



Spatial Dynamics of the Triple Deficit Hypothesis: Empirical Evidence from EU Economies*

Üçüz Açık Hipotezinin Mekansal Dinamikleri: AB Ekonomilerinden Ampirik Bulgular

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Abstract

This study investigates the triple deficit hypothesis, which posits a link between the current account and fiscal and savings-investment balances, by accounting for both temporal and spatial effects. For this purpose, the analysis is carried out using the data of 27 EU countries for the period 2000-2024. The empirical findings, derived using the Spatial Autoregressive (SAR) Model, indicate a statistically significant and positive relationship between the trade balance and both the budget and savings balances. Furthermore, the spatial effect was also found to be positive and significant, suggesting that trade deficits in neighboring countries exhibit mutual influence and spatial dependence. considering these findings, the triple deficit hypothesis is validated for EU countries during the analyzed period. The evidence implies that external trade deficits are not isolated phenomena but are shaped by both domestic fiscal and savings policies and regional spillover effects.

Öz

Çalışmada, bütçe dengesi ve tasarruf dengesinin cari denge üzerinde arttırıcı etkisini savunan üçüz açık hipotezi, mekânsal ve zamansal etkiler ile analiz edilmektedir. Bu doğrultuda, dış ticaret dengesi, bütçe dengesi ve tasarruf dengesi gibi üçüz açığı oluşturan unsurlar arasındaki ilişkinin, 2000-2024 döneminde 27 AB ülkesi için analiz edilmesi için mekânsal panel veri analizi yöntemi uygulanmaktadır. SAR Modeli kullanılarak elde edilen bulgulara göre, hem bütçe dengesi hem de tasarruf dengesi ile dış ticaret dengesi arasında pozitif yönlü bir ilişkinin varlığına yönelik bulgulara ulaşılmıştır. Bunun yanı sıra, pozitif etkili bir mekânsal etkinin varlığına ilişkin bulgular da elde edilmiştir. Bu sonuçlar ışığında, AB ülkelerinde 2000-2024 periyodu için üçüz açık hipotezinin geçerli olduğu ve komşu ülkelerin dış ticaret açıklarının birbirlerini aynı yönde etkilediği görülmektedir.

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1. INTRODUCTION

The current account balance, one of the fundamental indicators used to assess a country's external economic equilibrium within the global economy, encompasses its external economic transactions, including trade in goods and services, primary income flows, and current transfers. An external trade deficit reflects an imbalance in a country's international transactions, and while it may be benign in the short term, its persistence can pose significant risks. The sustainability of such deficits is therefore critical to maintaining macroeconomic stability, as large and prolonged imbalances may trigger abrupt, disruptive adjustments in external financing (International Monetary Fund, 2023). In developing economies, high external trade deficit rates generally increase dependence on external financing, while also bringing vulnerability to sudden capital outflows (World Bank, 2023:71). On the other hand, In developed economies, external trade deficits often reflect structural rather than cyclical factors—such as demographic trends, fiscal imbalances, and institutional conditions—and thus require more nuanced analysis (Cheung, Furceri and Rusticelli 2013). Therefore, the level of the external trade deficit, as well as its financing structure and long-term trends, play a decisive role in terms of economic policies (IMF, 2022).

The external trade deficit can be a significant problem in terms of its consequences. Especially in countries with high import input dependency, rising import costs resulting from the depreciation of the national currency adversely affect production and exports, and a widening external trade deficit may further precipitate a foreign exchange crisis. In addition to a foreign exchange crisis, the increase in imported input costs will also bring about cost inflation. Indeed, according to Labonte (2010), the external trade deficit is a harbinger of serious financial and foreign exchange crises for developing countries. However, the external trade deficit can also become a problem depending on the way the foreign exchange deficit it causes is financed.

