on average, a little smaller than −1 percent of GDP, deteriorating to −2.7 percent and −3.7 percent in the run-up to the 1994 and 2001 crises, respectively [3].

After 2002, we observed the emergence of a different trend. Following the November elections, new authorities showed no hesitation in fully adopting neo-liberal policies. Since the 2001 economic crisis, mostly because of easy access to international credit markets caused by the existence of the abundant global liquidity which lowered the real interest rate paid by Turkey and resulted in higher sustainable debt level, as well as due to the Government's commitment to tighten fiscal policy and take some significant legislative steps towards EU membership, modest improvements were made in Turkish economy, e.g. slowing down of inflation, increase in growth and more stable public finance. Central bank became independent, with an inflation targeting policy framework focusing on price stability.

Unlike these positive developments in Turkey's economy, as illustrated in Fig. 1, starting from 2003, annualized current account deficits had increased to the 3–4 percent band, and then jumped above 6 percent after 2006. In 2009, the growth rate, in parallel with the global recession, was −4.8 as the current deficit went down. However, in 2010, the ratio of CAD to GDP started growing again, development that peaked in 2011 at near −10 percent, surely an unprecedented extent of external disequilibrium. Thereafter, Turkish economy grew accustomed to operate burdened with such large (above 6 percent) persistent CADs, in order to achieve positive economic growth. According to [4], 'this period represents a new threshold in the process of transforming the Turkish economy into a foreign debt-ridden entity, creating a haven for cheap imports and even cheaper labour surplus.' Also, the high CAD to export ratio could be an alarming signal of how serious the CAD has become in Turkey, considering Turkey's limited number of exportable and modest amount of exports (Fig. 1).

The main culprit for the CAD's widening has been the considerable hike in the trade deficit (Fig. 2). Trade deficit has deteriorated foremost due to currency appreciation coupled with heavy reliance on imported intermediate goods (Fig. 3) and imported energy [16]. Mainly because of appreciated lira and customs union with the EU, Turkish industrial sector (most notably its manufacturing exports), has become heavily reliant on imported inputs that are not easily substitutable with domestic goods. As a result, any increase in demand for Turkish exports simultaneously created a demand for presently necessary imports.

A persistent appreciation of the lira over the last decade coincided with, and reinforced, the economy's shift onto a more capital-intensive production caused in increases in the demand for intermediate inputs and thus exacerbated the trade imbalance (Fig. 3). As is seen in Fig. 3, the main cause of high import growth rate mostly resulted from the growth of intermediate goods' imports, which is the 73% of total imports in 2017. Given this fact, it is not easy for Turkey to reduce the current account deficit by increasing its exports. In other words, to deal with the trade deficit and hence current account deficit, the focus in Turkey should be not only on increasing export competitiveness, but also on controlling excessive demand for imports, particularly decreasing thus far heavy reliance on intermediate input imports.

Apparently alarming are not only the main drivers of such deterioration of CAD, but also financing sources of it. As Fig. 4 clearly demonstrates, the current account deficit is mainly financed by a mix of ever more volatile portfolio investment flows and foreign bank loans.

