Economics

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The roles of the terms of trade and the real exchange rate in the current account balance

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ABSTRACT

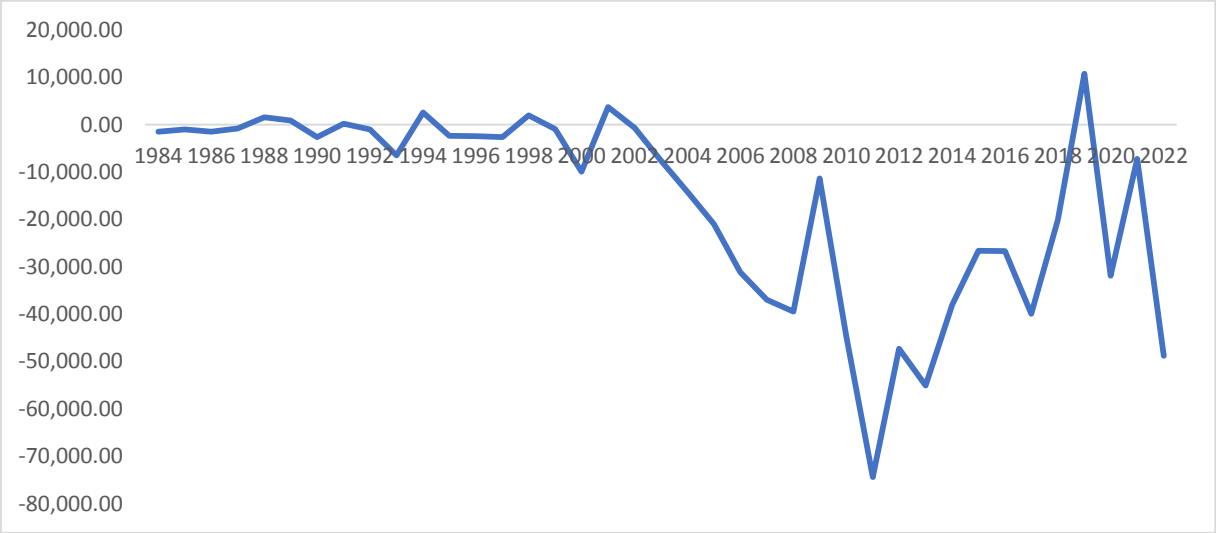
Turkey has been suffering from a persistent deficit in its current account for many decades. The primary dynamics of the current account balance are difficult to evaluate, which remains a significant challenge. The link between the oil price, the real exchange rate, the terms of trade, industrial production, FDI, and the current account balance was investigated for the monthly period between January 2005 and October 2022. To carry out the study, the SVAR model was utilized. The currency rate and industrial output accounted for the biggest explanatory shares in the balance, according to variance decomposition, although their impacts diminished with time. The deficit is also strongly influenced by the terms of trade. In the first few months, the price of oil had a weak influence on the deficit; nevertheless, that impact gradually grew over the course of the following periods. These findings were confirmed by the impulse response functions. As a direct result of this, the nation has to formulate fiscal and monetary policies that are beneficial to lessen the effects that these factors have on the balance. There are significant repercussions that this has for decision-makers in government, investors, and academics.

Keywords: Real exchange rate, oil price, terms of trade, SVAR model, current account balance
JEL Codes: C5, F1, F3

1. Introduction

Turkey has been experiencing a chronic current account deficit for decades. Although the country implemented many growth policies, it could not successfully reduce this problem. Having a current account deficit can make the country vulnerable to crises, turmoil, economic policies, and political instabilities. Constant depreciation in the exchange rate, lower economic growth, trade deficit, default, and many problems can be followed by current account imbalances. Hence, the nation need to eradicate this issue by determining the consequences of the primary variables that are responsible for the deficit. The primary goal of this paper is to investigate the effects of the various factors chosen as determinants on the balance. It is expected that the deficit results from different sources. The oil price, the real exchange rate, the terms of trade, the index of industrial production, and foreign direct investments (FDI) are the factors. An application of a model known as structural vector autoregression (SVAR) was used to carry out the study over the monthly time span spanning January 2005 to October 2022. The investigation of potential solutions to Turkey's persistent current account deficit is the primary aim of the paper. The first step is to explain the influences of the chosen factors. The second question inquires into which factors have the most significant effect on the balance as well as the extent of the influences that these variables have. This final query determines the range of feasible policy suggestions. The purpose of this work is to search for solutions to the aforementioned questions.

Figure 1. Total current account balance for Turkey (annual, million USD)



Source: the CBRT

The Turkish economy experienced a structural transformation in the 2000s. Although its growth fastened, the current account deficit became larger than before as seen in Figure 1. In 2001, the current account balance was around 3.7 billion US dollars. However, it dramatically rose to a 74.4 billion US dollars deficit in 2011, which was a record level in the history of the country. Although COVID-19 slowed consumption and production which helped decrease the current account deficit, it became a serious problem around 48.8 billion US dollars in 2022. The Turkish economy can be an example for other developing countries which experience chronic current

account deficits. Therefore, analyzing this country can shed a light for other countries to follow and examine their situations.

One of the most significant dynamics that determines the current account balance is the oil price (Bousnina et al., 2021). A nation that is an oil exporter could experience an improvement in its balance when the oil price continues to rise. It may exacerbate the deficit of countries that are net oil importers. A drop in the price of oil can help these sorts of nations get their external balances back in order. In spite of the fact that Turkey is geographically close to a number of nations that have abundant energy resources, it does not have enough of its own to meet its needs. As compared to the economies of the surrounding area, Turkey's industrialized economy is in the forefront. Because of this degree of growth, there is a required need for energy. Oil is a significant energy source for the nation since it is used in production, in everyday living, and in transportation. This means that domestic demand for oil accounts for a significant portion of the deficit.