The fact that its financing is based on short-term/speculative external borrowing and/or serious privatizations brings with it the risk of not being able to finance the external trade deficit, especially during crisis periods; this situation may cause the stagnation and contraction processes experienced in the goods and foreign exchange markets to deepen. From this perspective, the external trade deficit should be seen as a potential macroeconomic problem for all economies, regardless of their level of development and should be examined in detail. In fact, when the 2023 current account balance data obtained from the World Bank is examined, it is seen that 65 countries out of 106 countries, the vast majority of which are developing economies, have an external trade deficit. In other words, approximately 42% of developed countries and 71% of developing and underdeveloped countries have an external trade deficit.

In the case of European Union countries, the dynamics of external trade deficits are assessed within the context of both national economic policies and the structural factors associated with the common currency. In particular, for countries within the Eurozone, inconsistencies between common monetary policy practices and national fiscal policies have contributed to persistent external trade deficits in certain member states (European Commission, 2023). After the 2008 global financial crisis, stricter surveillance mechanisms for current account balances were developed across the EU, and policy tools such as the Macroeconomic Imbalance Procedure (MIP) were implemented (European Commission, 2024). However, the structural deficits and weaknesses in external competitiveness observed in Southern European countries make it difficult to address current account balance problems in a uniform manner across the EU (OECD, 2023). In addition, the high external deficits that emerged during the rapid growth phases of several new member states in Eastern and Southeastern Europe are also noteworthy (Sanchez and Varoudakis, 2013).

According to the 2023 Current Balance data, 41% of EU countries have an external trade deficit. In addition, when the arithmetic average of the last 25 years of current account balance data of EU countries is taken in order to examine the situation in the long-term; it is seen that 63% of EU countries have an external trade deficit.

According to the IMF, an external trade deficit occurs when national savings cannot cover total investments; this situation may be due to the inadequacy of the sum of public and private sector savings. A fiscal deficit occurs when public expenditure exceeds revenues, which reduces public savings and total national savings. Within this framework, the positive association between the fiscal deficit and the external trade deficit is interpreted through the lens of the "twin deficits" hypothesis (Liu and Ren, 2024). In European Union countries, especially in the Eurozone, the relationship between fiscal deficits and external trade deficits is further complicated by the incompatibilities between the common monetary policy and national fiscal policies.

Analyses of the Eurozone conducted by Barnes (2010) and the OECD (2010) indicate that structural fiscal deficits in some countries increase current account deficits, thereby contributing to macroeconomic imbalances. A review of the current account literature shows that studies predominantly focus on the twin deficit and triple deficit hypotheses. However, the lack of research examining the triple deficit hypothesis from a spatial perspective among geographically adjacent countries represents a notable gap in literature. This study aims to address this gap by evaluating the triple deficit hypothesis for European Union countries while incorporating spatial effects. For this purpose, the following sections will address the theoretical framework, literature summary and econometric analysis, and then the results will be interpreted in line with the findings and policy recommendations will be presented.

2. THEORITICAL FRAMEWORK AND LITERATURE

The Twin Deficit Hypothesis, which posits that fiscal deficits can lead to current account deficits, is commonly explained through the Mundell–Fleming models (McTeer, 2008). According to these models, under the assumption of perfect capital mobility, expansionary fiscal policies implemented in both flexible and fixed exchange rate regimes result in external trade deficits (Akpınar and Çelik, 2025). This indicates that fiscal deficits stemming from expansionary fiscal policies may ultimately generate external trade imbalances. In fact, according to the Finite Horizons assumption¹, a possible fiscal deficit that will occur due to a decrease in tax rates will cause deteriorations in the current balance. Individuals whose income rises due to lower tax rates fail to consider that this increase may be offset by higher taxes in the future, and therefore tend to raise their consumption expenditures (Kim and Roubini, 2008). The resulting increase in consumption boosts import demand and leads to a deterioration in the current account balance. This situation, in which a fiscal deficit ultimately disrupts the current account balance, is referred to as the twin deficit².

In the context of the twin deficit hypothesis, the private sector savings balance and the fiscal balance are considered jointly, and their sum is regarded as the internal balance. However, based on the national income identity, the sum of the external trade balance, the fiscal balance, and the savings

¹ The finite horizons approach states that individuals do not think ahead when making consumption decisions.

