



Investigating the dynamic causality between Budget Deficit (BD) and Current Account Deficit (CAD) in the framework of the Mendel-Fleming model in IRAN: a Bootstrap Rolling Window Approach

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Abstract

Iran's economy has consistently experienced a rise in the budget deficit (BD), which has hindered the country's capacity to see overall economic growth. However, it also constantly deals with uncertainty in the international market. Careful management of the link between these two forms of deficits is necessary to attain stability and sustainable economic growth. This research has investigated the Dynamic causal relationship between double Current Account Deficits (CAD) and Iran's budget deficit (BD) from 1965 to 2018 using the rolling window (bootstrap) method. Every era of causality is examined, taking into account the structural gaps. The paper's findings support the Mundell-Fleming model by demonstrating that, between 1981 and 1987, the budget deficit (BD) positively impacted the current account deficit. However, between 1975 and 1977, 1998 and 1999, and 2005 and 2013, the country's lack of organized or poorly organized financial markets resulted in the abandonment of the current account deficit, which had a detrimental effect on the country's budget deficit (BD). Furthermore, the findings indicate that the government's budget deficit (BD) was positively and significantly impacted by the Current Account Deficit (CAD) from 1991 to 1992, but negatively and significantly impacted from 1975 to 1976, 1981 to 1985, 1989 to 1970, 2005 to 2006, and 2009 to 2011. Overall, the findings suggest that there is dynamic causation between the twin budget-current account deficits, albeit in distinct directions. This suggests that the Iranian government is unable to address the imbalance in its external sector through budget policy.

Highlights

- The findings suggest that there is dynamic causation between the twin budget-current account deficits, albeit in distinct directions.
- This suggests that the Iranian government is unable to address the imbalance in its external sector through budget policy
- Iran's economy has consistently experienced a rise in the budget deficit (BD), which has hindered the country's capacity to see overall economic growth

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1. Introduction

The current macroeconomic environment emphasizes the interdependence of national economies, the significance of current account openness, and budgetary strategies. The first is caused, at least partially, by the "lower bound" limits that followed the global financial crisis, which weakened traditional monetary policy. While tightening the international Current Account cycle's synchronization strengthens the second case. First and foremost, nations may invest in industrial development, improved universal health care, education, and other vital economic areas when their budgets are balanced (Brender & Drazen, 2008). Cisions that save costs for current and future generations can be made by nations with a healthy budget balance. The majority of developing countries have low tax collections, which push the government to borrow money and run budget deficit. Njironge, Kosimbei, and Korir (2014) assert that the need to maintain social services and the economy makes it challenging to cut government spending. Nonetheless, poor investment activity, constrained industrial development, and economic inequality set developing nations apart (Chipote & Tsegaye, 2014). The twin-deficits hypothesis originated from initial investigations into the twin-deficits phenomenon in society.

Chenery et al. (1966) claimed that a developing nation will have to borrow money from outside sources due to the gap between investment and savings if it is forced to import more than it exports and this difference exceeds the nation's capacity for savings. This theory clarified why, in their early phases of growth, the majority of developing nations struggle with the problem of external debt.

Since many nations are experiencing an increase in both domestic and external imbalances, the connection between the trade and budget deficits is crucial. Future taxpayers will be responsible for paying the public debt if the twin deficit hypothesis for a given nation is true. This indicates that Ricardian equivalency is invalid. As a result, it makes budget financing difficult and could even trigger a financial crisis down the road. Naturally, policymakers need to be aware of this since the fiscal actions they take to lower the Budget Deficit (BD)¹ could potentially affect the current account in some way.

One of the connections between the Current Account Deficit (CAD)² and the Budget Deficit (BD) is issuing that economists and policymakers in wealthy and developing countries are investigating (Suresh & Gautam, 2015). When the government spends more money than it takes in from taxes and customs fees throughout a fiscal year, there is a BD (Alesina & Roberto, 1999). When a nation's imports of goods and services surpass its exports of the same throughout a fiscal year, a CA also arises (Bernheim, 1988). In line with the twin-deficits hypothesis (TDH), a rise in the deficit in the budget to a wider current account deficit. The Ricardian Equivalence occurs when an increase in the BD has no effect on the

¹ BD stands for Budget Deficit

² CAD stand for Current Account Deficit

Current Account deficit, as opposed to the twin divergence, which occurs when the BD decreases the CAD (Azgün, 2012; Sakyi & Opoku, 2016).

The current state of the macroeconomic environment is marked by a greater reliance on fiscal measures and a greater awareness of the importance of trade openness and economic interdependence. The weakening of traditional monetary policies brought about by the "zero lower bound" restrictions that followed the global financial crisis is, at least in part, responsible for the budget imbalance. However, increasing the synchronization of the international trade cycle strengthens the CAD (Karras, 2019).

Objective research on the relationship between these two deficits is necessary, and a large body of work has been done on the subject using a variety of data sets and econometric techniques. The next part will go into more detail about this literature, but overall, the findings are a little conflicting, with little agreement that rising budget deficits tend to worsen the current account balance, though not exactly on a one-to-one basis. A 2011 International Monetary Fund (IMF) analysis found that a 1% GDP budget consolidation boosts the current account balance by no more than 0.5% of GDP, with a long-lasting impact. The two Greek inadequacies showed a positive association, as shown by Papadogonas & Stournaras (2006). Similar evidence is also present in Turkey, according to Altintas & Taban (2011). Diverse investigations on the twin-deficits theory have shown inconsistent findings. According to Kim & Roubini (2008), there is a negative correlation—which they dubbed twin divergence—between the two account deficits in the US. Marinheiro (2008), however, provided evidence of the opposite relationship—known as reverse causality—in Egypt. It is also possible to have bidirectional or two-way correlations, as Feldstein & Horioka (1980) showed.

Tang & Lau (2011) discovered that between 1973 and 2008, there was a 0.43% increment within the US current account shortage for every 1% increment within the budget shortage. Many nations experienced simultaneous budget and current account deficits following the currency and Asian financial crises. The twin-deficits hypothesis for Cambodia was confirmed by Lau & Tang (2009) using the Granger causality test and cointegration. India's twin-deficits theory was confirmed by Banday & Aneja (2016) and Basu & Datta (2005) using cointegration and the Granger causality test. Kulkarni & Erickson (2011) found that the BD in Pakistan and India were caused by the current account deficit. According to Thomas Laubach's 2003 observations, for every 1% increase in the deficit-to-GDP ratio, long-term interest rates rise by about 25 basis points. In a recent study, Engen & Hubbard (2004) discovered that interest rates increase by two basis points for every 1% increase in the debt to GDP ratio.

Njironge et al. (2014) claim that the essence of these two deficits is to obstruct the nation's long-term economic development and cause macroeconomic imbalances. For example, South Africa's BD has been steadily growing, which could make it more difficult for the country to maintain inclusive economic growth while maintaining an unstable trade balance. To support sustainable,

inclusive growth and economic stability, these two deficits need to be closely controlled. Finding the connection between these two deficits is essential, though, as it will have a significant impact on policy.

