The Impact of Natural Gas Imports on the Current Account Deficit in Turkey

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ABSTRACT

The current account deficit is an important macroeconomic indicator that determines the future economic expectations and economic policies to be implemented. In developing countries such as Turkey, for the current account deficit problem, it is extremely important to ensure the implementation of various economic policies and measures. In Turkey, after natural gas reserves were found in 2020, energy imports, foreign dependence on energy imports, and energy issues, such as the share of current account deficit have been raised. The study, between the years 2009-2019 examines the impact on the current deficit of natural gas imports occurred in Turkey. In the study, the Unit Root Test and Granger causality tests were applied while considering the relationship between current account deficit and natural gas imports. Depending on the results obtained; while there is no Granger causality from current account deficit to natural gas imports, in the case where the current account deficit is dependent on natural gas imports; It has been determined that there is Granger causality from natural gas imports to the current account deficit. It is seen that the increase in natural gas imports caused an increase in the current account deficit. According to this analysis, it was concluded that if there is a natural gas resource in our country and it reduces foreign dependency, it will create a reducing effect on the current account deficit, which is seen as one of the most important indicators.

Introduction

Today, the macroeconomic performance of countries is assessed by way of considering various economic indicators. It is also assessed whether the indicators discussed are also leading crisis signals. The current account deficit is one of the important macroeconomic indicators for countries. Moreover, the ratio of current account deficit to GDP is also inspected. At this rate, a value of 5% or more is targeted.

The importance of the current account deficit in the global economy and Turkey and the factors affecting the current account deficit has changed direction specifically during the last ten years. In addition to the causes of the current account deficit, its possible effects are also inspected. Importing is an important factor in the foreign trade part of the current account deficit, which is affected by factors such as foreign trade and services balance and savings-investment. Turkey, which is dependent on foreign sources specifically for intermediate goods in production and industry, meets its energy needs through imports.

The energy demand is increasing due to factors such as the increase in industrialization, the development of the production sector, the creation of different usage areas of energy products such as housing, the growth trend, and population growth. Countries with high foreign dependency in the field of energy and unable to meet their energy need import energy. In the field of energy, Turkey's foreign dependency is high. In Turkey, the periods of increased growth in the production sector bring about an increase in energy demand. This event causes a vicious circle in terms of energy imports, current account deficit, and growth. Approximately 15% of the current account deficit in Turkey is due to energy imports. Moreover, Turkey meets 90% of its natural gas demand through imports.

If the natural gas reserve resource in Turkey in 2020 becomes active and can be utilized, the decrease in natural gas imports will have positive effects on the economy and specifically on the current account deficit.

Moreover, if the natural gas demand and foreign dependency on the agenda with the natural gas reserve found in this study decrease; it is assumed that it will channel the development of estimation models on how and in what direction the direction of current account deficit will be affected.

Whether there is a cause-effect relationship between natural gas imports and the current account deficit in Turkey, and how and to what extent natural gas imports affect the current account deficit is studied as the problem of the research. In this context, the subject of the research is the effect of natural gas imports on the current account deficit between the years 2009-2019 in Turkey.

Among the findings of the study is that one of the proportionally important shares in the current account deficit is natural gas imports due to natural gas demand or consumption. Over the energy imports, which are deemed as one of the important factors affecting the current account deficit, specifically natural gas imports were selected, and in the light of recent data, how the current account deficit was affected was discussed. In the years when natural gas imports decrease, the current account deficit will improve with the decrease in the pressure of energy imports.

Literature Studies

Göçer (2013) discussed, in his study, Turkey's current account balance between 1996 and 2012 with the VAR model and indicated that the reason for the current account deficit in Turkey is energy expenditures and foreign trade deficit.
Lebe and Akbaş (2015) analyzed Turkey's current account between the years 1991-2012 using the VAR method. They revealed that the increase in oil prices and the exchange rate were effective on the current account deficit.

Bozgeyik and Kutlu (2019) used the multivariate GARCH model in their study in which they inspected the determinants of Turkey's 1992-2017 current account deficit. They found a negative relationship between the current account and oil prices. They mentioned that the increase in oil prices will increase production costs and their growth expectations will change. As the general production level will decrease as a result of the increase in oil prices, it has been indicated that the current account deficit will also decrease.