² There are also various studies that oppose the twin deficit hypothesis. For example, Feldstein and Horioka (1979) stated that capital is internationally immobile; Summers (1988) argued that capital is internationally mobile; however, this is restricted by government policies. In addition, Barro (1989) put forward the infinite horizon approach instead of the finite horizon approach and argued that fiscal deficits will not increase imports. Kim and Roubini (2008) stated that the fiscal balance is disrupted during economic recession periods, and at the same time, investments lag behind savings and savings surplus is given. Such a situation, according to a simple national income identity, will improve the current balance; they argue that when the fiscal balance is disrupted, the current balance will give a surplus.

balance must be equal (McTeer, 2008). The triple deficit hypothesis differs from the twin deficit hypothesis by evaluating the fiscal deficit and the savings gap separately, rather than treating them together as a single internal balance. Accordingly, in an economy that is open to the outside and where the state is an economic actor, the national income is equal to the sum of consumption expenditures (C), investment expenditures (I), government expenditures (G), taxes (T), exports (X) and imports (M)³ (Mankiw, 2009).

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

Considering that income is equal to the sum of consumption and savings ($Y = C + S$), Equation 3 can be reached, which shows that the external trade balance ($X-M$) is equal to the sum of the fiscal balance ($T-G$) and the savings balance ($S-I$). Accordingly, the situations in which the external trade balance and fiscal balance are in deficit are called twin deficits, whereas the situations in which the external trade balance, fiscal balance and savings balance are in deficit at the same time are called triple deficits. This relationship indicates that the external trade deficit will widen as the fiscal deficit and/or the savings gap increases (Mankiw, 2009).

$$C + S = C + I + G - T + X - M \quad (2)$$

$$(X - M) = (T - G) + (S - I) \quad (3)$$

Although the empirical literature includes a substantial number of studies examining the twin and triple deficit hypotheses, spatial econometric analysis remains notably absent. Furthermore, empirical findings supporting the twin deficit hypothesis tend to be relatively consistent and predominantly confirm its validity. By contrast, evidence regarding the triple and especially the quadruplet deficit hypotheses is considerably more heterogeneous and, in many cases, remains contested.

For example, Salvatore (2006), Holmes (2011), Theofilakou and Stournaras (2012), Trachanas and Katrakilidis (2013), Xie and Chen (2014), Ahmad, Aworinde and Martin (2015), Aydın and Afsal (2018), Sayar and Bayar (2019), Ahmed and Akın (2019), Klein and Linnemann (2019), Handoyo, Erlando and Astutik (2020), Janko (2020), Baş (2020), and Lahiani, Mtibaa and Gabsi (2022) obtained findings supporting the twin deficit hypothesis. In addition, Karras (2019) found evidence supporting the existence of twin deficits; however, they also showed that the direction of the relationship shifted from positive to negative during periods of war.

However, there are also studies that identify evidence supporting the twin deficit hypothesis under different conditions. For example, Çatık, Gök and Akseki (2015) argued that while the twin deficit holds in countries operating above their growth potential, twin divergence is observed in those performing below potential. Similarly, El-Khishin and El-Saeed (2021) found support for the twin deficit hypothesis in oil-rich MENA countries, but reported no evidence of the relationship in MENA economies without significant oil resources. In addition, Oktar and Yüksel (2016) and Gaysset, Lagoarde-Segot and Neaime (2019) identified the presence of twin deficits in some of the countries in their samples, though not in others. Finally, Mallick, Behera and Murthy (2021) provided strong evidence that both twin deficits and twin divergence existed in India across different periods. On the other hand, there are also studies in the literature that do not support the validity of the twin deficit hypothesis. For example, Sobrino (2013) found that the fiscal balance did not affect the external trade balance in the short term in his analysis of the Peruvian sample. Kayhan et al. (2017), on the other hand, could not identify a causal relationship running from the fiscal balance to the external trade balance in their analysis of the fragile five. Ahmad and Aworinde (2021) analyzed PIGS countries and found no unidirectional or bidirectional causal relationship from the fiscal balance to the external trade balance in Italy and Ireland. Finally, Normandin (1999) and Holmes (2021) found no evidence that the fiscal balance affected the external trade balance in their

³ Taxes and imports have a negative sign because they represent leakages from the economy.