The BD and CAD should theoretically be positively connected. The twin-deficits hypothesis states that an increase in the BD causes the Current Account balance to be upset (Eldemerdash et al., 2014). An increase in the BD will cause the interest rate to rise under the Mundell-Fleming model, which is based on the IS-LM model. Foreign capital floods in as a result of a higher interest rate, driving up demand and the value of the local currency. Finally, the Current Account balance will worsen with an increase in net domestic currency (Mundell, 1963; Ding & Xi, 2012). The Keynesian absorption hypothesis tries to explain the effect from a different perspective than the Mundell-Fleming model, which contends that changes in interest rates and exchange rates are how the BD affects the current account deficit. According to Keynes, an increase in disposable income and private consumption will result in domestic absorption if the BD widens (Mohanty, 2019). As a result, if domestic demand rises, imports will also grow, causing the current account imbalance to expand.

The idea that the BD and the CAD are positively causally associated is, nevertheless, contested by various hypotheses. According to Bird et al. (2019), post-Keynesian theory emphasizes how interest rates affect the private sector, which implies that they have an impact on private savings and investment. Since individual investments and savings are obviously correlated with the real interest rate, an increase in the BD that raises the rate will have the effect of "crowding out," leading to a decrease in investment and an increase in private savings (Eldemerdash et al, 2014). Eventually, increasing willingness to private savings contribute to closing the current account deficit. Taking inter-period budgetary restrictions into consideration, the Ricardian equivalency hypothesis postulates that an increase in government spending in the current period will raise private savings in the current era by creating the expectation of a future tax hike. As a result, one crucial element that could influence the connection between the two deficiencies is the private sector (Barro, 1974; 1990).

Most prior hypotheses (Ahmad et al, 2015; Karras,2019; Klein & Linnemann, 2019; Mohanty,2019) focus on the relationship between the examined deficits. It is crucial to understand that additional factors may have an impact on the causality's direction. The causal order is reversed under three conditions. First, the external balance is probably going to have an impact on the domestic economy if foreign trade is a major part of the economy. This might lead to a slowdown in the increase in the country's income and an increase in the BD (Khalid & Guan, 1999). Additionally, the CAD will increase if an external demand side shock results in a drop in exports. The budget imbalance rises and the domestic economy deteriorates as a result of an increase in the CAD and a decrease in government tax collection (Marinheiro, 2008). Moreover, imports may be impacted by an external price shock. For instance, if a spike in supply results in the price of imported goods rising significantly, the public and private

domains will have to bear greater prices for imported commodities. As a result, government revenue and private savings decline, increasing BD (Sobrinho, 2013). Second, borrowing from outside nations has become necessary to fund domestic investment due to an increasing current account deficit. The accumulation of debt will make future fiscal strains and deficits worse (Helmy, 2018). Third, "current account targeting" is how Summers (1988) describes the connection between the CAD and the financing deficit. To put it another way, the government can use budget policy to accomplish an economic objective that aims to reduce external imbalances.

Monetary and budgetary policies, when implemented honestly, are essential to macroeconomic stability. A macroeconomic theory known as the twin-deficits hypothesis makes the assumption that there is a perfect link between the current account balance and the BD. Kim & Roubini (2008), Darrat (1998), Miller & Russek (1989), Lau & Tang (2009), Abbas et al. (2011), Coretti & Muller (2006), Lee et al. (2008), Altintas & Taban (2011), and Banday & Anejas (2016) have produced a growing body of theoretical and empirical work on the twin-deficits hypothesis.

Tight management of these two deficits is necessary for inclusive, sustainable economic growth and stability (Stephen et al., 2010). In the 1980s, when the economy in question was experiencing both current account and BD, the twin-deficits concept was first studied in the United States (Akbostanc & Tunc, 2015). The majority of industrialized nations, including Sweden and Germany, started looking into the viability of the twin-deficits concept in the 1980s, according to Baharumshah & Zubaidi (2006). Then, the twin-deficits theory was extended to less developed nations. A significant BD has a negative impact on the economy, particularly given the hefty taxes imposed on future generations.

Stated differently, the connection between the CAD and the BD is far more intricate than the traditional twin-deficits theory. The magnitude and direction of the relationship between the twin deficits can be altered by exogenous shocks, country characteristics, and the structure of the global capital market (Erceg et al., 2005; Sobrinho, 2013). Consequently, there's no reason to assume that the twin deficits link remains the same throughout time.

We have observed a government BD in Iran's economy for many years because the government budget is dependent on oil income (oil exports) and there are fluctuations in this market. On the other hand, Iran's non-oil export sector has not been able to make significant growth and has decreased Iran's competitiveness with other nations due to issues with the industrial sector and the current commercial structure. Additionally, as a result of the monetary policies' implementation-induced increases in domestic prices, there is a corresponding rise in demand and imports, which causes swings in the current account balance (Vasalia, 1999). The oil market's volatility and shocks have generally had an impact on oil revenues and exports. In Iran's case, the sanctions in place have caused a decline in oil exports, which has negatively impacted the country's

budget and current account balance. Of course, the nation's economic policies have attempted in recent years to enhance non-oil exports and decrease the reliance of the economy on oil income and import substitution, but for various reasons, these goals have not been met (Tahmasabi, 2012).

This research uses a bootstrap rolling window approach to analyse data on Iran's both the budget and current account deficits from 1965 to 2018 from a historical vantage point. This research is the initial investigation to assess the non-linear elements on the causal connection between Iran's CAD and BD using the rolling window method. Conventional methods, like the Granger causality test and the vector auto regression (VAR) model used in previous research, cannot pinpoint the start and stop of any given causation cycle. Furthermore, these methods cannot identify variations in causality that take place over time (Kim & Roubini, 2008; Forte & Magazzino, 2013). Throughout its economic history, Iran has seen a number of domestic and international shocks that have impacted its financial and current account balance and could lead to structural changes. Since each subperiod cannot have a single causality (Li et al., 2016), we'll look into the parameter instability brought on by the structural alteration, and we'll figure out each sub-period using the bootstrap rolling window method. Subsequently, we assess the twin deficits' causal relationship for every s sub-period.

The article consists of the following sections: The literature review and theoretical framework are included in Sections 2 and 3. The data and technique are then covered in Section 4, and the empirical findings are provided in Section 5. Section 6 concludes this study with conclusions and policy recommendations.

2. A Review of the Related Literature

Divergent opinions exist concerning the theoretical correlation between the two forms of current account and BD. Some studies suggest that a higher CAD results from a higher BD, while others do not. Empirical research on the subject has produced conflicting results. There is disagreement over the exact nature of the connection between the CAD and the budget shortfall, despite the fact that the relationship has been the subject of countless studies.

2.1 Mundell-Fleming Model

Rising domestic interest rates put upward pressure on BD; this is the basis for Mundell (1963) and Fleming (1962)'s theoretical framework, which explains the causal connection between the CAD and the BD (explaining the twin-deficits theory). This strategy will draw in foreign investment, which will cause the real exchange rate to drop. The CAD is eliminated as a result of the currency rate fall, which lowers exports relative to imports (Kouassiet et al., 2004). This trend is also in line with the Dutch sickness theory, which holds that financial flows affect a country's export industry, current account balance, and real exchange rate (Younger, 1992; Murshed, 2018; Amin & Murshed, 2018; Polat & Rodriguez Andrés, 2019).