In addition, starting from 2009, the portion of debt creating finance (FDI–CAB) has started to stir and grow at the expense of wiser alternatives. This shift has made Turkey vulnerable to investor sentiment, since portfolio investment
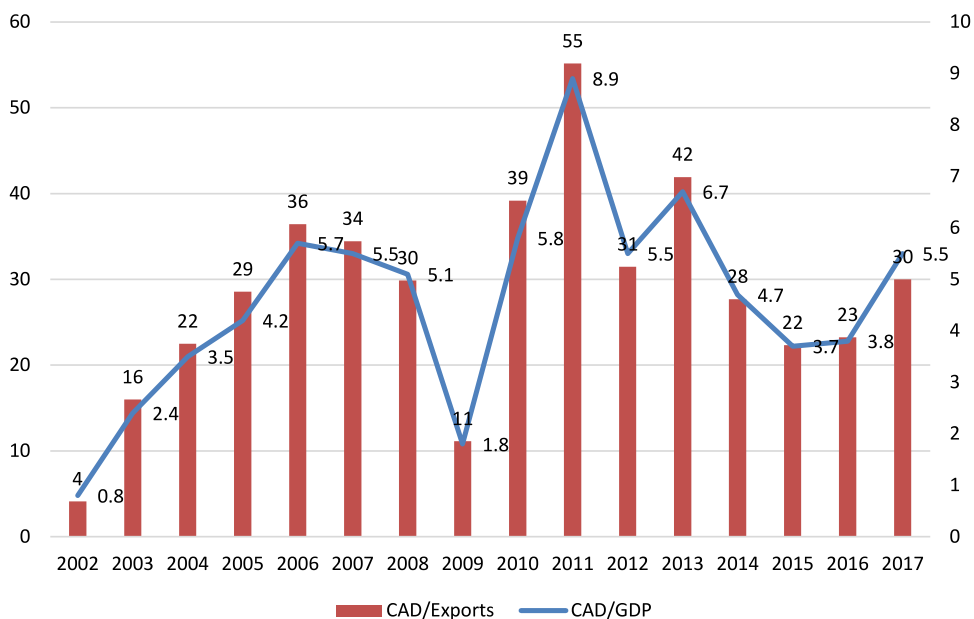
Fig. 1. The Ratios of current account balance to GDP and exports.
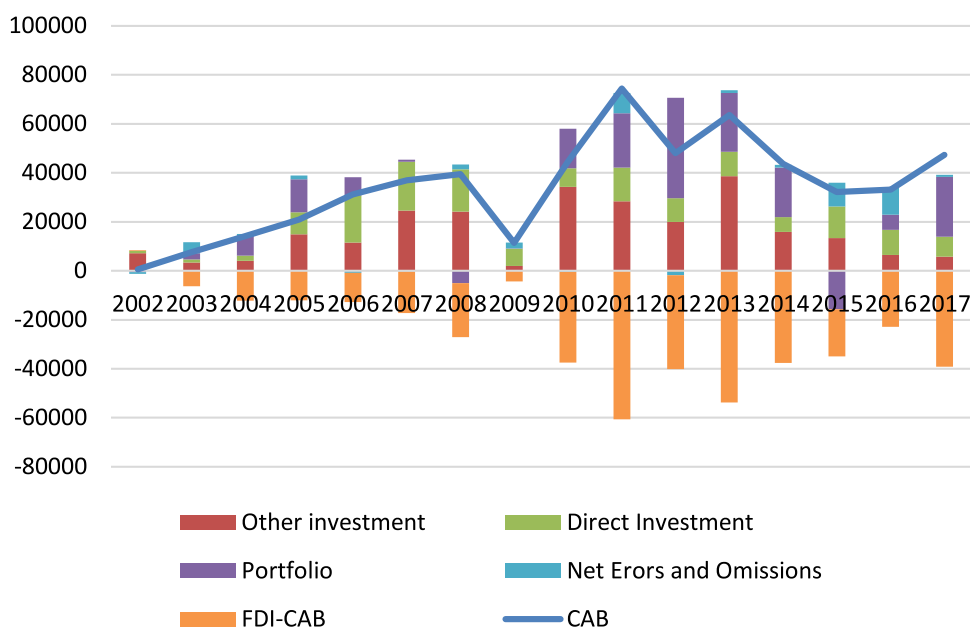*Source:* Özer [15], Central Bank of Republic of Turkey.
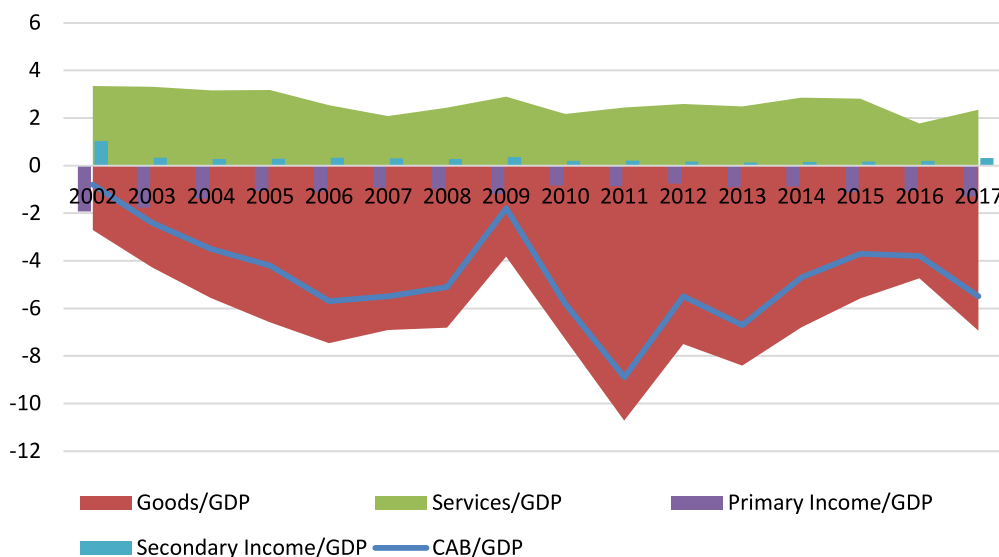
Fig. 2. Components of current account balance and Broad Economic Categories (BEC) classification of imports.
Source: Özer [15], Central Bank of Republic of Turkey, Turkstat.

can be withdrawn at any time, either out of fear of the currency depreciation or out of greed for higher potential returns elsewhere. In other words, given the high current account deficit mostly financed by short-term portfolio flows from abroad, investor sentiment towards the country turned negative because of the fears that Turkey would be unable to finance its external borrowing requirement. Hence, steeply rising CAD, financed with short-term portfolio inflows (almost 30% in 2017), represents a clear and chronic increase in the country's financial vulnerability. In addition, Fig. 5 clearly shows the dependence of the GDP growth rate cycles on the direction of the capital flows and close connections between CAD/GDP ratio and GDP growth.