Trade is one of the most significant factors that determines the nation's current account balance. The connection between an economy's exports and imports is one factor that may unquestionably impact the stability of its current account balance (Sahoo et al., 2016; Greenidge et al., 2011; Song, 1997). To deal with trade imbalances, Turkey implemented import substitution industrialization policies in the 1970s. However, this did not create a satisfactory result. It was suggested that export could grow faster if the country can create a free and flexible economy. In spite of this, the economy continues to struggle with the same issue. In terms of the Harberger-Laursen-Metzler (HLM) effects, an improvement in the terms of trade can have distinct impacts on the country's balance. Therefore, the terms of trade were taken into consideration for the investigation.

For the current account balance, financial rules and reserves may both play important deciding roles (Moral-Benito and Roehn, 2016; Steiner, 2014). It has been shown that fluctuations in currency rates, namely depreciations and appreciations, can have a strong influence on a nation's current account balance (alşkan and Karimova, 2017; Mussa, 2007). In instance, as a response to the economic crisis that occurred in 2000-2001, the Turkish economy enacted a number of financial laws for the banking as well as the industrial sectors. A floating exchange rate system was implemented in place of the previous fixed one. Hence, it was expected that the overvaluation of the currency will be reduced and that will help eliminate the current account deficit problem. However, easing capital movements and making reforms toward a free market economy attracted a large number of investments which gave way to an overvalued currency. Thus, the country started experiencing a large amount of imports which deepened the current account deficit problem.

Growth can play a determining role in the balance (Cheung et al., 2013). The dependency of economic growth on imported intermediate goods can stimulate the deficit (Ünal, 2017). However, in some nations, growth that is supported by export can create a surplus. Therefore, economic growth should be considered for the analysis. For that industrial production is taken into account. It was designed to see how industrial production could contribute to the balance. There can be a high connection between investments and the current account balance (Janko, 2020; Comunale, 2018). FDI can flow from developed and developing countries which can aim to produce for the domestic market or international trade. Intensifying investments in the economy can stimulate both imports and exports. Foreign capital can lead to growth in the export of goods and services which can also contribute to economic growth (Metwally, 2004). In other words, economic growth can be improved through investments. However, if FDI is directed to produce for the domestic market by importing necessary intermediate or final

products, a deterioration of the current account balance and a slower pace of growth are both to be anticipated as possible outcomes. If this is the case, then it is essential to investigate the function that FDI plays in current account imbalances.

Turkey was chosen for the analysis because of several reasons. First, the nation has a persistent current account deficit, which makes it susceptible to economic upheaval, hazards, and instabilities like fluctuations in the currency rate. Moreover, significant devaluations and depreciations of the lira are brought on by massive current account deficits. Despite the fact that the nation had several instances during its history in which its currency declined in value, this strategy was not successful in improving the balance. Second, although the nation has an industrialized economy and borders energy-rich economies, it constantly experiences a deficit because of its energy demand. Third, Turkey has the most developed industries in the region. However, it ends up with trade imbalances. Fourth, it is a good example for developing countries to understand how to deal with current account imbalances. This issue also results in macroeconomic imbalances, a reduction in the country's capacity for future development, high interest rates, and pressure on the currency rate. Lastly, to our best, there has not been any study that has appropriately concentrated its attention on the dynamics that determine the balance. In this study, which is the first of its kind, a SVAR model was used to do an analysis of Turkey.

2. Previous research and the current work

Many countries experience chronic current account deficits. Turkey is one of these countries which faces current account imbalances. There are still research gaps to explain this problem. Although there are not many new works that study this issue, some publications about the topic are available. In this section, these works are introduced.

Sahoo et al. (2020) used linear cointegration methods to examine the influence of imports of crude oil and gold on India's balance for the yearly period spanning 1980 to 2017. The outcome suggested that there was substantial prove of a significant and positive association between imports of oil and the current account balance. The relationship was negative and significant when gold imports are considered. The balance suffers from the rising price of crude oil, but benefits from the rising price of gold in the short term. Ayele (2017) investigated whether or not a devaluation in the real exchange rate might significantly contribute to the balance of four severely indebted developing nations in East Africa. A pooled mean group technique was implemented for the analysis of the data for the annual period from 1970 to 2016. In addition, the applied bound testing and the autoregressive distributed lag (ARDL) model were also used in this research. According to the findings of the panel estimate, a depreciation in the currency rate did not cause a substantial impact on the country's balance in either the short run or the long run. Nevertheless, it was claimed that the findings of bound testing and the ARDL model revealed that a depreciation in the real currency rate improved the balance only for Ethiopia in the long run. The Markov-switching approach was used by Topalli and Dogan (2016) for the four-year period beginning in 1990/1 and ending in 2014/2. According to the estimates, the most significant factors that determine Turkey's current account balance are the country's energy consumption, its openness rate, its GDP, its exchange rate, and its investments. Also, it was indicated that the sustainability of the balance was poor, but that it became much worse when the economy was in a contractionary phase.

Yurdakul and Cevher (2015) made an effort to determine whether or not there is a correlation between shifts in macroeconomic factors and those in the current account deficit. Throughout the course of the research, quarterly data between 2003/1 and 2014/2 were taken into consideration. The conditional and partial Granger causality tests revealed a robust link between