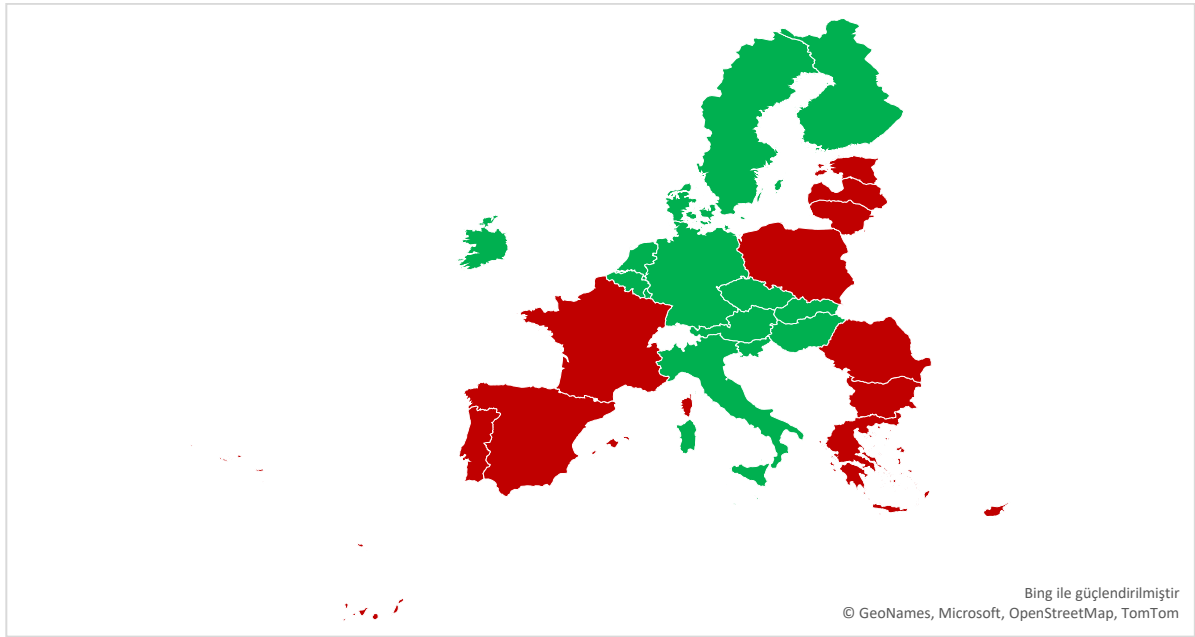
analyses of the United States. It is understood that the findings of the studies testing the validity of the Triple Deficit Hypothesis are relatively controversial. Indeed, studies such as Tülümce (2013), Bolat, Değirmen and Şengönül (2014), Tang (2014), Karanfil and Kılıç (2015), İpek and Kızılgöz (2016), Samuel (2017), Shastri, Giri and Mohapatra (2017), Altunöz (2018), Kızılkaya and Öztutuş (2018), Saraç (2019), Ejder and Çaşkurlu (2020), Magoti, Mabula and Ngong'ho (2020), Tülümce and Saykal (2021) and Mehrara, Gholami and Mehdi (2022) obtained findings supporting the triple deficit hypothesis; Sürekçi (2011), Karaçor et al. (2013), Özdemir et al. (2014), Samırkaş and Samırkaş (2015), Şen and Kaya (2020), Çoban and Balıkçioğlu (2016), Arantika, Yeniwati and Triani (2018), Apaydın (2019), Kamacı and Kara (2019) and Benli (2019) have not obtained findings that support the triple deficit hypothesis.

Considering the empirical literature as a whole, the findings on the validity of the twin deficit hypothesis appear relatively consistent, particularly in studies using panel data models that examine multiple countries. In contrast, the literature on the triple deficit hypothesis remains more contentious.