Fig. 5 clearly illustrates that high growth rates were mostly associated with copious amount of capital inflows, especially short-term speculative capital inflows, largely driven by high domestic interest rates after 2006. On the other hand, the contractions in GDP are directly related to the capital outflows as happened in three sudden stops of 1994,
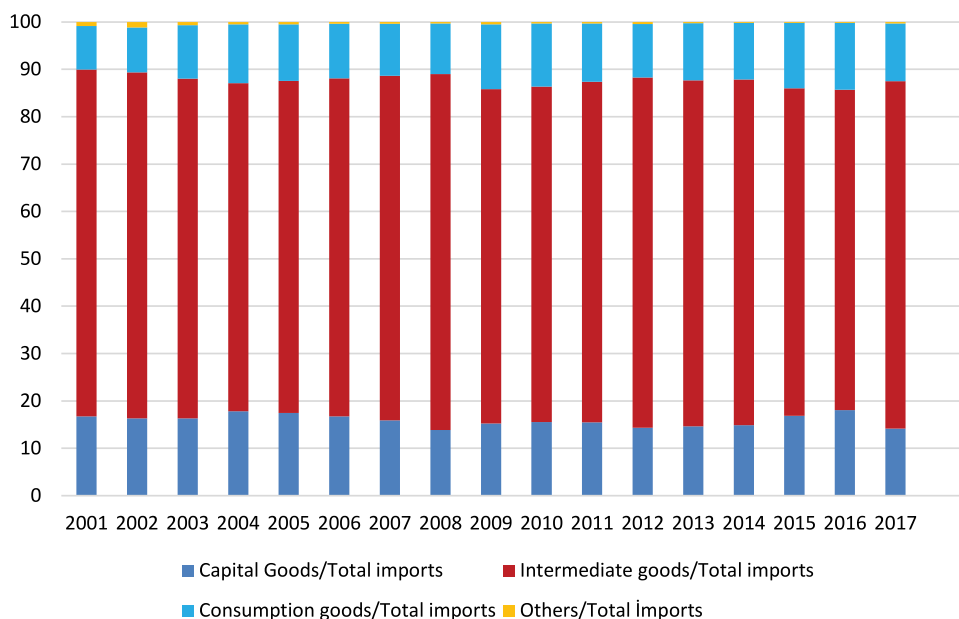
Fig. 3. Broad Economic Categories (BEC) classification of imports.
*Source:* Özer [15], Turkstat.

Fig. 4. Financing current account deficit.
Source: Central Bank of Republic of Turkey.

2001 and 2009. Since most of the capital inflows are in the form of short-term speculative flows, it is fair to characterize the GDP growth as also speculative in nature. Also, it is readily observable in Fig. 5 that there exists a close connection between CAD and GDP growth. In other words, a key feature of rapid growth between 2003 and 2007 and after 2009 was a hefty increase of CAD and the consequent amassing of foreign debt.

Fig. 5 further explores a strong piece of evidence linking the current account deficit and GDP growth through the business cycle in Turkey, since these two series appear to have moved closely together since 2002. As explained in [3],
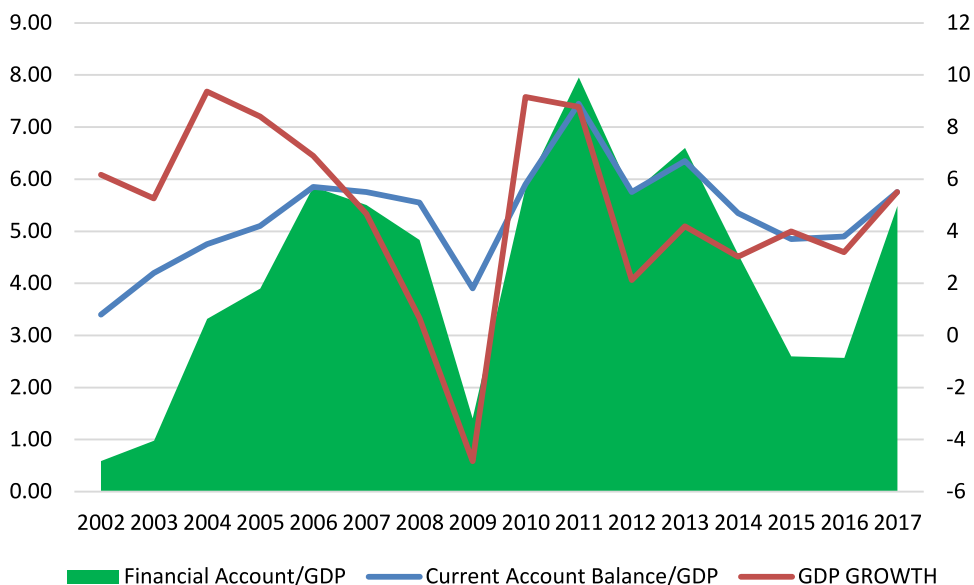
Fig. 5. Capital Flows, Real GDP Growth (%) and CAD.
Source: Özer [15], Central Bank of Republic of Turkey.
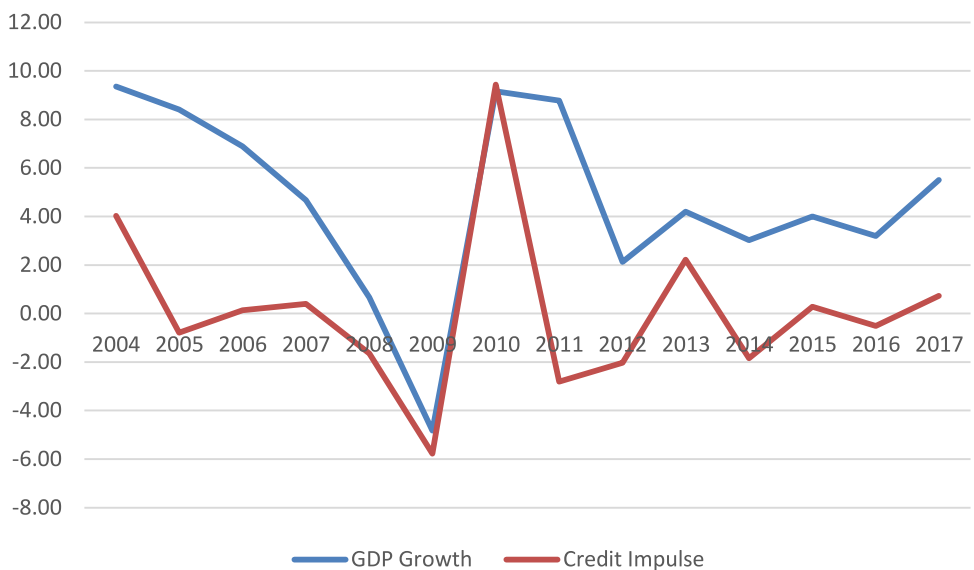
Fig. 6. GDP growth and credit impulse.[1]