the current account balance/GDP and the real effective currency rate. In addition, it was anticipated that the balance is affected by growth, energy imports, and openness. The effect of the FDI, on the other hand, revealed just a little influence. Gnimassoun (2015) conducted research to determine whether or not the adoption of a currency rate system may have an effect on the imbalances in countries located in sub-Saharan Africa. In order to analyze data for yearly time period spanning 1980–2012, the Bayesian model averaging (BMA) approach was combined with the General-to-Specific (GETS) technique. It was determined that exchange rate regimes that allowed for some degree of flexibility were more successful in reducing imbalances. Furthermore, it was claimed that the fiscal policies and resource policies both contributed to the imbalances. By applying the ARDL approach, İnsel and Kayıkçı (2013) evaluated the theoretical and statistical connection between macroeconomic factors and the deficit. In the period of the research, quarterly data from 1987/4 through 2009/4 were taken into consideration. According to assessments, inflation had a positive impact on the balance; nonetheless, economic growth, open trade, rising energy costs, and an appreciation in the currency all contributed to a worsening of the balance in Turkey. Peru was the focus of an investigation of the HLM effect by Aquino and Espino (2013). The result of this impact is a reduction in a nation's overall level of savings as a direct consequence of a worsening in its trade position. The application of VAR models was carried out during the years 1950 to 2009. The findings suggested that an unexpected and sustained rise in export prices contributed to an improvement in the balance. Jaffri et al. (2012) employed research to find out how foreign FDI affects Pakistan's balance and income outflows. ARDL model was used from 1983 until 2011. Increases in FDI were shown to be the source of higher income outflows and a deepening country's current account imbalances in both the short term and the long term of the analysis. Arratibel et al. (2011) conducted research on the link between nominal currency rate volatility and macroeconomic dynamics, including economic growth, credit, FDI, and the current account balance for the nations that constitute the EU. The years 1995–2008 were covered by the panel data analyses that were performed. It was calculated that reduced fluctuation in currency was related to faster growth, higher FDI, larger current account deficits, and excessive credit usage. In their investigation of the connection between volatility in the price of oil and Nigeria's balance, Chuku et al. (2011) used a SVAR model. For the purpose of this study, a specific time range spanning from 1970/1 to 2008/4 was chosen. In general, it was discovered that sudden changes in the price of oil caused a considerable influence on the current account balance for the short term. Tsen (2009) implemented several basic econometric approaches such as the Johansen cointegration and error correction models by including Japan, Hong Kong, and Singapore. Different quarterly sample sizes were considered for the selected countries. For the results of the research, the price of oil, domestic demand, international demand, terms of trade, and trade balance were all interconnected and cointegrated. These were determined to be significant factors, both in the short term and in the long term, in determining the state of the trade balance.

Different from than previous works discussed above, this work has several originalities. To the best of our knowledge, a SVAR model was used in order to assess the influence that the macroeconomic variables would have on Turkey's balance. In particular, the terms of trade were taken into account in the study, and both HLM effects and the impacts of the currency rate and industrial output were brought up for discussion. It is possible to employ a vector autoregressive (VAR) model as a simplified version of a structural vector autoregressive (SVAR) model (Sims, 1986). The foundation of SVAR models is the identification of assumptions that are consistent with the construction of contemporaneous connections between endogenous variables.

Institutional knowledge, economic theory, and extraneous limitations are used as the foundation for these assumptions (Bernanke, 1986). SVAR models provide us with the opportunity to create assumptions by allowing us to examine the reactions of the model (Kilian, 2013; Stock and Watson, 2001; Blanchard and Watson, 1986). Although current account determinants have been discussed in previous research, in particular, for the developed countries, the research remained limited for the Turkish economy by a novelty approach and determinants. The exchange rate, energy, and investment were all taken into consideration during the analysis of the deficit; nevertheless, additional research is required to fully comprehend how the terms of trade and the industrial production index influence the balance. Previous works theoretically examined the condition of the Turkish economy but the economic structure of the country was neglected. In this work, the economy was analyzed both theoretically and structurally. The country followed import substitution industrialization between 1960 and 1980 but this only stimulated the current account imbalances because this process made the economy more dependent on imported intermediate goods. To cover the current account balance, the economy carried out several reforms by creating openness, export growth strategies, and transforming the currency regime from a fixed system to managed one. Despite this, the structure of the balance stayed the same up till the present day. A further contributing factor to the ongoing currency depreciation is the widening deficit. Thus, the purpose of this study is to locate a solution to the aforementioned issue.

3. Criteria and data selection

It has been assumed that the primary drivers may create large fluctuations in Turkey's balance. The price of oil is one element that may have a substantial effect on the balance (Uneze et al., 2012). However, the impacts might be substantially different in countries that are net importers of oil and those that are net exporters of oil. There is a correlation between rising oil price and an improvement in the current account balance of oil-rich nations. The effect may have a detrimental impact on economies that are dependent on oil imports.

It is necessary for a nation to pay attention to the pricing of both its imports and exports if it wants to become competitive and cover its current account deficit. It was pointed out that under a system with a flexible exchange rate, output can decline when there is an improvement in the terms of trade, but it can rise when there is a deterioration in the terms of trade. Notwithstanding this, advances in a country's rate of productivity have the potential to have a significant impact on the terms of trade (Laursen and Metzler, 1959). Because of this, the terms of trade become more significant when the exchange rate is flexible. In addition, Harberger (1950) pointed out that under the situation of elasticities of demand for imports, such significant depreciations in the currency rate might make the balance of payments worse. If this is the case, then it is reasonable to expect these nations to implement appropriate policies regarding employment and income in order to improve their balance of payments. This suggests that the terms of trade and the current account balance have a positive connection with one another. The HLM effect is another name for this phenomenon (Shafiullah et al., 2020; Erauskin and Gardeazabal, 2017; Otto, 2003). According to Tsen (2006), there is a link in the long term between Malaysia's trade balance and the terms of trade based on the commodity approach. Moreover, it was discovered that the trade balance was estimated to be caused by the terms of trade through the Granger causality. In certain nations, an improvement in the balance can be brought about by rising the terms of trade. This probably is not really the case in every nation. It is presumable that this variable might be considerably connected with imbalances in the current account. Thus, it is necessary to do research into the effects that the terms of trade have on the Turkish economy.