3. EXAMINATION OF TRIPLE DEFICIT

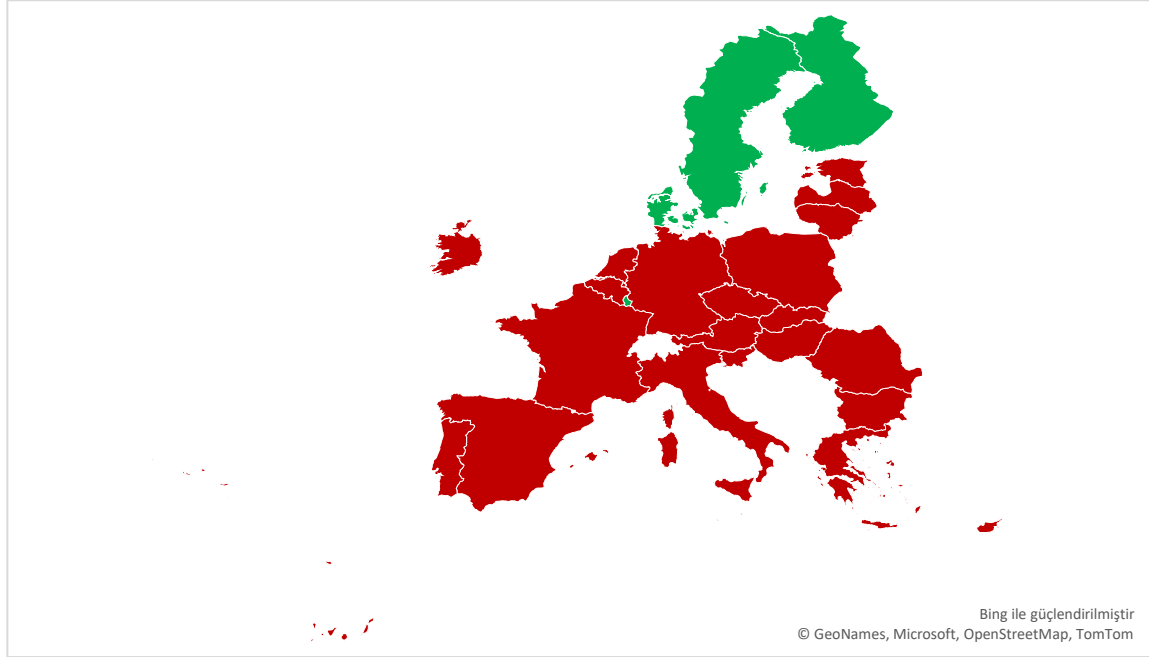
When the external trade balance of EU countries is examined between 2000 and 2024, it is observed that 15 countries maintain an external trade surplus, while 12 countries experience an external trade deficit. Moreover, it is notable that countries with a trade surplus are predominantly clustered in Central and Northern Europe, whereas countries with a trade deficit are largely concentrated in Eastern Europe. This pattern provides important preliminary evidence of a potential spatial effect in the formation of trade surpluses and deficits. External trade balances of EU countries are shown in Figure 1.

Figure 1: External Trade Balance in EU Countries (2000-2024 average)