based on a basic inter-temporal approach, one can conclude that an update in expectations of future income by forward-looking private agents turns out to be the main determinant of the current account trajectory. The stronger the expected income growth in the future, the greater Turkish current borrowing and spending has been, whilst the converse holds true when subpar income growth is expected (a downturn). Since domestic income is the major determinant of imports demand and foreign countries' income determines the export supply, a relative increase in domestic income lends support to imports, but creates modest effect on exports to a first approximation at least.

One other way of showing that Turkey's growth has been heavily affected by external borrowing is to examine the tight liaison between credit impulse and GDP growth. Fig. 6 illustrates that Turkey's growth is highly dependent on credit.

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[1] To compute the credit impulse, following [17], we first compute new borrowing, by using $New\ borrowing_t = \frac{(Credit\ Stock_t - Credit\ Stock_{t-1})}{GDP_{t-1}}$ and then take the first difference of new borrowing.

Table 1
The comparative dynamics of external equilibrium indicators and growth rate (%).
Source: Boratav [18], CENTRAL BANK OF REPUBLIC OF TURKEY, TurkStat.

	1980–1988	1989–1997	1998–2002	2003–2007	2008–2017
Capital flows/GDP	1.6	2.5	2.9	7.8	4.3
CAD/GDP	−1.7	−0.8	−0.5	−4.8	−4.8
Average growth	4.9	4.3	1.0	7.3	4.1

Fig. 7. Contributions to GDP growth.
Source: TurkStat.

As visible from Fig. 6, the growth is correlated with exogenous credit boom and bust. In other words, the clear association in Fig. 6 between growth rate and exogenous credit should be taken as an another evidence of clear connections between current account deficit and economic growth, since, as we mentioned above several times, Turkey has been enjoying credit-led economic boom mostly financed by short-term portfolio flows from abroad, with strong domestic demand leading to a deterioration of the current account deficit itself. These close connections become clearer during 2009–2010 when GDP growth and credit impulse lines are merged implying that during this period GDP growth is almost fully financed by credits. Also, Fig. 6 presents another piece of evidence, *i.e.* very volatile growth rates closely associated with Turkey's credit dependence after 2007.

We can demonstrate the same phenomenon by using ratios of foreign capital inflows and/or CAD to GDP, respectively, as presented in Table 1.

When we examine Table 1, our first observation is that – especially starting from 2003 – there is a noteworthy increase of capital inflows in Turkish markets, despite the fact that the recent global crisis of 2007 temporarily caused a decrease in its quantity. Secondly, during the period of 1980–1988 when the capital movements were controlled, all inflows of capital were used to finance CAD. After the liberalization of foreign capital accounts in 1989, because of the domestic demand (via mechanism briefly explained earlier), the short run growth has become heavily dependent on foreign inflows of capital. Moreover, Table 1 reveals that there is a close, almost lockstep positive, relationship between CAD and growth. In addition, to achieve a certain level of economic growth, contemporary Turkish economy, *ceteris paribus*, has to attract more foreign capital as well as suffer through large and persistent CAD.

Fig. 7 shows that the growth that has been accompanied by a persistently large current account deficit is driven mostly by domestic demand growth.

According to Fig. 7, strong growth after the global financial crisis (9 percent per year on average in 2010–11) and modest growth in the following years are mostly driven by domestic demand, particularly consumption, largely supported by capital inflows. inflows of capital.