Yiğit and Açıkalın (2019), in their study in which they inspected the current account deficit and its causes in Turkey, the current account deficit problem; they indicated that it is due to foreign dependency on energy, intermediate goods, and capital goods. Moreover, they mentioned that low savings rates and policies related to the exchange rate affect the current account deficit negatively.

Yaman (2011) inspected the factors affecting the current account deficit and the consequences of the current account deficit in his study. The internal and external variables determining the current account deficit in Turkey; oil prices, natural gas prices, interest rates in the world, regional and global growth trends. It was indicated that the determining factors of the current account deficit are the balance in foreign trade and oil prices.

Demir (2013) inspected the factors affecting the current account deficit and their consequences. In his study; he indicated that the energy demand has increased due to foreign dependency and industrialization in energy in developing countries, this situation has increased the costs of the countries and ultimately energy imports have caused the current account deficit. Based on the findings obtained in the study, it has been observed that there is unidirectional causality from the industrial production index and energy imports to the current account deficit in Turkey. It has been indicated that this situation is under the theoretical framework.

Özaytürk and Alper (2017), in their study, inspected the causes of the current account deficit between the years 2000-2013 by way of using panel data method and FGLS (Least Squares Method) in 11 OECD countries (including Turkey). When the empirical evidence of the study is inspected; it has been observed that there is a positive relationship between the GDP, the amount of imported oil and the level of financial development, and the current account deficit. What is specifically emphasized in the study is that the amount of imported oil greatly affects the current account deficit.

Huntington (2015) analyzed the relationship between the crude oil trade and the current account of 91 countries between 1984 and 2009 in terms of oil-importing and oil-exporting countries, by using the panel data set. In this study, after controlling for other external variables, it was investigated whether oil-importing countries and exporting countries were equal. In the study, it has been observed that while oil exports are effective in creating a current account surplus, it does not affect the current account deficits of oil-importing countries. As an exception, it has been indicated that the current account deficits of relatively rich countries that import oil at higher rates are adversely affected by high energy imports.

By way of using the data relating to Turkey encompassing the years 1971-2015 in their study, Sarıtaş, Genç, and Avcı (2018) analyzed the effects of economic growth and energy imports and energy imports on the current account deficit within the framework of the VAR model; they dealt with impulse response analysis, Granger causality analysis, and variance decomposition tests. As a result of the study, it has been understood that energy imports are the Granger cause of the current account deficit. The energy imports have one of the largest shares in the current account deficit; it has been indicated that 15.42% of the current account deficit is due to energy imports.

Uysal, Yılmaz, and Taner (2015) utilized the Johansen co-integration analysis method within the scope of the VAR model by considering the growth, energy consumption, and current account deficit data relating to Turkey between the years 1980-2012 in their study. As a result of the study, it was indicated that one of the main reasons for the current account deficit in Turkey is energy imports. In the analysis, it was indicated that energy imports and the current account deficit move together in the long run.

Balance of Payments

There is a financial relationship between countries in terms of economy, trade in goods and services. The account that presents the relations of the citizens of the country with other countries is called the balance of payments. It is wanted that the income of the countries from abroad and the payments

to be made to these countries are equal. In cases where there is no equality, a deficit or surplus arises in the balance of payments. As for countries, this is a factor that affects the variables in the economy as well as the economic and financial indicator or reputation. When we look at the sub-items of the balance of payments, there are two main items or accounts, although it consists of four accounts. These are the current account and the capital account. Other items form according to the final state of the current account and capital account (Yıldırım, 2019, pp. 73-74).

When considered extensively, the balance of payments is a statistical report issued to obtain systematic records of economic transactions between residents of an economy and residents of an economy within a certain period (Central Bank of the Republic of Turkey [CBRT], 2020).

During one year, all of the economic activities of the countries with other countries are transferred to the balance of payments account. Considering the account in question; there are foreign exchange incomes and expenses that the country obtains as a result of transactions such as goods, services, and capital movements. Therefore, when considering the balance of payments, it gives information about whether the economic activities of the country are performed correctly or completely. Moreover, the balance of payments presents the economic and financial existence and even power of the country in question in the international arena (Yiğit and Açıkalın, 2019, p.324).

The balance of payments items are the current account, capital account, reserve account, and statistical error (net error and omission) accounts.