An increase in the value of one currency relative to another can cause a detrimental effect on the nation's balance (Batdelger and Kandil, 2012). A positive contribution to the balance can be made by a surplus brought about by a depreciation in the currency rate. It is possible for depreciations in the flexible exchange rate to occur in order to generate a balanced power in international commerce and to minimize the worsening of the balance of trade. The method of threshold regression developed by Hansen was used by Doudou et al. (2022) in order to evaluate whether or not there exist threshold levels of depreciation and appreciation in the currency rate for the purpose of explaining the trade balance. It was discovered that rises in the value of the currency rate that is more than a certain critical value might make the trade balance worse. Depreciation in the currency rate can make the situation better. Chinn and Lee (2009) conducted an analysis to determine how much of the deficit requires modifications to the real currency rate. It was claimed that there is a need for a depreciation in the currency rate in the US. Adjustments need to be made in Japan in order to generate appreciations in the exchange rate that exists between Japan and the Euro region. A devaluation of the currency can both boost the country's overall competitiveness and make local products much more competitive on the global market. This may result in a better balance for the current account. As a consequence, it is assumed that the lira might be a crucial influence in the process of finding solutions.

Economic growth can affect the current account balance (Freund, 2005). Output can be stimulated by export and imported intermediate goods. Hence, a rising growth rate can be followed by a rising current account deficit, if the country is highly dependent on imports of goods. In addition, if a country is led by export growth, then rising growth can also create the current account surplus. In this aim, industrial production was considered for the analysis. It was assumed that this variable could be a significant explanatory factor of the balance.

FDI is a strong variable that can impact the current account balance (Herrmann and Winkler, 2009). It is not easy for developing countries to compete with industries in developed economies. Therefore, these countries need FDI to attract technology and production techniques. The investments can improve the quality of products and can make a country become a competitive one in international trade. The direction of the FDI can also be for the domestic markets. Jaffri et al. (2012) discovered a negative connection between the FDI and current account imbalances. Ünal (2021) mentioned that strategy of the multinational companies is important in the home country. The direction of the FDI can also be for the domestic markets. This can stimulate imports of production which can deteriorate the current account balance.

For the assumptions laid out, data collection was completed from several sources. Between January 2005 and October 2022, monthly samples of data were taken for analysis. While determining where to begin collecting the data, the typical time period that encompasses the longest amount of time was considered. Brent and West Texas Intermediate are both well-known benchmarks for the price of oil across the world. It is reasonable to assume that these two sets of data are cointegrated, yet Turkey is a nation that is geographically closer to the countries of Europe. As a result, the price of Brent crude oil based on monthly data expressed in US dollars per barrel was chosen for the investigation. The St. Louis Federal Reserve Bank was the source of the information for this report. Statistics from the central bank in Turkey was used to get some of the other information.

The variables are described as follow:
op : Brent crude oil price (US dollars)
tt : Terms of trade ($\text{Export price}/\text{Import price}$)
er : Real exchange rate (Based on CPI 2003=100)

ipi : Industrial production index (2015=100)
fdi : Foreign direct investment (US dollars)
ca : Current account balance[1] (US dollars)

4. Analyses and findings

4.1 Tests for unit root

The stationarity of the variables was analyzed employing three distinct unit root tests: the Augmented Dickey-Fuller (ADF), the Phillips-Perron (PP), and the Vogelsang-Perron (WP) tests. The results of the test to determine the unit root are shown in Table 1. Outcomes of all of the unit root tests, including the three alternatives, came to the identical conclusions for all of the variables. It was discovered that the order of integration was one for the price of oil, the terms of trade, the real exchange rate, and the industrial output index, while it was Zero for FDI and the current account deficit.

Table 1. Tests

	Augmented Dickey-Fuller (ADF)		Phillips-Perron (PP)		Breakpoint Unit Root Test (Vogelsang and Perron, WP)	
Variable	t-Statistic	p-value	Adj. t-Stat	p-value	t-Statistic	p-value
$Lnop$	-2.6982	0.0757	-2.8331	0.0551	-3.2944	0.5064
$\Delta Lnop$	-11.0199	0.0000	-11.4034	0.0000	-12.0789	< 0.01
$Lntt$	-1.4863	0.5390	-0.8297	0.8084	-4.0174	0.1511
$\Delta Lntt$	-4.3634	0.0004	-17.2108	0.0000	-17.2412	< 0.01
$Lner$	0.5038	0.9866	0.5567	0.9883	-2.3288	0.9415
$\Delta Lner$	-10.1091	0.0000	-11.7366	0.0000	-12.0422	< 0.01
$Lnip$	-0.2338	0.9306	-2.4981	0.1173	-3.1476	0.5983
$\Delta Lnip$	-4.5287	0.0002	-70.2843	0.0001	-22.8735	< 0.01
$Lnfdi$	-4.2374	0.0007	-12.1171	0.0000	-12.3904	< 0.01
$lnca$	-7.0491	0.0000	-9.9473	0.0000	-9.7715	< 0.01

The exogenous variable is the only one that is constant. Using the Akaike information criterion (AIC), an appropriate lag length has been chosen for the ADF and WP tests, with a maximum lag of 12 periods. The Bartlett kernel is used to decide what the favorable Newey-West bandwidth for PP unit root testing should be. The Dickey-Fuller min-t is applied to determine when the break occurs.