To sum it up, there are clear pieces of evidence pointing at close connection between CAD and growth in Turkey and thus several reasons to worry about the sustainability of Turkey's growth path. First of all, the current account deficit is largely financed by short-term portfolio investment (roughly over 70%). Second, because of persistent and large CAD, external debt has grown, nearly doubling in absolute terms over the last decade to a current level of over USD450 bil. (53% of GDP). Third, the corporate sector's foreign currency debt (around 40% of GDP) is on the rise. Fourth, the country's net FX reserves are relatively insufficient in comparison with the large external debt (estimated to be only around USD34 bil.). Finally, leading sectors such as the real estate and manufacturing continue to be the most affected by the boom–bust cycle in the Turkish economy [19].

Therefore, it is crucial to examine the causal relations between CAD and growth, especially in providing some answers to the question of whether CAD causes growth or vice versa, and identifying the underlying causality's term structure. By providing particular evidence on whether these causal relations are transitory or permanent, we may crack-open a chance to offer some policy propositions.

3. Methodology and data

Empirical tests of growth being balance-of-payments constrained growth (BOPCG) have been developed to a reasonable extent of econometric rigour only recently. Most studies use cointegration methodology, developed by Johansen and vector error correction model to test whether or not growth is balance-of-payments constrained, such as [20–25] and [26]. Lélis et al. [23] also uses traditional Granger causality tests. Beside these studies, scholars have utilized ARDL Bounds testing approach such as [26], SURE estimations such as [27] and [28] used the Engle–Granger (EG) two-step method to test for cointegration and the test for cointegration with a structural breakpoint proposed by Gregory and Hansen. Thereafter, some studies applied special [29] technique for generating long series of sustainable growth rates, *i.e.* ones consistent with BOP to test whether these series and actual growth series were correlated enough [12,30,31]. Nevertheless, none of them, to the best of our knowledge, focused on particular nature and direction of apparent causal relationship, let alone on answering the policy-relevant question of whether this relationship represents a short-lived or longer-term phenomenon.

To investigate the permanent and transitory linkages between CAD and growth, we will use frequency domain causality test developed by Breitung and Candelon [32], which is an extension of time domain Granger causality test and based on [33] and [34]. This test allows researchers to examine the extent and direction of causality across different frequencies which conventional Granger causality tests are unable to diagnose. As mentioned in [35], even though BC suggests simple test, it should be considered an effective way of capturing frequency-wise causation between nonstationary as well as cointegrated variables.

To explain [30] approach, we will start with a bivariate finite-order vector autoregressive (VAR) representation of the two-time series, X_t and Y_t, is the following form:

$$\Theta\left(L\right)\begin{pmatrix}X_t\\Y_t\end{pmatrix}=\begin{pmatrix}\Theta_{11}(L)&\Theta_{12}(L)\\\Theta_{21}(L)&\Theta_{22}(L)\end{pmatrix}\begin{pmatrix}X_t\\Y_t\end{pmatrix}=\begin{pmatrix}\varepsilon_{1t}\\\varepsilon_{2t}\end{pmatrix}\tag{5}$$

where $\Theta\left(L\right)=1-\Theta_1 L-\Theta_2 L^2-\cdots-\Theta_p L^p$ is a lag polynomial with $L^j X_t=X_{t-j}$ and $L^j Y_t=Y_{t-j}$. The error vector, $\varepsilon_t=\left(\varepsilon_{1t}\quad\varepsilon_{2t}\right)'$, is assumed to be multivariate white noise with $E\left(\varepsilon_t\right)=0$ and $E\left(\varepsilon_t\varepsilon_t'\right)=\Sigma$, where Σ is positive, definite and symmetric.

The moving average (MA) representation of system is as follows:

$$\begin{pmatrix}X_t\\Y_t\end{pmatrix}=\begin{pmatrix}\psi_{11}(L)&\psi_{12}(L)\\\psi_{21}(L)&\psi_{22}(L)\end{pmatrix}\begin{pmatrix}\eta_{1t}\\\eta_{2t}\end{pmatrix}\tag{6}$$

where $\psi\left(L\right)=\Theta(L)^{-1}G^{-1}$ and $(\eta_{1t}\quad\eta_{2t})'=G(\varepsilon_{1t}\quad\varepsilon_{2t})'$, so that $\mathrm{cov}(\eta_{1t},\eta_{2t})=0$ and $\mathrm{var}(\eta_{1t})=\mathrm{var}(\eta_{2t})=1$ and G be a lower triangular matrix and G' is an upper triangular matrix of the Cholesky decomposition, $G'G=\Sigma^{-1}$ such that $G\varepsilon_t=\eta_t$ and $E\left(\eta_t\eta_t'\right)=I$. By using above representation, the spectral density of X_t can be written as follows:

$$f_X\left(\omega\right)=\frac{1}{\pi}\left\{\left[\psi_{11}(e^{-i\omega})\right]^2+\left[\psi_{12}(e^{-i\omega})\right]^2\right\}\tag{7}$$

Geweke [33]'s suggestion of measure of causality is expressed as:

$$M_{Y\to X}(\omega)=\log\left[1+\frac{\left[\psi_{12}(e^{-i\omega})\right]^2}{\left[\psi_{11}(e^{-i\omega})\right]^2}\right]\tag{8}$$

If $\psi_{12}\left(e^{-i\omega}\right)=0$, then, $M_{Y\to X}\left(\omega\right)$ will be zero implying that Y does not Granger cause X at frequency ω. Thus, the expression of $\psi_{12}\left(e^{-i\omega}\right)=0$ can be interpreted a condition for non-existence of Granger causality at frequency ω.