Current account deficit

The current account is one of the most emphasized accounts among the balance of payments items. The accounts under the current account; trade in goods and services account are the primary and secondary income accounts. In the current account, there are total exports and imports of goods under the foreign trade balance. In cases where the relevant sub-accounts are in balance, services balance, primary and secondary income balances are mentioned. If the revenues are more than the expenses in the current account, a current surplus arises, and if the expenses are more than the revenues, a current account deficit arises.

It is assumed that there are three reasons for the current account deficit; deterioration in the foreign trade balance, savings and investment balance, and a decrease in net foreign assets. The real depreciation of the Turkish lira may reduce the current account deficit and additional external borrowing. Yet, this situation will increase the net foreign exchange liabilities of the economy rapidly. Moreover, the sustainability of external debt will also be affected. The sudden and high real depreciation of the TL will not present the positive effect predicted on the current account deficit and real income losses will be seen (T.R. Ministry of Development, 2014, p.2).

The current account deficit has become a macroeconomic variable that countries focus more on and consider as an indicator of crisis following crises affecting certain countries or regions. Essentially, the indicator is considered as a crisis signal; it is the ratio of current account deficit to GDP. However, of course, this rate alone is not considered sufficient as a crisis indicator.

Progress of Current Account Deficit in Turkey

During the periods when growth rates accelerated in Turkey, a current account deficit problem was experienced due to foreign dependency in industry and production and growth due to domestic demand. Many economic conditions, such as exchange rates, high energy imports, export rates, and the inability to reach the wanted levels in the savings and investment balance, are cited as the cause of the current account deficit.

During the past, the current account deficit decreased in times of crisis in Turkey. During periods of stagnation or contraction in the economy, foreign dependency on intermediate goods and the decrease in import demand explain the improvements in the current account deficit during the past crisis periods. An improvement in the current account deficit will reduce the fragility of the economy and the effects of possible external shocks.

Following the 2008-2009 crisis, the current account deficit has become one of the macroeconomic indicators that are more emphasized not only in Turkey but also in the global economy. During the crisis in Turkey, the growth rates decreased. Considering the global economy, there were differences between the financing of the current account deficit until the 2008-2009 global economic crisis and the financing of the current account deficit following the crisis. The long-term capital inflows and foreign investments contributed to the current account balance before the crisis. However, following 2008-2009, short-term capital inflows and increased liquidity were observed. Considering the global economic outlook at the end of 2019, it can be indicated that capital accumulation has increased since the crisis. The basis of this situation is the 2008-2009 economic crisis.

During the post-crisis years, the current account deficit problem has changed its dimension globally. The crisis in question has been described as the deepest global recession during the last decade. In addition to the decrease and imbalance in global economic activities, there are high unemployment rates. Moreover, structural fragilities and risks in the global economy have increased. Following the crisis, global growth and economic activities only entered a recovery period in 2010.

During the crisis period in Turkey, short-term money inflows and outflows were among the factors that increased economic fragility. The global dimension of the crisis has narrowed the foreign demand. The Central Bank and the government have implemented various policies and measures

have been taken. Fiscal and monetary measures taken for the crisis had a positive impact on growth but caused a widening in the current account deficit. With the effect of the global crisis, the current account deficit increased even more, and while it was 11.360 Million US Dollars in 2009, it increased to 44,620 Million US Dollars in 2010. This widening in the current account deficit presents the effects of the crisis.

Table 1. Current Account realized in Turkey between 2009-2019 (Million USD)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Current Account	-11.360	-44.620	-74.402	-47.960	-55.858	-38.848	-27.314	-26849	-40.584	-21.623	6.909
Current account transactions excluding energy	14.625	-10.588	-26.823	4.446	-8.223	9.827	6.189	-2.764	-7.728	16.180	40.160
Energy imports	29.905	38.497	54.117	60.117	57.752	56.175	38.651	27.464	37.654	43.613	41.731