4.2 SVAR analysis

A-B model can be specified in terms of its short-run SVAR(p) as follows:

$$\boldsymbol{A}\left(\mathbf{I}_{\boldsymbol{k}} - \boldsymbol{A_1 L} - \boldsymbol{A_2 L^2} - \ldots\ldots\ldots \boldsymbol{A_p L^p}\right)\boldsymbol{y_t} = \boldsymbol{A e_t} = \boldsymbol{B u_t}$$

where, $\boldsymbol{L}$ is lag operator, the vector $\boldsymbol{e_t}$ is error terms of the standard VAR model with covariance matrix $\boldsymbol{\Sigma_e}$, the vector $\boldsymbol{u_t}$ is error terms of the structural VAR model with covariance matrix $\mathbf{I}_{\boldsymbol{k}}$, k is the number of variables in the model, and $\boldsymbol{A}$ and $\boldsymbol{B}$ are restriction matrices. The order

[1] The current account balance (cab) at the monthly frequency for Turkey is usually negative and rarely positive. All values were positive by means of the linear transformation of 4105-cab on the current account balance data. Thus, the logarithm of the current account balance data can be obtained. Furthermore, increase in data obtained by this linear transformation means that the deficit in Turkey will increase.

condition requires $k^2 + \frac{k(k-1)}{2}$ restrictions for identification in the short-term A-B model. Listed below are the criteria used for identification in this investigation:

- ✓ The development of exports in Turkey as well as the economy overall is reliant on imports. The majority of Turkey's exports are supported by the country's imports of intermediates. To put it another way, a major portion of Turkey's manufacturing requirements are met by importing goods from other nations. Moreover, the fact that Turkey is an oil importer results in an increase in its reliance on other countries. Under these conditions, maintaining production will need a certain quantity of imported intermediate input. In addition, there are two important pieces of evidence that point to the dependent production structure being the case. To begin, the amount of Turkey's foreign commerce tends to decrease during times of crisis, and this trend is dependent on both exports and imports. In another version, although the volume of imports falls as a result of the economic slump, the level of exports falls relative to the level of imports since exports are reliant on imports. Furthermore, it has been noted that Turkey's current account deficit shrinks during times of crisis. Second, it has been observed that Turkey's current account deficit widens at times when Turkey's economic growth is at a high level. At periods of economic expansion, the amount of exports grows, but the rate at which imports are expanding becomes greater than the rate at which exports are growing. This contributes to a growth in Turkey's deficit, which is produced by the country's deficit in its trade with other countries. There are two different theories that might be given for the reason why domestic income has such a significant impact on exports. To begin, the cash earned inside the country is used to pay for imports, which serve as the raw material for exports. Second, the index of industrial production, which stands for the national income, is an indication of the production statistics in Turkey. The circumstance further demonstrates that Turkey is dependent on the trade it does with other countries. To summarize, it is possible to draw the conclusion that Turkey's current account deficit will become permanent in future (Kose and Aslan, 2020).
- ✓ Turkey is a country that has been experiencing a deficit for many years. The price of oil, the country's terms of trade, the real exchange rate, the country's rate of economic growth, and FDI are the primary factors that determine Turkey's deficit.
- ✓ Import is also of great importance for Turkey's economic growth. For this reason, during the periods when Turkey has a current account surplus, its economic growth is below its potential growth. Therefore, the instantaneous connection between the deficit and economic growth is considered bidirectionally due to Turkey's economic structure.
- ✓ A further point to consider is that the real exchange rate does not cause an impact on the deficit; but, despite this, the deficit continues to exert stress on the exchange rate. Hence, it would be reasonable to presume that the instantaneous link between Turkey's currency and its deficit is bidirectional.
- ✓ It was assumed that shifts in the terms of foreign trade had an immediate influence not just on the currency rate but also on the deficit. This variable is not immediately influenced by all of the other factors that are being considered by the VAR model.
- ✓ Oil prices are external variables for Turkey. Because of the increase in the price of oil, Turkey's current account balance is expected to also worsen. Because of this, the price of oil will only create an immediate effect on the deficit, but it will not, in turn, be instantly influenced by the variables of other factors.

- ✓ FDI has an instantaneous impact on the balance. The variables that instantaneously affect FDI were taken into account as the growth and the currency. Moreover, FDI instantaneously affect the deficit as well as economic growth.

For the purpose of the short-term study, the SVAR model is implemented in its stationary version. The SVAR model that includes the A and B matrices are then stated as follows when these constraints are applied.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & a_{32} & 1 & 0 & 0 & a_{36} \\ 0 & 0 & a_{43} & 1 & a_{45} & a_{46} \\ 0 & 0 & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{bmatrix} e_t^{\Delta Lnop} \\ e_t^{\Delta Lntt} \\ e_t^{\Delta Lner} \\ e_t^{\Delta Lnipi} \\ e_t^{Lnfdi} \\ e_t^{Lnca} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & b_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{66} \end{bmatrix} \begin{bmatrix} u_t^{\Delta Lnop} \\ u_t^{\Delta Lntt} \\ u_t^{\Delta Lner} \\ u_t^{\Delta Lnipi} \\ u_t^{Lnfdi} \\ u_t^{Lnca} \end{bmatrix}$$

The optimum lag length for the VAR model is selected as 12, using AIC with a maximum lag of 12. The Likelihood Ratio (LR) test for over-identification was executed due to the fact that the SVAR model is over-identified. The p-value for the LR statistic was discovered as 0.3374, which was determined to be larger than 0.05, which is the null hypothesis. This suggests that over-identification is justified, and it cannot be rejected at the 5% significant level.

4.3 Forecast error variance decomposition analysis

Table 2 displays the conclusions drawn from the forecast error variance decomposition study performed on Turkey's current account balance. The findings were presented after an examination over a period of one year. According to the data shown in the table, the effect of the shift in the price of oil during the first month was 0.05%. In the sixth month, its influence was up to 4.01%, but in the final month, it was down to 3.79%. According to the findings, the influence of the price of oil was far less significant than the effect of the other factors, although the effect did become significantly more important towards the middle of the period. Between the first and twelfth months, there was no discernible shift in the influence that the terms of trade had on the market. The repercussions amounted to 11.23% and 11.53%, respectively. This suggests that the influence of terms of trade stayed almost unchanged throughout the course of the whole time period.