The null hypothesis of Y does not Granger cause X is expressed as:

$$H_0:M_{Y\to X}\left(\omega\right)=0\tag{9}$$

To test the null hypothesis of Y not Granger causing X at frequency ω, [6] rewrites the VAR model in Eq. (5) as follows:

$$X_t=\Theta_{11,1}X_{t-1}+\cdots+\Theta_{11,p}X_{t-p}+\Theta_{12,1}Y_{t-1}+\cdots+\Theta_{12,p}Y_{t-p}+\varepsilon_{1t}\tag{10}$$

where $\Theta_{11,j}$ and $\Theta_{12,j}$ are the coefficients of the lag polynomials $\Theta_{11}(L)$ and $\Theta_{12}(L)$. The following two equations define the necessary and sufficient conditions for the non-existence of Granger causality at frequency ω:

$$\sum_{j=1}^{p}\Theta_{12,j}\cos\left(j\omega\right)=0\tag{11}$$

Table 2
Descriptive statistics.
Source: Authors' calculations.

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque–Bera
Current account deficit	−6678.3	−6132.0	5997.4	−0.56	2.63	4.41 (0.11)
GDP growth rate	4.59	5.90	5.42	−1.29	4.49	28.74 (0.00)

Table 3
Conventional and frequency domain Granger causality test results.

	Conventional	Frequency-domain					
		Long term		Medium term		Short term	
ω_i		0.01	0.05	1.0	1.5	2.0	2.5
GROWTH $\not\Rightarrow$ CAD	3.68	×	×	×	×	×	×
CAD $\not\Rightarrow$ GROWTH	**6.06**[a]	×	×	✓	✓	✓	✓

[a]Denotes the existence of causality between variables.

$$\sum_{j=1}^{p} \Theta_{12,j} \sin(j\omega) = 0 \tag{12}$$

The null hypothesis in this test, which equivalents to that of Geweke, $M_{Y \to X}(\omega) = 0$, is

$$H_0 : R(\omega)\,\Theta_{12}(L) = 0 \tag{13}$$

with

$$R(\omega) = \begin{bmatrix} \cos(\omega) & \cos(2\omega) & \dots & \cos(p\omega) \\ \sin(\omega) & \sin(2\omega) & \dots & \sin(p\omega) \end{bmatrix} \tag{14}$$

The outcome of BC test is determined by using a standard F-test on a set of coefficients of Eqs. (11) and (12). The F-statistics are approximately distributed as F(2, T − 2p) for $\omega \in (0, \pi)$.

To investigate the permanent and transitory linkages between CAD and growth, we utilized a sample of quarterly data retrieved from DataStream, covering the period from first quarter of 2002 to the first quarter of 2017. Table 2 provides descriptive statistics for the variables.

4. Empirical results and discussions

To investigate the permanent and transitory linkages between CAD and growth, we carried out conventional Granger causality tests within the VAR (3) model, primarily to get an initial idea of the dynamic nature of the interactions between CAD and growth. And then, we implemented the frequency domain Granger causality tests of Breitung and Candelon [32], to get more precise information about causalities across frequencies. Table 3 presents the results[2] of both conventional and frequency domain Granger causality tests. In Fig. 7, we report the results of the frequency domain GC test, along with their 5% critical values (the blue line parallel to the x-axis) for all frequencies, ω, in the interval (0, π).

The conventional Granger causality test results in Table 3 indicate that there is a unidirectional Granger causality from CAD to growth. But, as we mentioned above, conventional Granger tests results do not provide clear evidence as to whether the co-movement is due to short-run fluctuations or longer cycles. Thus, to disentangle short-run (transitory) and long-run (permanent) effects, we need to use the BC test results of the frequency domain Granger causality, presented in Table 3 and Fig. 8.

When we look at the results, they seem to support the conclusions of the conventional Granger causality test, which indicate the existence of unidirectional Granger causality from CAD to growth. Furthermore, they also indicate that there is Granger causality between CAD and growth in both short- and medium-run ($\omega > 0.82$), which corresponds to approximately 7 quarters. In other words, current account deficit Granger causes the economic growth in Turkey both in the short-and medium run. On the other hand, both conventional and frequency domain causality test results in Table 3 and Fig. 8 fail to provide any evidence of causality from growth to CAD. Thus, based on the results of frequency domain causality test, it is fair to conclude that CAD causes the economic growth in both short-and medium-runs, implying that the inflow of foreign capital mainly driven to accommodate financing need of CAD in Turkey is one of the most important determinants of the economic growth through its effect on domestic demand and national income. Put differently, CAD