The sticky prices of goods and the constant equilibrium of asset markets, including the foreign exchange market, are fundamental characteristics of the Mendel-Fleming model. Because nominal stickiness guarantees that nominal shocks have actual impacts, policymakers' performance is crucial in these models. According to Mondel and Fleming, a larger BD would boost aggregate demand, raise domestic absorption, and push domestic interest rates higher than global rates. Foreign capital flows to the stock market in response to rising interest rates to take advantage of better yields in the home market. Next, there is a rise in the demand for home currency, and as the value of the currency rises, domestic commodities become more expensive than those from other countries. As a result, citizens import more goods, which widens the CAD (Onafowokan & Owoye, 2006). Lastly, an increase in imports may make the current account balance worse. Since oil accounts for the majority of Iran's financial income, fluctuations in the global price of the commodity could have a negative impact on the country's current account balance and result in a deficit. This shift in commerce has a direct impact on government revenue, which strains the finances and, if not controlled, could result in a BD. Regular observations of this cycle have been made with spikes in oil prices.

2.2 Keynesian Absorption Theory

The twin deficits idea is also consistent with traditional Keynesian absorption theory. The Keynesian cost-income approach's logic shows that tax cuts or increases in public spending lead to open budget policies that raise national income. Imports rise as a result of this increase in national revenue, which raises the current account deficit. It is accurate to say that there is a connection between the two deficits, with the BD causing the current account deficit, based on the scenarios mentioned. Researchers like Perera & Liyanage (2010) have observed this occurrence and verified the significance of intermediary variables like interest rates and currency rates, in accordance with the Mundell-Fleming's theory.

2.3 Ricardian Equivalence

Barro's (1974) seminal essay on the theory of the Ricardian equation rejects the twin-deficits concept, despite the fact that the Keynesian school of thought finds it plausible. A shift in the government's financing strategy, in accordance with the theory of Ricardian Equivalency, has no effect on stimulating the private spending pattern and, consequently, has no effect on the domestic interest rate. Because of this, it is expected that the exchange rate would stay steady, removing the chance of a current account imbalance. This is because consumer inter-period budget constraints are unaffected by government budget measures, and changes in saving balance out changes in disposable income to keep consumption at the same level. The consumption path has not changed over time, so an increase in the BD does not exacerbate the current account deficit. For example, if the BD rises, a tax cut now is perceived as a prospective tax increase in the future. As a

result, after the current tax cut, consumers save the full increase in their disposable income to offset the future tax. Conversely, the validity of the twin deficits theory might be reinforced by the lack of Ricardian Equivalency. The lack of a relationship between BD and real exchange rate swings can also be explained by Ricardian equivalency, especially because neither the domestic interest rate nor the consumption route is altered (Evans, 1986; Bernheim, 1987; Seater, 1993).

2.4 Feldstein-Horioka Puzzle

Feldstein & Horioka (1980) found in their investigation a virtually perfect link between domestic savings and domestic investment rates, despite capital mobility. This correlation is confusing because, in a perfect world of capital mobility, people would invest abroad if the marginal return on capital in their home country was lower than that of their foreign country. As a result, theoretical explanations based on the idea of cross-border capital mobility predict that domestic savings and investment would not be correlated. According to the connection between FHP1 and the twin-deficits hypothesis, a rise in the BD is expected to reduce domestic savings in the absence of Ricardian equivalency, which will lower the marginal return on capital in the domestic sector. Because of this, residents frequently make investments overseas, which forces the exchange rate to rise and may worsen the CAD by necessitating the purchase of more foreign currency to make up for the BD. Thus, the twin-deficits hypothesis is likely to hold true in situations of complete capital mobility (and the presence of FHP), and vice versa.

3. Research background

Numerous studies have been done on the connection between twin impairments; some of these studies, both domestically and internationally, are briefly reviewed here.

Hussain and colleagues (2023) investigate the interplay of the twin deficit. In an attempt to respond to this question, the current study used the autoregressive distributed lag (ARDL) model to assess the twin deficit hypothesis in the context of Pakistan. Two distinct models were estimated: one that used the balance of trade as the dependent variable and the other that used the current account balance. Over an extended period, both models validate the traditional understanding of Pakistan's twin deficit hypothesis, which posits that the BD is the sole cause of the trade balance.

Bashir and Ayoub investigated the twin idea in 2023. They reconsider how applicable the Twin Deficit Hypothesis is to the Indian economy, which is characterized by rising inequality and limited liquidity. The authors add two important mediating variables—trade openness and exchange rate—to the econometric study to investigate their influence on the current account deficit. Using a novel asymmetric cointegration technique published by Shin et al. (2014),

the researchers have investigated the short- and long-term asymmetric relationship between the gross BD and the current account deficit. Using annual time series data from 1970 to 2018, the empirical analysis shows that the Twin Deficit Hypothesis for the Indian economy has asymmetries. The strong results of this study show that, over time, there is an unbalanced relationship between the two impairments.

Kohensal and Alizadeh (2015) used the threshold vector autoregression technique to study the twin hypothesis in Iran. The twin deficit theory has been tested in this study for the years 1350–1391. The factors have a two-way causal link, according to the results.

To achieve economic growth, Tadayon et al. (2019) looked into Iran's economy's simultaneous containment of the BD and current account deficit. Based on the design of the ideal routes of economic variables during the period of 1357–1396, optimal control theory has been applied in this study to analyze the optimal path of Iran's economy's BD and current account deficit. Consequently, simultaneity is first fitted in the form of a BP-IS-LM model in accordance with economic theories and the fundamentals of econometrics using the three-stage least squares approach, taking into account the dynamic behavior of economic variables in the nation. The fitting results are employed in the optimum control theory for policy making once the cointegration tests are completed and the coefficient of Tile inequality for each behavioral equation is found. The findings indicated that contractionary financial policies will be more effective in reducing twin deficits and that Iran's economy will need to reduce government spending to achieve the targeted level of the target variables.

The concept of triple deficits in the Iranian economy between 1979 and 2018 was investigated by Mehrara et al. (2022) in the presence of trade openness for two trade models with and without oil. The Johanson-Jusilius method and the error correction mechanism were used in this study to examine the long-term and short-term relationships of the research variables, respectively. The findings demonstrated that while the triple deficit hypothesis's long-term relationships between its component parts are established in both oil and non-oil models, its short-term validity is not supported. Last but not least, the degree of trade openness was lowered in the oil trade model by both internal and external imbalances, whereas in the non-oil trade model, only the savings gap had this effect. This highlighted the crucial role that the private sector plays in lowering both internal and external imbalances.

4. Model and Methodology

The purpose of this essay is to demonstrate how CAD and BD are related. The relationship between the twin deficits can theoretically be shown by the national account's principal equation;

$$Y = C + I + G + X - M \quad (1)$$

In this case, Y is the national product, while C and G stand for, respectively, private consumption and public spending by the government. I stands for

investments, S for personal savings, T for tax receipts from the government, X for exports, and M for imports. Thus, the net export is X-M.