Table 2. Variance decomposition for the current account

Period	Oil price	Terms of trade	Exchange rate	Industrial production	Foreign direct investment	Current account
1	0.05	11.23	58.50	28.54	0.36	1.31
2	3.66	11.12	54.22	26.59	2.91	1.49
3	3.70	11.02	53.75	27.23	2.84	1.45
4	4.03	11.52	53.05	27.01	2.69	1.69
5	4.06	11.13	51.77	27.97	3.37	1.70
6	4.01	10.68	50.92	26.93	4.81	2.65
7	3.79	10.49	50.31	25.39	6.32	3.71
8	3.67	10.33	48.59	25.16	6.19	6.06

9	3.57	10.42	47.32	24.85	6.42	7.42
10	3.51	10.62	46.05	24.16	7.94	7.72
11	3.70	10.45	45.34	24.49	7.83	8.19
12	3.79	11.53	44.29	24.45	7.65	8.29

The exchange rate was the variable that contributed the most amount to the overall explanation. The impact it had after the first month was 58.5 %. It reached a low of 44.29% in the final month after steadily falling to a high of 50.9% in the sixth month. The most significant contributor to the shift in the current account balance was currency rate. Data shown in the table illustrate that the influence of the currency rate in the Turkish economy is absolutely critical. Industrial output was responsible for the second biggest proportion of the explanatory shares. For the first month, this variable's contribution to the explanation was around 28.54 %. After that, its influence was reduced to 26.93% in the sixth month, and it continued to diminish progressively into 24.45% in the twelfth month. The impact of FDI remained minimal in the first month, accounting for just around 0.36% of the total. Despite this, its influence reached its highest point of around 7.94% in the ninth month, and then gradually fell to 7.65% in the last month. This demonstrates that in the long term, FDI will become more essential. The present account balance only made up a very little part of the overall impact when trying to explain itself. In the first month, its explanatory share was 1.31%, but by the twelfth month, it had climbed to 8.29%. As seen in the table, roles that the currency rate and industrial output play in resolving the problem of current account deficit are quite essential.

4.4 The reaction of current account balance to the determinants

Figure 2 illustrates how the balance reacts to the factors that were chosen as determinants. The price of oil, the terms of trade, the real exchange rate, the index of industrial production, and FDI are the impulses. The response is the balance of the current account. Estimates were made for the dynamics of the reaction of the balance to structural positive innovations that were one standard deviation in magnitude. It was possible to evaluate both the significance of the responses and the degree to which they were significant.

According to the findings that is gleaned from the figure, the reaction of the balance to shifts in the price of oil during the first month was statistically negligible. It was not until the second month that it turned negative and became statistically significant. This outcome remained the same throughout the time span. According to the results presented in the research of the variance decomposition, the effect of the price of oil on the nation's balance continued to be relatively insignificant. Up until the second month, the reaction of the balance to the terms of trade was statistically significant and positive. After then, it was no longer statistically significant for the remainder of the time frame. This finding suggests that there may be a short-term impact on the balance resulting from changes in the terms of trade. A larger current account deficit is one potential consequence of rising export prices. Up to the third month, there was a statistically significant and favorable positive reaction from the balance in response to the real exchange rate. Beyond that time frame, it was no longer significant, and the outcome maintained the same for the remainder of the period. The findings demonstrate that increases in the currency rate could produce a stimulative impact on the deficit. This demonstrates how important the policy regarding currency rates is for the country's balance. The reaction to the industrial production index suggested that conditions were comparable. Until the second month, it was statistically significant and showed a favorable trend. After then, its significance stayed unchanged for the

whole of the historical period. The reaction to the FDI was negative, and only in the second month did the negative response become statistically significant. This indicates that lower levels of FDI could give way to an increase in the imbalances. The reaction of the current account balance to itself was insignificant until the eighth month, when it became negative. After that, however, the response became significant. When that month had passed, it was no longer of any significance.

Figure 2. Reaction of current account balance to structural one standard deviation positive innovation