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[2] We begin our empirical work by testing the series for unit roots using the ADF and KPSS tests. The results were not reported but are available upon request. We use the AIC criterion to determine the order of the VAR model. Next, carrying out ARCH-LM heteroscedasticity test and Portmanteau serial correlation test, we verified the assumption of white noise of the error vector in the VAR Eq. (1). The assumption of white noise error terms is also validated. We did not present the results of the models that suffer from some econometrics problems, such as autocorrelation and/or heteroscedasticity.
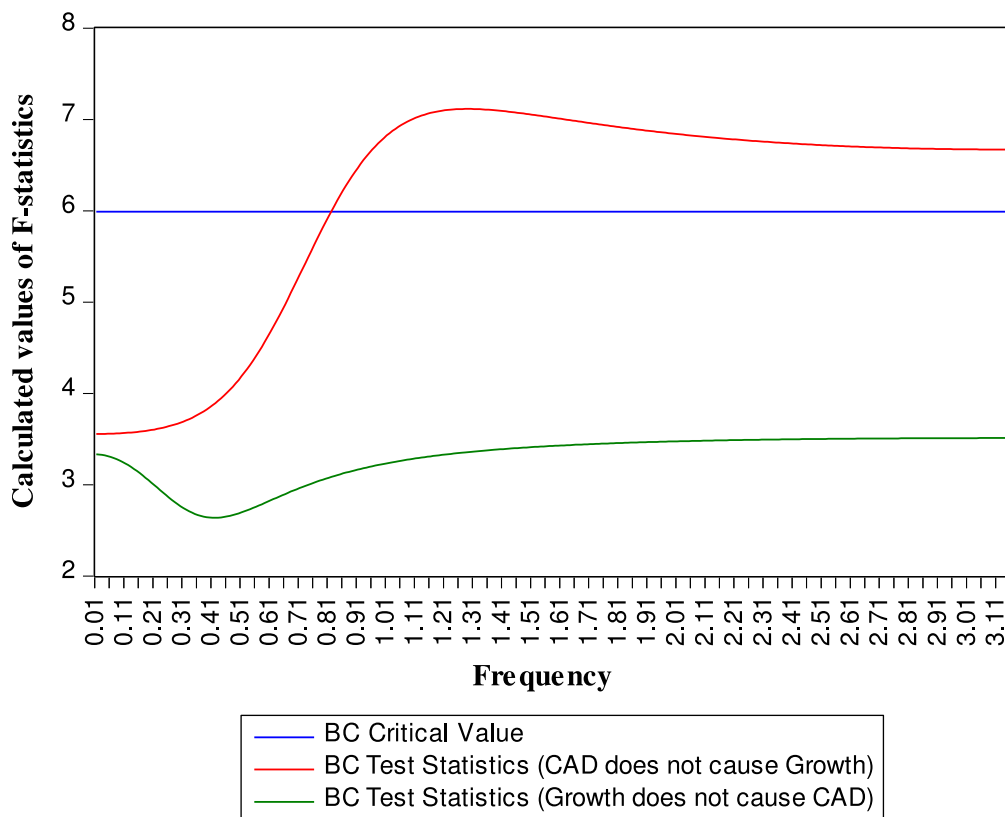
Fig. 8. The results of the frequency domain Granger causality.

and the capital inflows (especially short-term capital inflows) that finance it have become an important constraint on sustainability of Turkish economic growth. Therefore, in as much as the markets impose a sudden current account adjustment on Turkey, CAD exhibits adverse consequences for output growth. Moreover, since these flows are being used to finance domestic investment, they have become important for fuelling and sustaining growth.

To emphasize the value and contribution of our findings, it is better to compare our results with results of other studies carried out within the framework of BOPCG and direct estimation of the relationship between CAD and economic Growth in Turkey. The studies of Gökçe and Çankal [25] and Halicioglu [26] tested the validity of BOPCG in Turkey. Gökçe and Çankal [25] uses Johansen cointegration tests and VAR estimation and [26] employs ARDL Bounds testing approach. The findings of the former study support the implications of the Harrod–Thirlwall growth model and the study concludes that the reduction in the income elasticity of import will accelerate the growth in GDP. In addition, [26] uses ARDL Bounds testing approach to cointegration to test the validity of Thirlwall's law for Turkey during the 1980–2008 period and provides some evidence that Thirlwall's law in fact holds for Turkey. The study emphasizes the importance of CAD and its financing forces and further suggest, similarly to previous study, that to relax the balance-of-payments constraint on Turkey' economic growth, income elasticity of demand for imports must be reduced. Yurdakul and Ucar [36] studies the relationship between the current account deficit and economic growth in Turkey by using Granger causality (traditional) and VAR analyses. Unlike our findings, they provide some evidence of unidirectional causality from economic growth to CAD. However, the study shows certain deficiencies especially in terms of executing the econometric methods correctly.