By rearrangement of Equation 1, we get:

$$NX=X-M=Y-C-G=S-I \quad (2)$$

Net exports are denoted by NX. According to this equation (Mankiw, 2010), the trade balance is equal to the difference between national savings and investment, indicating a direct relationship between the two. As a result, economic policies that encourage investment will have a negative effect on the current account balance. A policy that increases national savings while increasing private or public consumption will negatively impact the current account balance. Furthermore, this formula ($NX=S-I<0$) shows that a country has a CAD when it invests more than it saves.

National savings can be divided into private and general saves to show how the twin deficits are related. The gap between government tax collection (T) and spending (G) is known as general savings (SG). We deduct government spending from tax receipts to determine general savings ($SG=T-G$). Comparably, the difference between disposable income (Y-T) and private consumption (C) is used to measure private saving (SP). Stated differently, private saving can be calculated as follows: $SP=Y-T-C$, or disposable income less private spending. Equation 2 can be rearranged to produce:

$$NX=X-M=(Y-T-C)+(T-G)-I=S^P+S^G-I \quad (3)$$

If we assume that private saving and investment are roughly equivalent, we discover that the Current Account balance corresponds to general saving. In other words, if the government's tax revenue is less than its expenditures ($SG<0$), there is a CAD ($NX<0$). Moreover, if private saving and investment are identical, the CAD will change in the same amount and direction as the BD (Bird et al., 2019). Assuming private savings and investment remain relatively stable, the BD will have a beneficial influence on the Current Account deficit.

The linkages between government savings, net exports, investment, and private savings are all shown by the fundamental relationships of the national accounts. However, the exchange rate and interest rate are not taken into account. We understand that the movement of capital is influenced by the interest rate and currency rate, and that this effect will have a major effect on the twin deficit. Additionally, based on the IS-LM model, the Mundell-Fleming model shows how the interest rate and exchange rate systems might affect the CAD when the BD changes (Mundell, 1963; Salvatore, 2006; Ding & Xi, 2012). Since investment is inversely connected to real interest rates (r), private saving is related to real interest rates (r), and net exports are influenced by real exchange rates (e), Equation 3 can be recast as follows:

$$NX(e)=S^P(r)-I(r)+S^G \quad (4)$$

Large, open countries' net capital outflows are proportionate to the real interest rate, and net exports are equivalent to their net capital outflows. The net capital outflow, which we will have in this case, is denoted by CF(r):

$$NX(e)=CF(r) \quad (5)$$

The Mundell-Fleming model predicts that higher interest rates will follow from a budgetary approach that reduces overall savings and increases BD. A higher interest rate causes the real exchange rate to rise and net capital outflow to drop, which in turn causes a fall in net exports (NX) and an increase in the current account imbalance. Equation 5 states that the change in net exports is equal to the net capital outflows (Salvatore, 2006). Consequently, it would be consistent with TDH1 for the BD and CAD to move in the same direction.

Capital mobility and the exchange rate regime may have an impact on the twin deficits' connection. First, according to Leachman & Francis (2002), the exchange rate regime is essential to the twin deficits transmission process. When a country has a floating exchange rate system in place, the interest rate and exchange rate system have an impact on the CAD as a result of the Mundell-Fleming model BD. If a nation has a fixed exchange rate system in place, changes in the BD might not have an impact on net exports and the CAD since capital movement will not be impacted by exchange rate fluctuations. Capital mobility may also have an impact on connection. Expanding the BD will cause interest rates to rise less if capital flows are more sensitive to interest rates, which will lessen the adverse effect on net exports (Mankiw, 2010). Put otherwise, a country's BD has less of an impact on its CAD the more money it moves about. Our work is theoretically grounded in the Mundell-Fleming model. Our ability to ascertain if the Mundell-Fleming model holds true for different periods of Iran's history will be aided by the rolling window method.

This article aims to examine the connection between Iran's CAD and BD. The Keynesian macroeconomic model, often known as the Mundel-Fleming model, serves as the basis for analyzing this problem. According to the model, an increase in the BD that draws in foreign capital inflows and an increase in the value of the home currency cause the real domestic interest rate to rise. This framework adheres to Lau & Baharumshah's (2009) methodology. This technique has been applied to time series data analysis. We investigate the connection using a CAD function with only one factor ($BUDGET = f(TRADE)$).

4.1 Test for Parameter Stability

Commonly used causality tests for conventional asymptotic properties and covariance restriction include the Wald test, likelihood ratio (LR), and Lagrange coefficient (LM). Nonetheless, if the time series variables in the VAR model are not stationary, the results might not have a normal asymptotic distribution, which is why some academics question the t statistic (Sims et al., 1990). Toda & Yamamoto (1995) suggest an altered Wald test as a means of mitigating bias. As a consequence, the residual-based (RB) bootstrap critical value is suggested. The Granger non-causality test is applied in this work using the bivariate VAR framework that Balcilar et al. (2010) suggested.

1. There is a theoretical relationship between the fiscal and trade deficits. The twin-deficits hypothesis (TDH) holds that an increasing budget deficit deteriorates the trade balance (Eldemerdash et al., 2014).

The residual-based (RB) modified LR causality test is considered to be represented by the bivariate process VAR(p):

$$y_t = \phi_0 + \phi_1 y_{t-1} + \dots + \phi_p y_{t-p} + \varepsilon_t \quad t = 1, 2, \dots, T \quad (6)$$

$\varepsilon_t(\varepsilon_{1t}, \varepsilon_{2t})$ is a stand-alone white noise process with a Σ covariance matrix and zero mean. The Schwartz Information Criterion establishes the optimal lag length (SIC). $y_t = (y_{1t}, y_{2t})'$ divides into two branches: the financial deficit (y_{2t}) and the CAD (y_{1t}). Thus, we may rewrite Equation 1 as follows:

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} \phi_{10} \\ \phi_{20} \end{bmatrix} + \begin{bmatrix} \phi_{11}(L) & \phi_{12}(L) \\ \phi_{21}(L) & \phi_{22}(L) \end{bmatrix} \begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (7)$$

Where $\phi_{ij}(L) = \sum_{k=1}^{p+1} \phi_{ij,k} L^k$, $i, j = 1, 2$ and L is the lag operator defined as $L^k x_t = x_{t-k}$. The null hypothesis in Equation 1 is that the Granger causality BD is not a Current Account deficit, which is tested by applying the constraint $\phi_{12,i} = 0$ for $i = 1, 2, \dots, p$. Similarly, the second null hypothesis asserts that the Granger causality CAD is not a BD, which is likewise examined by applying the restriction $\phi_{21,i} = 0$ for $i = 1, 2, \dots, p$.

The traditional VAR model technique makes the assumption that parameters will remain constant throughout time and uses the complete sample to assess causality. However, this assumption will be broken if structural changes take place over time; as a result, the two series will become unstable, rendering the causality results erroneous. Granger (1996) noted that it's critical to recognize that the parameters are movable. Therefore, we examine both the short- and long-term parameter stability in this work. The Lc test created by Nyblom (1989) and Hansen (1992) is used to assess the stability of the long-term parameter, while the Sup-F, Mean-F, and Exp-F tests created by Andrews (1993) and Andrews & Ploberger (1994) are used to assess the stability of the short-term parameter.