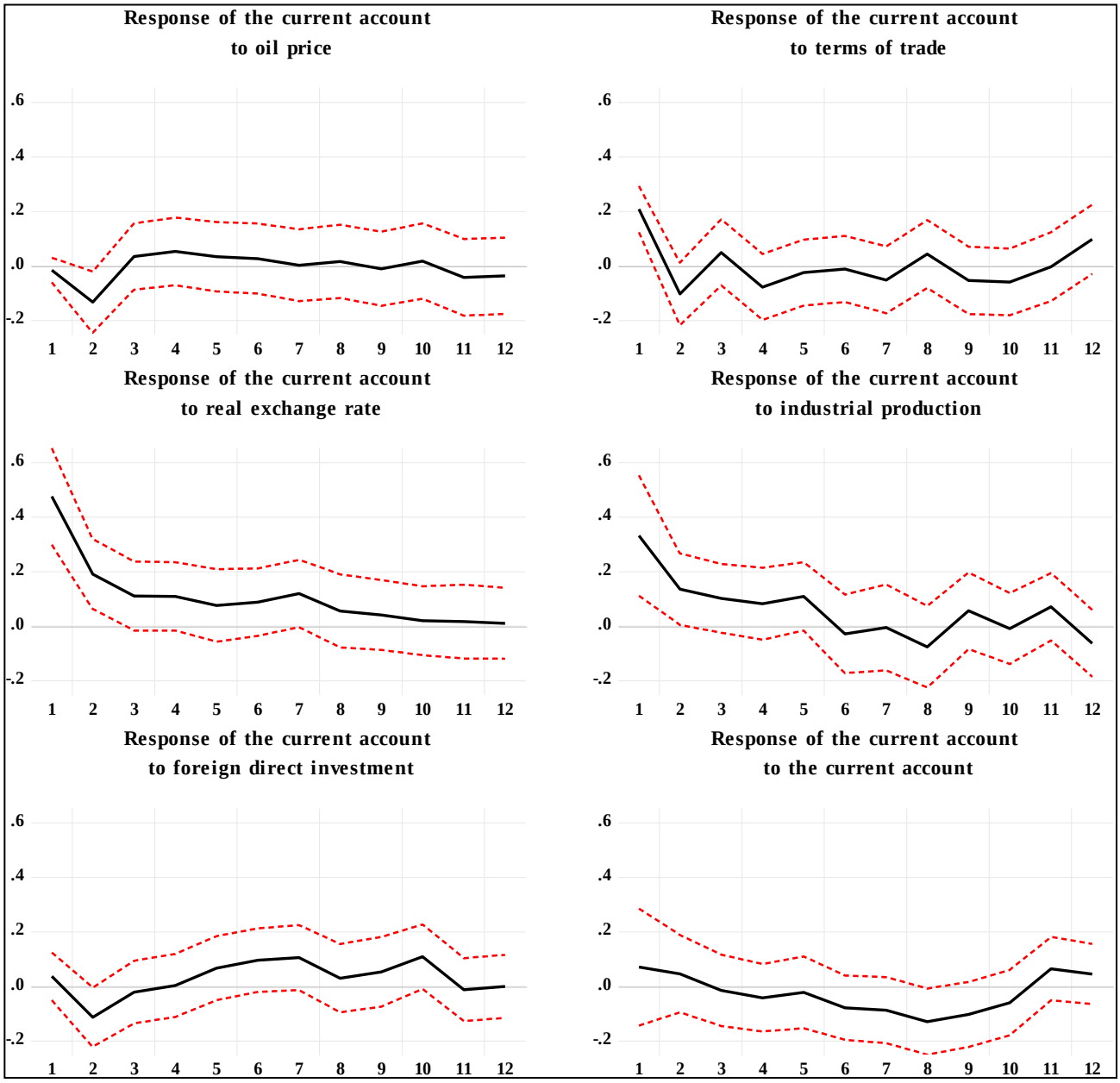
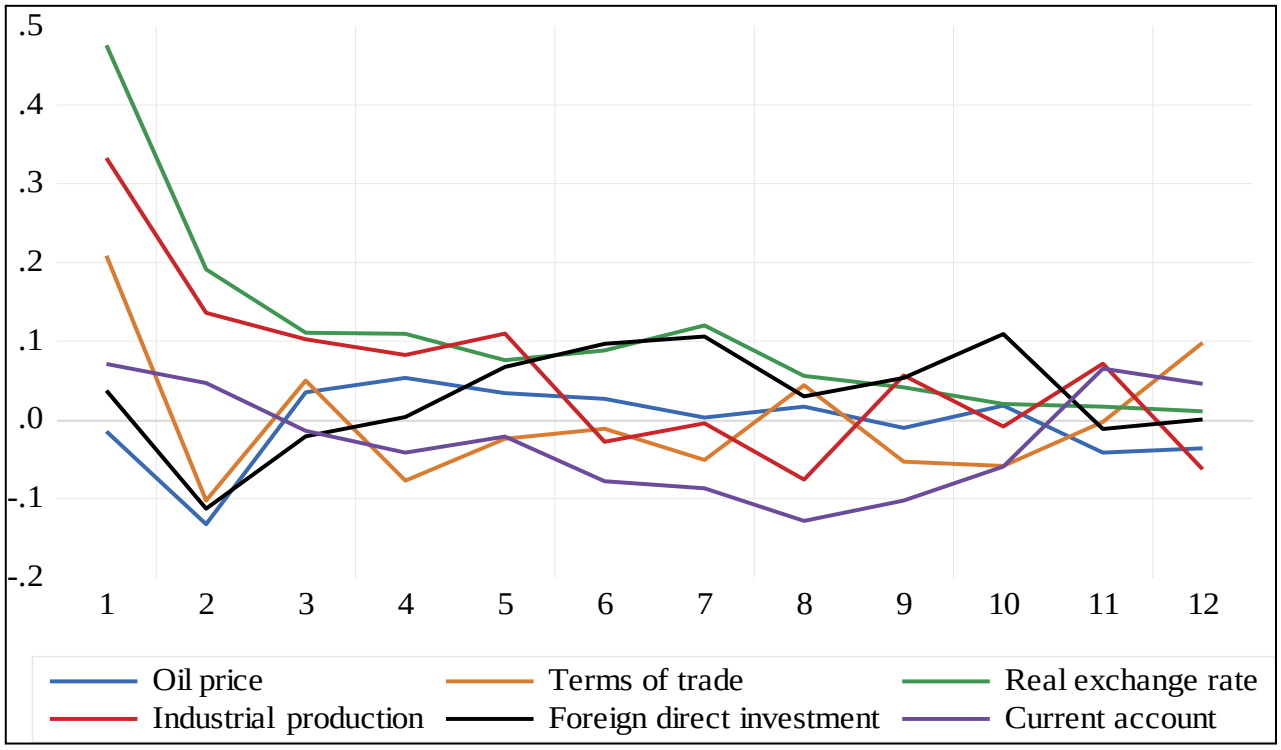


Figure 3 illustrates which factor had a more significant influence on the balance. The exchange rate was the decisive element in determining how to interpret the balance, as shown by the figure. Following this dynamic, the one showing substantial influence on the current account balance was the industrial production index, followed by the terms of trade. The picture provides visual evidence that the variables' explanatory shares in the variance decomposition analysis are appropriate. However, the figure also illustrates that the effects were much higher in the early months. Then, their effects gradually decrease over the period.

Figure 3. Reaction of current account to innovations using SVAR factors



5. Policy implications

The paper indicates that there are important political implications the country can follow. It can be seen from the variance decomposition analysis and impulse response functions that the terms of trade constituted considerable influences on the imbalances. According to the variance decomposition analysis, the impact was limited in the first month but it increased significantly over the periods. The impulse response functions indicate that the terms of trade create a strong influence on the current account balance. This means that the export price relative to the import price is quite important for the Turkish economy. The more export price rises, the more country produces deficits. Therefore, it can be proved that there is no HLM effect in the case of Turkey. This is a different result compared with Otto (2003), Tsen (2006 and 2009), and Espino (2013). In that case, the country should follow policies to decrease the price of export goods. Then, it can be more competitive in international economics and improve the current account balance.