Even though first two studies emphasize the importance of current account deficit for Turkey's economic growth, we provided the more direct evidence, particularly indicating the short-and medium-term effects of CAD on economic growth in Turkey. Thus, our study's results provide a better and deeper insight into the dynamics of recent growth process in Turkish economy. Namely, the way that Turkish CAD has been financed, i.e. mostly short-term speculative money inflows, creates a significant constraint on economic growth in Turkey. Moreover, the heavy reliance of industrial sector to imports of inputs and intermediate goods is also endangering the sustainability of this growth process. At last, the use of exchange rate as means of increasing the external competitiveness of Turkish economy, seems to be creating another constraint on Turkey's economic growth, since it is causing a *pro rata* increase in CAD. As a result, the policy makers in Turkey should understand that only a temporary current account deficit can be considered an important driver of growth and this can only be achieved as long as Turkey has the financial capacity to fund increasing imbalances. They also have to understand that a constantly growing CAD would sooner or later lead to an unsustainable BOP crisis resulting in a

reduction in aggregate demand and long-run growth. Recent developments in Turkish economy starting in 2018 have proven that this is indeed the case in point.

5. Conclusion

In this paper, we have investigated the causal relations between current account deficits and growth for the Turkish economy, using quarterly data covering the period 2002Q1–2017Q1. The results of the study show that there exists unidirectional causality running from CADs to the subsequent growth in both short- and medium-run. The significance of this result becomes clearer when one examines the sources of financing of CADs in Turkey. As shown in [16], until late 2013, Turkey financed its CAD according to prescriptions of the so-called Lawson's doctrine, by selling the bonds and equities of both the public and private sector, along with sell-off of the real estate and public facilities. Turkey had also been using a portion of these flows to finance domestic investment; hence, these funds were helping Turkey to sustain high growth rates for a while. Moreover, the country accumulated window-dressed international reserves owing to the surplus in financial account. However, speculative short-term capital inflows, mainly driven by extraordinary high rates of interest offered domestically, may have left Turkey extremely vulnerable to economic shocks even if treated at once, let alone if they provoked sudden stops in capital inflows as it actually happened in 1994, 2001 and 2009.

Indeed, it appears that Turkey became an even more open(ed) economy after the global financial crisis, both in terms of steadily increasing reliance on short(er)-term foreign capital inflows and in terms of somewhat increased share of merchandise trade in the GDP, as compared with 2008, which was the trade flow and external debt stock peak of the pre-crisis period. Furthermore, our analysis has shown that GDP growth trajectory does not Granger cause balance of payments dynamics of Turkey neither in the short run nor in the medium to longer term. On the contrary, our empirical exercise demonstrates that Turkish current account deficit unidirectionally drives GDP growth dynamics in Turkey over the short and medium run (or more precisely, its impact evaporates after 7 quarters), which allows us to conclude that current account deficits are not a long run determinant of Turkish GDP growth, in spite of its economic openness index of almost 50% lately.

Since persistent CADs have established themselves as crucial "growth indicators" in Turkey, it becomes evident that their mirror image — a massive sudden stop adjustment with adverse consequences for both output growth and macro-financial stability is lurking around the incoming bend. In other words, oversized and protracted CAD remains one of the major threats to the sustainability of such "growth on steroids" as well as overall macro stability. Therefore, it should be clear that reducing CAD to a manageable level and improving the financing quality of residual, growth-consistent CAD is of utmost importance for protecting stable growth and employment in Turkey already in the short run. In fact, structural adjustment is in order immediately. To have a sustainable growth in the future, Turkey will have to redesign its growth model from being credit-oriented towards focusing on productivity gains, especially by both setting up and experiencing advances in technology, or more broadly by adopting policies enabling her physical and human capital to grow. As we discussed in Sections 1 and 2, the current policy environment of Turkey exhibits some drawbacks in trying to reduce the CAD and implement new policy measures to soften Turkey' dependency on foreign imports in its industrial sector and its manufacturing exportable goods. Thus, there are several structural changes that have the capacity to increase growth rate in Turkey without hampering the balance of payments position of the economy. In this new framework of growth model, Turkey should find a better way, not only by relying on competitive exchange rate, to increase the share of manufactured exports and a cautious reduction of imports of inputs, intermediate and capital goods. There is an urgent need for a decisive role and greater involvement of the state in directing industrial policy towards adapting and domesticating foreign technology and investment in human capital and domestic infrastructure. Finally, Turkey should improve her institutions' quality and redesign them as growth friendly by establishing rule of law and providing an environment of ease in doing business. We believe that the implementation of these policies would assist in the production of medium and high-tech manufactured exports and the optimization of gains derivable from international trade in the long run and relax the CAD constrained on economic growth in Turkey. Obviously, this study, as any really, also has some limitations. First of all, this study may be broadened in future by analysing frequency–domain relationship in a multivariate context, where we can use additional macroeconomic control variables. Secondly, this study can be extended by implementing another causality approach, called the Quantile-Granger-causality approach proposed by Troster [37], allowing to examine the non-linear causal relationships between variables of interest. Finally, the study could be extended to include a panel of BOPCG countries.

CRediT authorship contribution statement

Mustafa Özer: Conceptualization, Methodology, Formal analysis, Writing - review & editing. **Marko Malovic:** Theoretical analysis, Writing - review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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