4.2 Rolling Window Causality Test

Our top choice is the rolling window Granger causality test based on modified bootstrap estimation, as the estimated conclusions of the conventional VAR model are erroneous if it can be shown that the parameter is not constant. The rolling window causality test may help us avoid the parameter instability brought on by structural alterations. Furthermore, there are multiple subperiods where the causal relationship between the CAD and the BD can be found.

Balcilar et al. (2010) state that if a fixed-size rolling window of l observations is available, the whole sample can be divided into a number of $T-l$ subsets. Every subsample is subjected to the RB causality test. Therefore, it is possible to precisely ascertain the causal relationship between the twin deficits in each subperiod by calculating the bootstrap likelihood values based on the LR statistic seen in the $T-l$ subsets. $N_b^{-1} \sum_{k=1}^p \hat{\phi}_{12,k}^*$ can be used to demonstrate the relationship between BD and Current Account deficit, where N_b is the number of bootstrap iterations. Similarly, $N_b^{-1} \sum_{k=1}^p \hat{\phi}_{21,k}^*$ demonstrates the relationship between CAD and BD. Both $\hat{\phi}_{12,k}^*$ and $\hat{\phi}_{21,k}^*$ are bootstrap estimates for the VAR model in Equation 2.

There are no standards for choosing window sizes. As with [Balcilar et al. \(2010\)](#), we have to strike a balance between precision and representativeness when choosing the size of window l . When choosing the window size, we make a trade-off between parameter representation and precision because a large window size can boost precision while a small window size can improve parameter representation. First, an evaluation of the 5-, 7-, and 10-year windows' sizes is attempted. There aren't many qualitative differences in the results for the different window specifications. In terms of numbers, the differences are clear. The least/greatest impacts will be seen for the smallest/largest window of size 5/10. These results are due to the less accurate estimation of parameters in the smallest window for 5. We utilize an average window size to balance accuracy and heterogeneity concerns because using an average window size of seven years also produces results that are quantitatively comparable to those of the ten-year window.

The advantages of this strategy are as follows: This method's first capabilities include the ability to conduct nonlinear structural failures and pinpoint their time points. Conventional linear analytic techniques can analyze the relationship and causation between time series over the whole sample, but they are unable to detect nonlinear breaks that could miss fundamental structural changes over the whole duration ([Balcilar et al., 2010](#)). Second, the sub-periods that are causally connected may be objectively identified using this technique. Structural gaps that have developed over time could significantly affect causality. Traditional approaches sometimes mentally partition the entire period into multiple discrete periods based on the primary economic characteristics ([Forte & Magazzino, 2013](#)). The rolling window approach can overcome obstacles and yield unbiased results. Thirdly, our approach can assess different causal relationships and their directions in an objective manner over different sub-periods ([Li et al., 2016](#)). Since its causes and patterns in different sub-periods are more easily observable than using conventional approaches, it offers a more objective and modern perspective on research.

5. Data and Results

Using yearly data from 1965 to 2018, this study examines the causal relationship between Iran's current account deficits and the budget. The difference between the government's total receipts and expenses is used to calculate the BD; the value of exports less the value of imports is used to calculate the current account deficit. The total of all goods and services' current account deficits makes up the current account deficit.

The central bank is the source of the information. According to Table 1's descriptive statistics, the study's key variables are the twin deficits of BUDGET and CURRENT ACCOUNT. The time series variables are not linear, as indicated by Table 1's display of both variables' non-normal distribution at the 1% level. Thus, in this research, we take structural modifications into account. Furthermore, Iran's BD fluctuates more than its current account deficit.

Table 1. Data details

	FISCAL	CURRENT ACCOUNT
Mean	-42195.72	95159.30
Maximum	338.8000	810073.3
Minimum	-354618.0	-17918.00
Standard deviation	80837.45	206418.4
Skewness	-2.205404	2.245391
Kurtosis	7.250420	6.804439
Jarque-Bera statistic	84.42293	77.94199
Possibility	0.000000	0.000000

Source: Research finding

The model variables in time series econometrics must be stationary in order for the regression to be considered valid. The unit root of the series and nullity are typically used to test the null hypothesis. Which test is the Phillips-Peron test among the unit root tests? This test's null hypothesis suggests that the variable has a unit root. Table 2 shows that the variables related to the BD and CAD are at an insignificant level according to the Phillips-Perron test. This is because the test does not reject the null hypothesis based on the unit root of the variable once the variables are different.

Table 2. Phillips-Peron Stationary test

Variable	Level	First order difference
BD	- 0.35	- 7.36
CAD	-1.52	- 6.17

Critical values at the 5% level, -3.496960

Source: Research finding

Since the variables' findings from the stationary test show that they are stable with initial difference, the Johansen-Juselius co-accumulation approach is utilized to ascertain co-accumulation or long-term relationships. The presence of a long-term vector between the model's variables is confirmed by the findings of the maximum eigenvalue approach and the effect matrix method (table 3).

Table 3. Johansen's cointegration test

	Eigenvalue	Trace Statistic	Prob	Max-Eigen Statistic	Prob
0	0.179122	15.27182	0.0540	8.092592	0.3694
1	0.160630	7.179228	0.0074	7.179228	0.0074

Source: Research finding

5.1 Model Estimation and Evaluation

Tables 4 and 5, respectively, present the findings of the studies conducted on both long- and short-term parameter stability in detail. We examine the stability of the parameters using the Mean-F, Exp-F, and Sup-F tests. Each test result

demonstrates that the null hypothesis is rebuttable at the 1% significance level. The analysis demonstrates the short-term instability of the parameters.

Table 4. Short-term parameter stability test

	BD equation		CAD equation		VAR (2) system	
	Statistic	Bootstrap likelihood	Statistic	Bootstrap likelihood	Statistic	Bootstrap likelihood
Sup-F	90.3565	0.0000	23.4669	0.0067	109.3468	0.0000
Mean-F	37.3954	0.0000	13.0904	0.0032	48.6409	0.0000
Exp-F	40.9225	0.0000	8.8012	0.0043	51.5655	0.0000
Lc					3.2757	0.005

Source: Research finding

Table 5 presents the outcomes of the long-term parameter stability test. Strong evidence reveals that the twin deficits parameters are unstable over the long term, as indicated by the bootstrap likelihood values of the Exp-F and Sup-F statistics, which reject the null hypothesis that the parameters are constant at the 1% significance level.

Table 5. Long-term parameter stability tests

	Sup-F	Mean-F	Exp-F	L
BD = a + b* Current Account deficit	17.3946	6.6770	6.6639	1.3194
Possibility	0.0003	0.0109	0.0018	0.005

Source: Research finding

The VAR model's long- and short-term parameters are unstable as a result of structural changes, according to the parameter stability test findings.

Thus, to identify the twin deficits' causal link for each subperiod, we utilize the bootstrap rolling window method.