Source: CBRT /EVDS

Figure 1. Current Account realized in Turkey between 2009-2019 (Million USD)
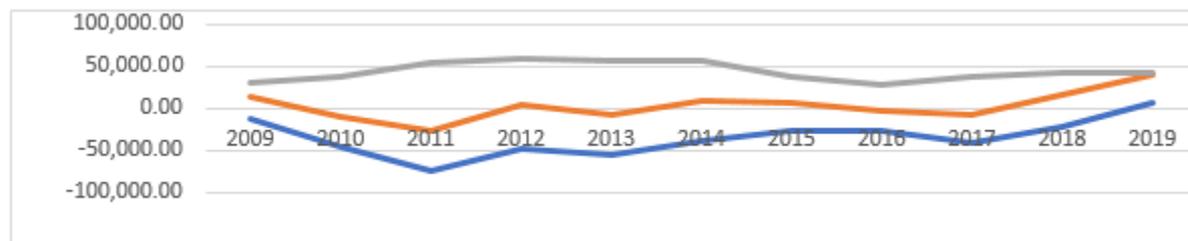
Figure 2. Current Account realized in Turkey between 2009-2019
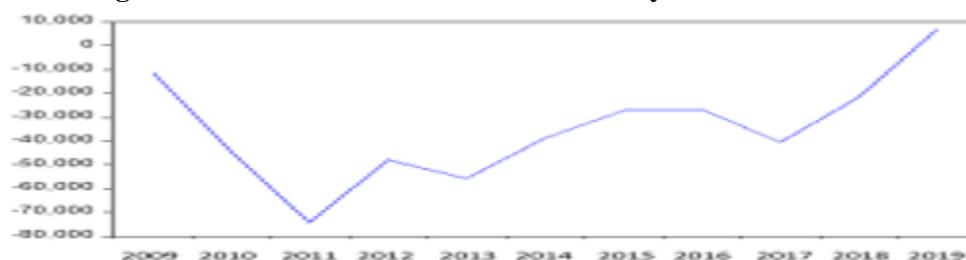
Source: CBRT /EVDS

To improve Turkey's post-crisis current account deficit and other economic indicators, the Central Bank revised its monetary policy at the end of 2010, and besides the targeted inflation policy, the financial stability target began to be mentioned. In this context, the policies were implemented to prevent the increase in loans at the end of 2010. It is aimed that the measures implemented to slow down the loan growth will also contribute to the narrowing of the current account deficit.

At the end of the year 2010, to ensure the intended slowdown in credit and economic activity, Turkey implemented a new monetary policy combination consisting of low policy interest rates and an increase in banks' required reserves. The implemented policy limited the appreciation of the currency. The credit growth slowed down in certain areas.

Although Turkey gained competitiveness and became advantageous in exports in 2010, the foreign trade deficit increased sharply. The imports increased more than exports in the relevant year. It has been indicated that for every $10 increase in oil prices, the foreign trade deficit increases by 0.5% of GDP (Organization for Economic Co-operation and Development [OECD], 2011, p.198-199).

The deepening of the crisis experienced in Euro Zone countries during the last quarter of 2011 affected Turkey adversely in terms of exports. The risks and uncertainties in the global economy continued. This situation has affected the Turkish economy.

As a result of the macro-economic measures implemented, domestic demand and the related growth rate

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slowed down in 2011. The uncertain outlook in the global economy has changed the risk perception of investors. Following the capital outflows in Turkey, the Turkish Lira depreciated and imports decreased following the contraction in domestic demand. The deepening of the crisis experienced in Euro Zone countries during the last quarter of 2011 affected Turkey negatively in terms of exports. As much as the foreign demand decreased because of the problems in the global economy, the competitive advantage that emerged with the exchange rate had a positive effect on exports. The positive trend in exports in 2011 reduced the rate of increase in the current account deficit (CBRT, 2011, p.5).

Turkey's current account deficit in 2011 was 74,402 Million US Dollars. The foreign trade deficit was shown as the cause of the current account deficit problem because of the deficit in the trade balance in 2011. With the effect of the measures taken to slow down the economic activities, the economy has been tried to be balanced.

Economic growth is fed by factors such as the consumption in the domestic market, investment demand, and import volume related to them. In the year 2012, low-interest rates, short-term capital inflows, appreciation of TL, and an increase in loan volume supported this situation. With these factors, an increase in the current account deficit was observed.