China could significantly decrease its terms of trade, in other words, its export price (Ünal, 2021). This is called export-led growth. As a result, it could significantly increase its current account balance. To do that productivity increase is important in terms of export goods. The rising productivity growth as a consequence of technological improvements or rising world demand can pull the price down and give a chance for a country to increase its competitive power.

The empirical studies explored that the real exchange rate was the variable that was most capable of explaining the shifts in the balance. That was the determinant that contributed the most amount to the whole explanation. In addition, the variance decomposition analysis was validated by the impulse response functions. In the first several months, the effect was favorable and had a statistically significant impact. This suggests that an increase in the deficit will occur in direct proportion to an appreciation of the currency rate. Thus, it is necessary for the Turkish economy to bring the lira's overvaluation down to a more appropriate level. The monetary policies should be designed for unnecessary appreciations in the exchange rate. In particular, during the economic crisis that occurred in 2000-2001, the Turkish economy went through a number of deregulation programs in an effort to eliminate macroeconomic imbalances. The fixed exchange rate system was replaced with a floating one, and both inflation and the cost of production fell by a large amount. The number of privatizations also rose during this time. Nevertheless, the deregulation policies attracted a large number of investments that appreciated the lira which created an overvalued exchange rate system. As a consequence, the current account imbalances deepened in the 2000s. Hence, the country should use fiscal policy to repress inflation and monetary policy to eliminate overvaluation in the currency. This can help the country to reduce its current account imbalances to a greater degree. It is widely accepted that real depreciation of devaluation in the lira can make imports more expensive and exports cheaper in international trade. Thus, this macroeconomic imbalances can be reduced. However, after the 2000-2001 economic crisis, the macroeconomic imbalance was worsened by record level deficits in the history of the Turkish economy. This can be explained that the lira remains overvalued and further artificial depreciation by the policies of the central bank is necessary.

Another important determinant was industrial production. It can be seen from the empirical results, there is a strong link between industrial production and the imbalances. Growing industrial production also stimulates the current account imbalances. It is because the country needs foreign inputs to produce growth in the economy. Turkey is still a developing country. Therefore, it cannot produce sophisticated and complex products in the domestic market. It does not have strong competitive power in medium and high-tech products. It should import an important part of intermediate goods and final goods. To grow, this economy is highly dependent on imports. Expanding production also rise imports, which also increases the deficit. To prevent this, the country needs to provide innovation in the area of necessary intermediate goods for the economy. It is because reducing the current account deficit will also slow economic growth, which is an unfavorable condition for a developing country. In this way, it can provide domestically produced necessary goods for the economic activities in the country. The weaker lira can encourage exports and discourage imports in the Turkish economy. If the domestic demand cannot respond to the higher costs of foreign capital which could improve the current account balance, more aggressive austerity policies are needed to reduce the problem. Therefore, there is a need for institutional complementarities between fiscal policies and monetary policies. Both economic factors should work in accordance with each other to make the country free of the chronic macroeconomic problem.

While the share of exports in GDP was 19.9% in 2000, this share significantly increased over the years and became approximately 37.9% in 2022 in Turkey. While the share of imports in GDP was 22.5% in 2000, this share increased continuously over the years and reached 42.6% in 2022. The correlation between these two variables is around 85%. These results show that exports and imports increase together. In other words, Turkey has an import-based export structure. In addition, the import of goods keeps a major ground in economic growth. Both imports and exports decrease during periods of economic recession in Turkey, but the decrease in export remains at a much lower level. As a result, Turkey's current account deficit decreases during periods of lower economic performance. At the same time, although Turkey is a country that applies an export-based industrialization strategy, it needs to import intermediate goods and investment goods for production. As a natural consequence of this, the large amount of investments also increase import. From this point of view, Turkey also needs the FDI to solve its problem. This is why, it can be a favorable policy to reduce the deficit, which is the chronic issue for Turkey, with strategies to encourage FDI.

6. Conclusion

A SVAR model was used to analyze the monthly period beginning in January 2005 and ending in October 2022 to determine how the price of oil, the terms of trade, the real exchange rate, industrial output, and FDI all impacted Turkey's current account balance. Turkey is classified as a developing nation and has struggled for decades with a persistent current account deficit. To determine the primary dynamics that contribute to current account imbalances, the forecast error variance decomposition method was put into practice. According to the findings of the investigation, the real exchange rate was the variable that contributed the most to the overall explanation. This indicates that an increase in the value of the currency relative to another might exacerbate the imbalance. Therefore, policymakers should reduce the overvalued currency to limit its effect on the imbalances. Although the country experienced devaluations in its currency after the 2000-2001 economic crisis, it is assumed that this effect remained quite limited and further depreciation is necessary for the economy. The second highest explanatory share was created by the industrial production index. The country is highly dependent on imported goods to stimulate output growth. Reducing current account balances will cause slow economic growth which is an undesirable strategy for a developing country. The country should invest in products that are necessary for the production process in the economy. The terms of trade also indicated a considerable share of explaining the deficit. High export prices can stimulate the deficit. Impulse response functions support the findings. The empirical analysis shows that there is a significant and positive connection between the terms of trade, the real exchange rate, industrial production, and the deficit in the early months. Hence, an institutional complementarity is necessary between fiscal policies and monetary policies to deal with the problem. In other words, depreciations in the currency rate should be supported by government policies by tightening demand. Thus, the demand for imports can be limited and export can be encouraged. Export price is an important dynamic for reducing current account imbalances. The country needs to decrease its export price. This can be provided by productivity growth and the right policies depending on consumption. In a conclusion, the problem of the chronic deficit is internal policies. FDI and the price of oil which are external dynamics do not have strong explanatory power for the deficit. Therefore, the country needs to follow radical monetary and fiscal strategies to eliminate the problem.

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