The p-values for the LR statistic and the rolling estimate of the effect of the BD on the CAD are shown in Figures 1 and 2, respectively. The findings show that between 1981 and 1987, the BD had a positive effect on the current account deficit; however, between 1975 and 1977, 1998 and 1999, and 2005 and 2013, the impact was negative.

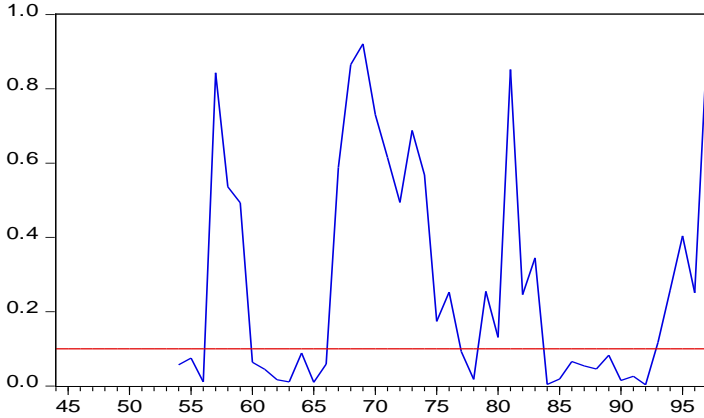


Fig. 1. Bootstrap p-values from rolling window test

Source: Research finding

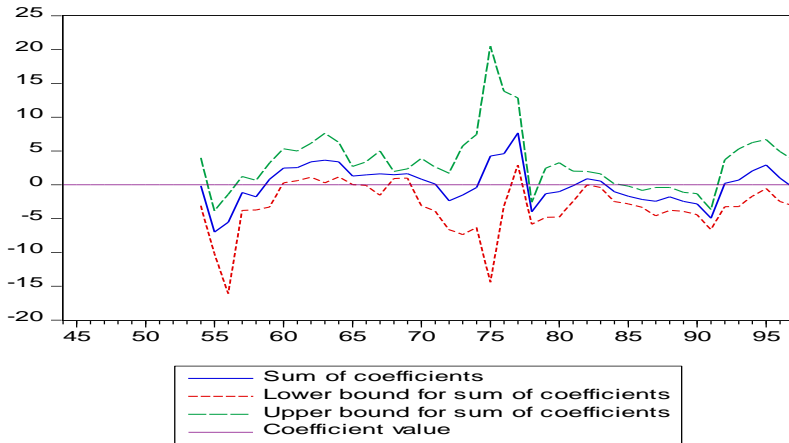


Fig. 2. Rolling window bootstrap estimation of the effect of fiscal deficit on the trade deficit

Source: Research finding

The p-values for the LR statistic and the rolling estimate of the current account deficit's effect on the BD are shown in Figures 3 and 4, respectively. The BD was positively and statistically significantly impacted by the CAD in 1991–1992. This effect is negative for the following periods: 1975–1976; 1981–1985; 1989–1990; 2005–2006; and 2009–2011. This is because Iran's economy is mostly dependent on oil exports. Summers (1988) called this causal relationship

"current account targeting," and it is mainly focused on emerging nations. He contends that budgetary policies can be used to implement external adjustment.

The relationship between the budget policies in Iran and the notable decline in foreign trade may be explained by the fact that the increase in government spending is primarily temporary and has little impact on household consumption plans as permanent income is affected less. As a result, when the government borrows money to fund spending increases, domestic private saving rises virtually continuously, and the resulting deficit affects the current account almost proportionately. Fundamentally, a BD causes interest rates to rise, which in turn causes the exchange rate and the CAD to rise. The findings, in line with various prior studies, may not be universally applicable because Iran's economy, as an oil-rich nation reliant on oil revenues, is susceptible to events affecting the global oil market and, consequently, international oil prices.

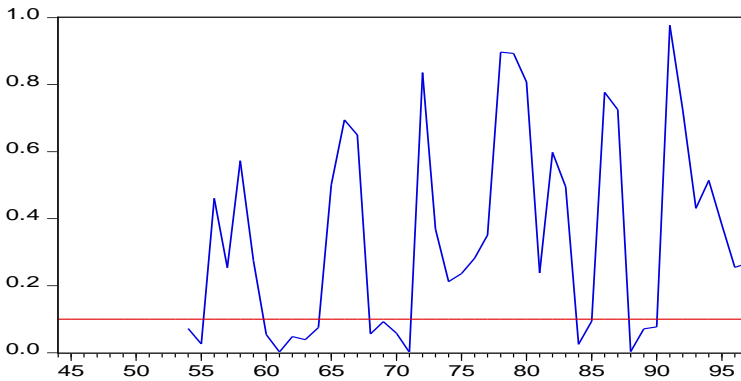


Fig. 3. Bootstrap p-values from rolling window test

Source: Research finding

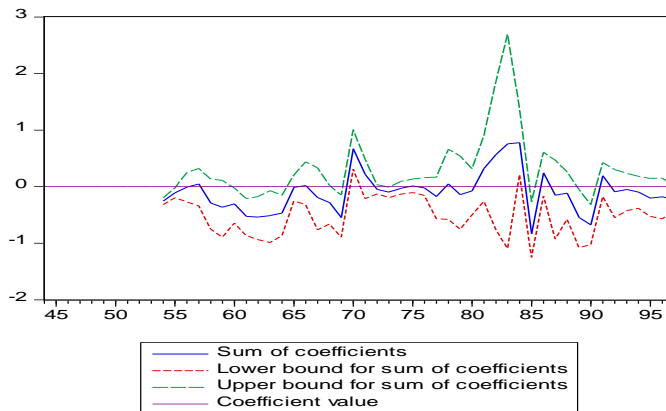


Fig. 4: Rolling window bootstrap estimation of the effect of trade deficit on the fiscal deficit

Source: Research finding

6. Summary and Conclusion

This study examines the relationship, from 1965 to 2018, between Iran's CAD and the government's BD. To find unique causal relationships in each period—while accounting for structural changes—we employed a bootstrap rolling window technique. We discovered that there is a time-varying relationship between cognitive deficiency and its underlying causes using the rolling window causality estimate. Every causal sub-period's start and finish were also specified. According to the Mundell-Fleming model's conclusions, the BD had a positive effect on the CAD from 1981 to 1987. However, between 1975 and 1977, 1998 and 1999, and 2005 and 2013, the BD had a negative causal relationship because it ignored the current account deficit, which is because the nation lacks organized or semi-organized financial markets, which are necessary to support the government budget. Furthermore, the data show that in 1991–1992, the CAD had a statistically significant positive causal relationship with the BD; but, in 1975–1976, 1981–1985; 1989–1990; 2005–2006; and 2009–2011, there was a negative causal relationship.

The goal of this study was to demonstrate that the Keynesian hypothesis of a long-run equilibrium relationship between the twin deficits holds true even in an oil economy. The cointegration test result demonstrated the presence of a long-term equilibrium link between the BD and the current account deficit, supporting the validity of the twin deficit theory for the Iranian economy. Furthermore, the results of this analysis provided compelling evidence in favor of reverse causality, or "trade targeting" for Iran. The outcomes further demonstrate the applicability of the Mondel-Fleming paradigm in Iran. This is explained by the fact that Iran's economy is dependent on and built around oil.