The current account deficit, which was US$ 74,402 million in 2011, improved in 2012 and reached US$ 47,960 million. At the end of 2012, the narrowing trend in the current account deficit continued. As a result of the monetary policy that the Central Bank commenced implementing during the last quarter of 2010, there was balancing in demand. The improvement in the current account deficit in 2012 was driven by the slowdown in domestic demand and the increase in net foreign demand. Through the implemented policies, the sustainability of credit growth has been ensured. Following the decrease in investment demand, imports decreased and sectors that could export because of the decrease in private consumption focused on foreign trade. The development in exports supported the decrease in the current account deficit. In the same year, gold exports also increased. The acceleration in the services balance is also cited as one of the reasons for the diminishing of the current account deficit. As at the end of 2011, there was a contraction in imports. In the year 2012, the level of domestic demand decreased and the demand for imports contracted. The total imports and imports excluding energy generally decreased in 2012 (CBRT, 2012, p.3)

At the end of 2012 and the beginning of 2013, there was a limited increase in import expenditures. In addition to the positive recovery of domestic demand factors and exports to the Euro Area, energy imports decreased because the temperatures in the winter season were above seasonal regulars and the decrease in energy prices. The mentioned issues are among the main factors limiting the rate of increase in imports (CBRT, 2013, p.3).

After the improvement in the current account deficit in 2012, the current account balance got worse again in 2013. In the year 2013, the current account deficit was 55,858 Million US Dollars.

The main cause for the increase in the current account deficit in 2013 is high imports as well as net gold imports continuing above the historical average. However, considering the current account deficit excluding gold, an increase is still observed in the current account deficit. The services balance also decreased in parallel with the slowdown in net tourism revenues (CBRT, 2013, 3).

In the year 2013, the expectations that FED would change the expansionary monetary policy implemented following the 2008-2009 crisis affected the developing countries and capital outflows were observed. This situation is deemed as causing the financing source in the current account balance of developing countries to be affected (CBRT, 2013, p.4).

In the year 2014, the current account deficit decreased and was announced as 38,848 Million US Dollars. The narrowing trend in the current account deficit continued in 2015 and 2016 as well. In the relevant years, the current account deficit was realized as 27,314 Million US Dollars and 26,849 Million US Dollars, respectively.

The improvement process in the foreign trade balance continued in 2016. However, with the decrease in tourism revenues, the balance of services has gotten worse. Exports to Euro Zone economies followed a positive course. Although the decrease in domestic demand for imports and the depreciation in the real exchange rate slowed down the increase in imports, imports increased both in nominal and real terms because of the increase in oil prices and high amount of gold imports (CBRT, 2016 p.4-6).

In the year 2017, a significant increase was observed in the current account deficit again compared to the previous year. While the current account deficit was 26,849 Million US Dollars in 2016, it increased by 50% in 2017 and reached 40,584 Million US Dollars. The chart presents a sharp downward decline in the current account.

In the year 2017, the foreign trade balance, which is the main determinant of the current account balance, got worse and the main reason for the situation was the high rate of increase in imports because of the increase in domestic demand and the increase in energy prices, despite the positive trend in exports (CBRT, 2017, p.3).

In the year 2018, the current account deficit decreased and amounted to 21,623 Million US Dollars. In the year 2019, Turkey had a current account surplus. In the year in question, the current surplus was declared as 6.909 Million US Dollars.

Imports of Natural Gas and Current Account Deficit in Turkey

In periods of increased growth rates in Turkey, the energy demand also increases. The various energy sources

such as natural gas, diesel, and coal are widely used in the production and industry sector. In addition to natural gas consumption, the areas of use are residences and workplaces. There is also the use of natural gas in electricity generation and as motor fuel. On a global scale, natural gas, which is one of the most important energy sources after crude oil, is less harmful to nature and has a relatively low cost.

When energy and natural gas imports are looked at in Turkey, it is seen that both oil and natural gas are used in electricity production. In the year 2018, 30% of the imported natural gas was used for electricity generation. In addition to being foreign-dependent for products such as natural gas and oil, the fact that one-third of electricity production is realized with imported energy sources is one of the factors that further increases the current account deficit (Energy Market Regulatory Authority [EMRA] 2019, p.21)

25% of natural gas is used in electricity production, 27% in residences, 38% in industry, and 10% in official offices and commercial offices. As a result of the studies carried out in the land regions of Turkey, significant natural gas reserves have been reached in Adıyaman, Çanakkale, Düzce, Edirne, İstanbul, Kırklareli, and Tekirdağ. The total amount of natural gas produced and released to the market in these provinces is 37.8 Billion m3. This amount corresponds to approximately 0.63% of Turkey's annual natural gas consumption. The remaining 99.37% share is imported ("Natural gas bill decreased from 42 to 16 billion dollars", last updated 28.07.2017, https://www.karar.com/dogalgaz-faturasi-42den16-milyar-dolara-dustu-401422)

Since natural gas production is very low in Turkey, natural gas demand is met by imports. Turkey's natural gas demand is supplied from Russia, Azerbaijan, Turkmenistan, and Iran through pipelines, and from Nigeria and Algeria via tankers in liquefied form (Umutlu and Bayraç, p.220).

Considering the data for the year 2012 to understand the proportional size of natural gas imports; while the natural gas import amount is 45,269 (million m3), the natural gas import price is 42,416 (Million $). Energy imports, on the other hand, are 60.117 (Million $) in the relevant year. (70% consists of natural gas import cost)

Turkey, which has a very limited energy resource, imports energy products. The demand for imports in this area and the increase in the use of energy in different areas have an expanding effect on the current account deficit. Not only the increase in energy demand but also the increase in unit prices of related energy products, such as natural gas and oil, affects the current account deficit. Other than the change in the unit prices of the relevant energy product alone, the position of Turkey's currency in the said period against foreign currencies is also important.

It is assumed that the demand for imports in this area and the increase in the use of energy in different areas have a significant impact on the current account deficit. Not only the increase in energy demand, yet also the increase in unit prices of related energy products, such as natural gas and oil, affects the current account deficit. Other than the change in the unit prices of the relevant energy product alone, the position of Turkey's currency in the said period against foreign currencies is also important. In periods when energy imports decrease; the increase in the exchange rate and the depreciation of the Turkish Lira will increase energy imports. In this case, it will affect the current account deficit adversely.

Figure 3. Amount of Turkey's Natural Gas Import Between the years 2009-2019
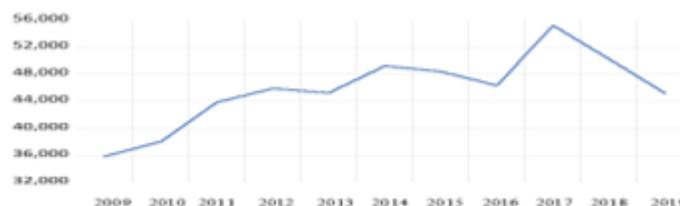
Source: EPDK (compiled from the EPDK annual report for 2010 and 2019)

Table 2. Current Accounts in Turkey

Year	Current Accounts (Million Dollar)
2009	-11.360
2010	-44.620
2011	-74.402
2012	-47.960
2013	-55.858
2014	-38.848
2015	-27.314
2016	-26.849
2017	-40.584
2018	-21.623
2019	6.909

Source: CBRT /EVDS

Methodology

In the study, ADF Unit Root and Granger causality tests were applied by using current account deficit data and natural gas import amount in Turkey.

Data Set

In the study, the data set comprises the current account (Million USD) and natural gas import amount (million m3). The data is obtained from the CBRT and EMRA statistics and annual reports. The data cover the years 2009-2019 for Turkey and are on an annual basis.

The current account data mainly sets forth the data expressed as the current account deficit in the study. Except for the year 2019, it is seen that the account has a negative and current account deficit in all years. There is a current surplus only in 2019.

The data is expressed in Million US Dollars. The data was compiled via the CBRT website EVDS.

Data on natural gas imports have been compiled from EMRA's 2010 and 2019 annual reports. It presents the total annual natural gas import amounts. As a unit, it is expressed as million m3, based on the upper calorific value of 9155 Kcal/m3.

Table 3. Amount of Natural Gas Import in Turkey

Year	Amount of Natural Gas Import (Million m3)
2009	35.856,48
2010	38.037,60
2011	43.874,45
2012	45.922,71
2013	45.268,98
2014	49.262,98
2015	48.427,78
2016	46.352,17
2017	55.249,95
2018	50.282,05
2019	45.211,47

Source: EPDK (compiled from the EPDK annual report for 2010 and 2019)

Method

The current account deficit data in Turkey encompassing the years 2009-2019 and the number of natural gas imports were discussed and ADF Unit Root and Granger causality tests were applied. It was observed that the series of these variables are not stationary. ADF (Augmented Dickey-Fuller) was implemented as a unit root test to make the series stationary. In the ADF test, the leg length is a maximum of 1 compared to the Schwarz formulation. In the case where the difference is not taken and the lag length is 0, both series are not stationary. It has been observed that the series at the 1st level difference and zero lag length become stationary by choosing the unstable and trendless criterion in the ADF. Table 4 presents the ADF test applied by taking the current account deficit data in Turkey between the years 2009-2019. The test statistic is less than the critical value of 5%. -2.692779<-1.98819, in which case the series is said to be stationary.