This phenomenon has significant economic ramifications for Iran's economy. To put it another way, the Iranian government should lower the CAD before attempting to address the "twin deficit" issue. Put differently, the goal of economic policies should be to reduce the current account deficit, particularly by encouraging non-oil exports and broadening the economy's export base. Iran's administration should work to diversify the country's revenue streams by promoting the export of non-oil items and lowering imports, as the country's current account balance is dependent on the price of oil.

Reducing government spending is one of the suggested strategies to improve the nation's current account balance. The current account balance may be improved in the near run by putting policies in place to encourage, inform, and convince people to pay their taxes. This is because tax revenue has the potential to remain consistent and is the most efficient way for the government to close its BD.

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Conceptualization, all authors; methodology, C.C. and C.N.C.; validation, C.C. and C.N.C.; formal analysis, all authors; resources, C.N.C. and C.M.; writing—original draft preparation, C.N.C. and C.M.; writing—review and editing, all authors; supervision, C.C. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

Data Availability Statement:

The datasets generated during and/or analyzed during the current study are available in the paper.

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References

- Abbas SA, Bouhga-Hagbe J, Fatás A, Mauro P, Velloso RC (2011) Fiscal policy and the current account. *IMF Econ Rev* 59(4):603–629.
- Ahmad, A. H., Aworinde, O. B., Martin, C. (2015). Threshold cointegration and the short-run dynamics of twin deficit hypothesis in African countries. *The Journal of Economic Asymmetries*, 12(2), 80-91.
- Akbostanc, E., & Tunc, G. I. (2015). Effects of budget deficit on production, inflation and trade balance of Iran-based on the synchronous equations' model. *Bulleting of Georgina National Academy of Science*, 1(9), 246–255.
- Amin, S.B. and M. Murshed. (2018). “An Empirical Investigation of Foreign Aid and Dutch Disease in Bangladesh. *The Journal of Developing Areas*, 52(2):169-182.
- Andrews, D. W. K. (1993). Tests for parameter instability and structural change with unknown change point. *Econometrica*, 61, 821-856.
- Andrews, D. W. K., Ploberger, W. 1994. Optimal tests when a nuisance parameter is present only under the alternative. *Econometrica*, 62(6), 1383-1414.
- Alesina, a. F., & Roberto, P. (1999). *Budget deficit and budget institution*. Chicago: Chicago University Press.
- Altıntas, H., Taban, S., (2011). Twin deficit problem and Feldstein-Horioka hypothesis in Turkey: ARDL bound testing approach and investigation of causality. *Int. Res. J. Fin.Econ.* 74 (1), 30–45.
- Azgün, S. (2012). Twin deficit hypothesis: Evidence from the Turkish economy. *ERC Working Papers in Economics*, 2(13), 189–196.

- Balcilar, M., Ozdemir, Z. A., Arslanturk, Y. (2010). Economic growth and energy consumption causal nexus viewed through a bootstrap rolling window. *Energy Economics*, 32(6), 1398-1410.
- Baharumshah, L. E., & Zubaidi, A. (2006). Twin deficits hypothesis in SEACEN countries: A panel data analysis of relationships between public budget and current account deficits. *Applied Econometrics and International Development*, 2(13), 213–226.
- Banday UJ, Aneja R (2016) How budget deficit and current account deficit are interrelated in Indian economy. *Theor Appl Econ* 23(1 (606):237–246.
- Barro, R. J. (1974). Are government bonds net wealth?. *Journal of Political Economy*, 82 (6), 1095–1117.
- Barro, R. J. (1990). Government Spending in a Simple Model of Endogeneous Growth. *Journal of Political Economy*, 98(5, Part 2): S103-S125.
- Basu S, Datta D (2005) Does fiscal deficit influence trade deficit?: an econometric enquiry. *Economic and Political Weekly*, 3311–3318.
- Bernheim BD, Bagwell K (1988) Is everything neutral? *J Political Econ* 96 (2):308–338.
- Bernheim, B. D. (1987). Ricardian Equivalence: An Evaluation of Theory and Evidence. *NBER Macroeconomics Annual*, 2: 263-304.
- Bernheim, B. D. (1988). Budget deficits and the balance of trade. *Tax policy and the Economy*, 2, 1-31.
- Bird, G., Pentecost, E., Yang, Y, (2019). The twin deficits hypothesis: an empirical examination. *Open Economies Review* (3), 1-19.
- Chipote, P., & Tsegaye, A. (2014). Determinants of household savings in South Africa: An econometric approach. *Mediterranean Journal of Social Sciences*, 5(15), 183–190.
- Corsetti G, Müller GJ (2006) Twin deficits: squaring theory, evidence and common sense. *Econ Policy* 21(48):598–638
- Chenery, H. and Strout, A. (1966) Foreign assistance and economic growth. *The American Economic Review*, 56 (4) 679-733.
- Darrat, A.F. (1988), Have Large Budget Deficits Caused Rising Trade Deficits?, *Southern Economic Journal*, 54(4): 879-87.
- Ding, Z. H., Xia, Y. Y., 2012. Twin Deficits and Economic Growth of US: The Theories, facts and Explanations. *Journal of International Trade*, (12), 61-71.
- Ercceg, C. J., Guerrieri, L., Gust, C. (2005). Expansionary Fiscal Shocks and the US Trade Deficit. *International Finance*, 8(3), 363-397.
- Eldemerdash, H., Metcalf, H., Maioli, S. (2014). Twin deficits: new evidence from a developing (oil vs. non-oil) countries ‘perspective. *Empirical Economics*, 47(3), 825-851.
- Engen EM, Hubbard RG (2004) Federal government debt and interest rates. *NBER Macroecon Annu* 19:83–138.
- Evans, P. (1987). Do budget deficits raise nominal interest rates?: Evidence from six countries. *Journal of Monetary Economics*, 20(2), 281-300.