Table 4. Current Account Deficit Unit Root Test

Null Hypothesis: D(CARIACIK) has a unit root
Exogenous: None
Leg Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.692779	0.0133
Test critical values: 1% level	-2.847250	
5% level	-1.988198	
10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CARIACIK,2)
Method: Least Squares
Date: 01/15/21   Time: 11:49
Sample (adjusted): 2011 2019
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CARIACIK(-1))	-0.909917	0.337910	-2.692779	0.0274

R-squared	0.438744	Mean dependent var	6865.778
Adjusted R-squared	0.438744	S.D. dependent var	27530.46
S.E. of regression	20625.01	Akaike info criterion	22.85084
Sum squared resid	3.40E+09	Schwarz criterion	22.83275
Log likelihood	-101.6488	Hannan-Quinn criter.	22.76355
Durbin-Watson stat	2.058929		

In the ADF test applied for the series about the natural gas import quantity, the non-constant and trendless model was selected and the series became stationary at the 1st level difference. ADF test statistic is -2.973794, the test critical value at the 5% level is less than -1.988198, and the H0 hypothesis of the unit root test is; the expression is not stationary/contains a unit root, is rejected. The series in question is stationary.

Table 5. Amount of Natural Gas Import -Unit Root Test

Null Hypothesis: D(DOGALGAZ) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.973794	0.0079
Test critical values:	1% level	-2.847250	
	5% level	-1.988198	
	10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DOGALGAZ,2)
Method: Least Squares
Date: 01/15/21   Time: 12:58
Sample (adjusted): 2011 2019
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DOGALGAZ(-1))	-1.109034	0.372936	-2.973794	0.0178

R-squared	0.517891	Mean dependent var	-805.7444
Adjusted R-squared	0.517891	S.D. dependent var	6966.898
S.E. of regression	4837.401	Akaike info criterion	19.91058
Sum squared resid	1.87E+08	Schwarz criterion	19.93250
Log likelihood	-88.59762	Hannan-Quinn criter.	19.86329
Durbin-Watson stat	1.829636		

Since both series in question are stationary at the same level, that is, at the 1st difference, the Granger causality test was applied as a method.

Inverse Roots of AR Characteristic Polynomial
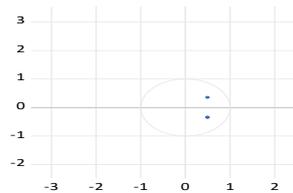
Roots of Characteristic Polynomial
Endogenous variables: DOGALGAZ
        CARIACIK
Exogenous variables: C
Lag specification: 1 1
Date: 01/15/21   Time: 13:18

Root	Modulus
0.503339 - 0.349200i	0.612610
0.503339 + 0.349200i	0.612610

No root lies outside the unit circle.
VAR satisfies the stability condition.

VAR Residual Serial Correlation LM Tests
Date: 01/15/21   Time: 13:20
Sample: 2009 2019
Included observations: 10

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	5.636330	4	0.2280	1.741199	(4, 8.0)	0.2337
2	2.228433	4	0.6938	0.561904	(4, 8.0)	0.6973

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	5.636330	4	0.2280	1.741199	(4, 8.0)	0.2337
2	11.12945	8	0.1945	1.951680	(8, 4.0)	0.2708

*Edgeworth expansion corrected likelihood ratio statistic.

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 01/15/21   Time: 13:22
Sample: 2009 2019
Included observations: 10

Component	Skewness	Chi-sq	df	Prob.*
1	1.800837	5.405022	1	0.0201
2	0.085855	0.012285	1	0.9117
Joint		5.417307	2	0.0666

Component	Kurtosis	Chi-sq	df	Prob.
1	5.393004	2.386029	1	0.1224
2	1.931280	0.475901	1	0.4903
Joint		2.861930	2	0.2391

Component	Jarque-Bera	df	Prob.
1	7.791051	2	0.0203
2	0.488186	2	0.7834
Joint	8.279237	4	0.0819

*Approximate p-values do not account for coefficient estimation

The stationarity and lag length of the series were controlled. By considering the AR Roots table and graphics, and within the scope of Residual Test; autocorrelation LM and normality tests, stationarity, presence of autocorrelation, and normality were inspected. The series is stationary and there exists no autocorrelation

Vector Autoregression Estimates

Sample (adjusted): 2010 2019
Included observations: 10 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DOGALGAZ	CARIACIK
DOGALGAZ(-1)	0.488753	2.792010
	(0.22786)	(0.82596)
	[2.14495]	[3.38032]
CARIACIK(-1)	-0.043750	0.517912
	(0.07103)	(0.25747)
	[-0.61595]	[2.01157]
C	22674.20	-144969.7
	(10722.3)	(38866.5)
	[2.11468]	[-3.72994]
R-squared	0.423922	0.677903
Adj. R-squared	0.259328	0.585876
Sum sq. resids	1.06E+08	1.39E+09
S.E. equation	3885.111	14082.86
F-statistic	2.575565	7.366303
Log likelihood	-95.05508	-107.9331
Akaike AIC	19.61102	22.18663
Schwarz SC	19.70179	22.27741
Mean dependent	46788.90	-37114.90
S.D. dependent	4514.301	21883.94

Determinant resid covariance (dof adj.)	2.55E+15
Determinant resid covariance	1.25E+15
Log likelihood	-202.1787
Akaike information criterion	41.63574
Schwarz criterion	41.81729
Number of coefficients	6

Following the mentioned stages, VAR and Granger causality tests were implemented. The cases where both variables are dependent and independent, respectively, are presented. There is no Granger causality from the current account deficit to natural gas imports.

In the case where the current account deficit is the dependent variable and the natural gas import is the independent variable; Granger causality is observed from natural gas imports to the current account deficit. Considering the results in Table 6, Prob. value is 0.0007. Since 0.0007<0.05, there exists Granger causality here.

Table 6. Granger Causality Test

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 01/15/21   Time: 13:30
Sample: 2009 2019
Included observations: 10

Dependent variable: DOGALGAZ

Excluded	Chi-sq	df	Prob.
CARIACIK	0.379387	1	0.5379
All	0.379387	1	0.5379

Dependent variable: CARIACIK

Excluded	Chi-sq	df	Prob.
DOGALGAZ	11.42793	1	0.0007
All	11.42793	1	0.0007

Research Findings

If we consider the hypotheses of the research;

H₀: There is no Granger causality from natural gas imports to current account deficit.

H₁: There is granger causality from natural gas imports to current account deficit.

H₁: natural gas imports are the Granger cause of the current account deficit; this is another way to express it. According to the research findings, the H1 hypothesis in the study was accepted.

There is Granger causality from natural gas imports to current account deficit between the years 2009-2019 in Turkey. The causality is unidirectional and runs from natural gas imports to current account deficit. In this case, it is understood that the increase in natural gas imports in Turkey in the relevant years caused an increase in the current account deficit. In periods when natural gas imports increase, the current account deficit is expected to increase while other variables are constant. It has been seen that the results obtained are under the conceptual framework.

Conclusion and Suggestions

The amount of energy imports and energy prices are important factors affecting the current account deficit. Likewise, the natural gas import amount and unit prices also play an important role in the current account. Turkey's dependence on foreign energy in the field of industry is at the

75% level. When the current account excluding energy is analyzed, the burden of energy imports is seen in the current account deficit. This situation in the current account deficit presents the importance of turning to renewable energy or researching reserves such as the new natural gas reserve found in 2020. From renewable energy sources; the amount of energy imports can be reduced by utilizing solar energy, hydroelectric and wind power plants.

As a result of the study, it was observed that there is causality from the amount of natural gas imports to the current account deficit in Turkey between the years 2009-2019 and the amount of natural gas imports is the Granger cause of the current account deficit. The fact that a country like Turkey, which does not have natural gas sources and meets about 99% of its natural gas demand through imports, having its natural gas source, and meeting the natural gas demand with domestic resources will reduce the burden of natural gas imports in the current account deficit and the current account deficit will improve. It is estimated that taking measures to reduce energy imports, increase savings and export rates and implement policies in this direction will reduce the current account deficit.

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