- Feldstein, M., Horioka, C., (1980). Domestic saving and international capital flows. *Econ. J.* 90 (358), 314–329.
- Forte, F., Magazzino, C., (2013). Twin deficits in the European countries. *International Advances in Economic Research*, 19(3), 289-310.
- Granger, C. W. J. (1969), Investigating causal relations by econometric models and cross-spectral methods. *Econometrica* 37, 424–438.
- Hansen, B. E. (1992). Tests for parameter instability in regressions with I (1) processes. *Journal of Business and Economic Statistics*, 20(1), 45-59.
- Helmy, H. E. (2018). The Twin Deficit Hypothesis in Egypt. *Journal of Policy Modeling*. 40(2), 328-349.
- Hussain, I., Hayat, U., Alam, M. S., & Khan, U. (2023). A Dynamic Analysis of the Twin-Deficit Hypothesis: The Case of a Developing Country. *Asia-Pacific Financial Markets*, 1-28.
- Karras, G. (2019). Are “twin deficits” asymmetric? Evidence on government budget and current account balances, 1870–2013. *International Economics*, 158, 12-24.
- Klein, M., & Linnemann, L. (2019). Tax and spending shocks in the open economy: Are the deficits twins? *European Economic Review*, 120, 103300.
- Khalid, A. M., Guan, T. W. (1999). Causality tests of budget and current account deficits: Cross-country comparisons. *Empirical Economics*, 24(3), 389-402.
- Kim, S., Roubini, N., (2008). Twin deficit or twin divergence? Fiscal policy, current account, and real exchange rate in the US. *J. Int. Econ.* 74 (2), 362–383.
- Kohensal, Mohammad Reza, & Alizadeh. (2015). Examining the double deficit hypothesis in Iran's economy: two-regime threshold vector autoregression approach. *Scientific Quarterly of Applied Economic Theories*, 2(3), 73-92.
- Kulkarni KG, Erickson EL (2001) Twin deficit revisited: evidence from India, Pakistan and Mexico. *Journal of Applied Business Research (JABR)* 17(2) :(90–104)
- Kouassi, E., Mougoue, M., & Kymn, K. O. (2004). Causality tests of the relationship between the twin deficits. *Empirical Economics*, 29(3), 503-525.
- Lau E, Tang TC (2009) Twin deficits in Cambodia: are there reasons for concern? An empirical study. *Monash University, Department Economics, Discussion Papers* 11(09):1–9.
- Lee MJ, Ostry MJD, Prati MA, Ricci MLA, Milesi-Ferretti MGM (2008) Exchange rate assessments: *CGER methodologies* (No. 261). International Monetary Fund.
- Leachman, L. L., Francis, B. (2002). Twin Deficits: Apparition or Reality? *Applied Economics*, 34(9), 1121-1132.
- Li, X., Balcilar, M., Gupta, R., and Chang, T. (2016). The causal relationship between economic policy uncertainty and stock returns in china and India: evidence from a bootstrap rolling window approach. *Emerging Markets Finance and Trade*, 52(3), 674-689.

- Mankiw, N. G. (2010). Chapter 5: The Open Economy. Shensa, P., Dorger, S., McHale, J. T., Acox, T. and Kuehn, T. (Eds.). *Macroeconomics* (7th ed.) (pp.119-162).
- Marinheiro, C.F., (2008). Ricardian equivalence, twin deficits, and the Feldstein–Horioka puzzle in Egypt. *J. Pol. Model.* 30 (6), 1041–1056.
- Mehrara, Maryam, Gholami, Amir, & Ahmadi, Seyyed Mohammad Mahdi. (2022). Testing the validity of the hypothesis of triple deficits in Iran with the presence of the degree of trade openness. *Economic Research of Iran*, 27(90), 135-169. doi: 10.22054/ijer.2022.61042.981
- Miller, S.M., Russek, F. S. (1989), Are the Twin Deficits Really Related?. *Contemporary Economic Policy*, 7, 91–115.
- Mundell, R. A. (1963). Capital mobility and stabilization policy under fixed and flexible exchange rates. *Canadian Journal of Economics and Political Science*, 29(4), 475-485.
- Mohanty, R. K., (2019). An empirical investigation of twin deficits hypothesis: evidence from India. *Journal of Quantitative Economics*, 17(3), 579–601.
- Murshed, M. (2018). The Harberger-Laursen-Metzler Effect and Dutch Disease Problem: Evidence from South and Southeast Asia. *Journal of Accounting, Finance and Economics*, 8(1): 134-166.
- Njironge, E. K., Kosimbei, G., & Korir, J. (2014). Testing the twin deficit hypothesis for Kenya. *International Journal of Business and Economics Research*, 3(5), 160–169.
- Nyblom, J. (1989). Testing for the constancy of parameters over time. *Journal of the American Statistical Association*, 84(405), 223-230.
- Onafowokan, O. A., & Owoye, O. (2006). An Empirical Investigation of Budget and Trade Deficits: The Case of Nigeria. *Journal of Developing Areas*. 39(2), pp 153-174.
- Papadogonas, T. & T. Stourmaras. (2006). Twin Deficits and Financial Integration in EU Member-States. *Journal of Policy Modeling*, 28(5): 595-602.
- Perera, A., and E. Liyanage. (2012). “An Empirical Investigation of the Twin Deficit Hypothesis: Evidence from Sri Lanka.” *Staff Studies*, 41(1).
- Polat, B. and A. Rodríguez Andrés. (2019). “Do Emigrants’ Remittances Cause Dutch Disease? A Developing Countries Case Study.” *The Economic and Labour Relations Review*, 30(1): 59-76.
- Salvatore, D., (2006). Twin deficits in the G-7 countries and global structural imbalances. *Journal of Policy Modeling*, 28(6), 701-712.
- Sakyi, D. & Opoku, E. E. O., (2016). The twin deficits hypothesis in developing countries: Empirical evidence for Ghana. *IGC Working Paper*.
- Sobrinho, C. R. (2013). The twin deficits hypothesis and reverse causality: A short-run analysis of Peru. *Journal of Economics Finance and Administrative Science*, 18(34), 9-15.
- Suresh, K., & Gautam, V. (2015). Relevance of twin deficit hypotheses: An econometric analysis with reference to India. *Theoretical Economics Letters*, 6(5), 304–311.

- Stephen, A. O., Benjamin, O. M., Francis, M., Njugun, S. N., & Rose, W. N. (2010). *Capital mobility, monetary policy and exchange rate management in Kenya*. Oxford University press, 172–210.
- Summers, L. H. (1988). *Tax policy and international competitiveness*. In J. Frenkel (Ed.), *International aspects of fiscal policies* (pp. 349–375). Chicago: Chicago University Press.
- Seater, J. J. (1993). “Ricardian Equivalence.” *Journal of Economic Literature*, 31(1): 142-190.
- Sims, C. A., Stock, J. H., Watson, M. W. (1990). Inference in Linear Time Series Models with some Unit Roots. *Econometrica*, 58(1), 113-144.
- Summers, L.H. (1988). Relative wages, and Keynesian unemployment. *American Economic Review*, 8(2): 385-88.
- Tadayn, Foujan, Ranjbar, Homayun, Rajabi, Mustafa, & Samti, Morteza. (2019). Simultaneous control of budget deficit and trade deficit in Iran's economy with the aim of economic growth. *Economic Growth and Development Research*, 11(41), 96-83. doi: 10.30473/egdr.2020.49784.5517
- Tang TC, Lau E (2011) General equilibrium perspective on the twin deficits hypothesis for the USA. *Empir Econ Lett* 10(3):245–251
- Tahmasabi B, Jafari S A, & Amiri H. (2012). The impact of the budget deficit on the real exchange rate in Iran's economy. *Danesh Audit* 12(49) 1-22
- Toda, H. Y., Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66(1), 225-250.
- Vesali, H. (1999). Analysis of the relationship between government budget deficit and current account deficit in Iran. *Journal of Planning and budgeting*, 4(6), 27-56
- Younger, S. D. (1992). Aid and the Dutch Disease: Macroeconomic Management when Everybody Loves You. *World Development*, 20(11): 1587-1597.