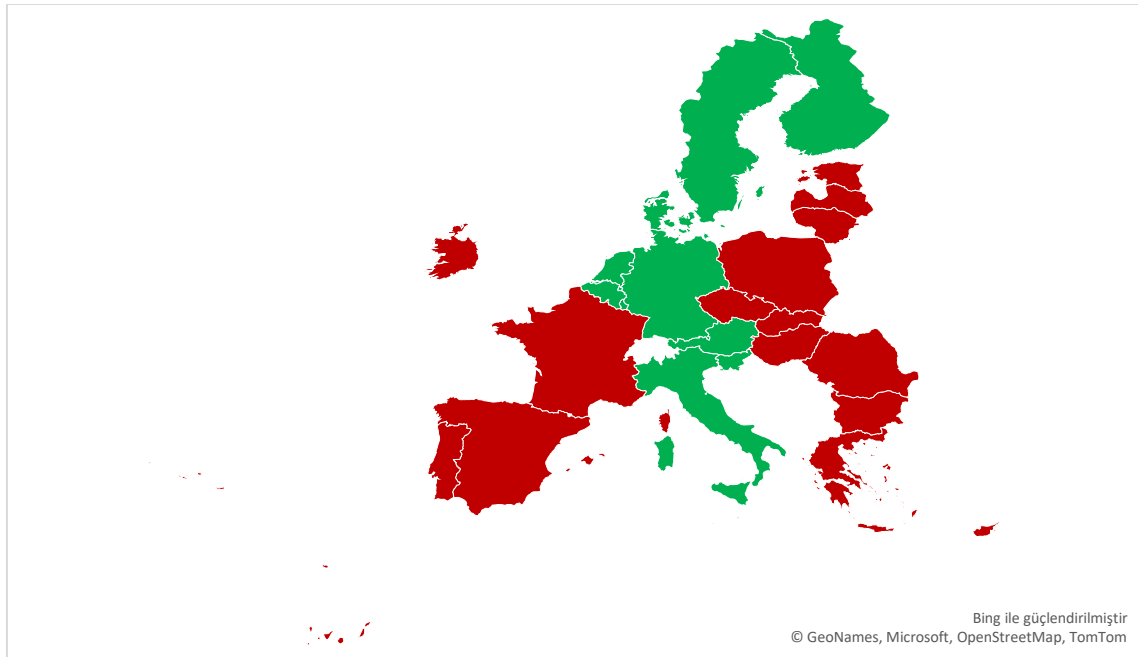
When the fiscal balance of EU countries is examined between 2000 and 2024, it is observed that 4 countries maintain a budget surplus, while 23 countries run a fiscal deficit. Moreover, a similar pattern of spatial clustering, as observed in the external trade balance, is also evident. The fiscal balances of EU countries are shown in Figure 2.

Figure 2: Fiscal Balance in EU Countries (2000-2024 average)



Finally, the savings balance of EU countries is examined. Between 2000 and 2024, 10 countries exhibit a savings surplus, while 17 countries experience a savings gap. Notably, countries with a savings surplus are clearly clustered in Central Europe. The savings balances of EU countries are shown in Figure 3.

Figure 3: Savings Balance in EU Countries (2000-2024 average)



4. ECONOMETRIC MODEL AND ANALYSIS

4.1. Data

In this study, a spatial panel data analysis was performed using data for the 27 European Union member states over the period 2000–2024. Detailed descriptions of the variables employed in the analysis are presented in Table 1. Consistent with the theoretical framework of the triple deficit hypothesis, the external trade balance is designated as the dependent variable, while the fiscal balance and the savings balance serve as the key independent variables. Both fiscal and savings

balances are hypothesized to exert a positive correlation on the external trade balance. Furthermore, the spatial dimension of the analysis is modeled using the spatial weight matrix, W , which was constructed by the author to reflect the contiguity of national borders, thereby capturing spatial dependence among countries.

Table 1: Variables

Variables	Explanation	Expectation	Sources
NX	The share of countries' external trade balances in GDP		IMF (WEO, 2025)
FB	The share of countries' Fiscal balances in GDP	+	IMF (WEO, 2025)
SB	The share of countries' savings balances in GDP	+	IMF (WEO, 2025)
W	Spatial Weight Matrix containing border neighborhoods of EU countries	+	Created by authors.

Table 2 shows descriptive statistics for the variables described in Table 1. Examining the mean, standard deviation, minimum and maximum values for each variable, along with the number of observations, provides important clues about the presence of significant outliers in the dataset.

Table 2: Descriptive Statistics

Variable		Mean	Std. dev.	Min	Max	Observations
NX	overall	1.978438	8.530987	-20.6425	39.38355	
	between		7.501548	-6.878958	29.30027	
	within		4.300852	-12.71172	24.47068	
FB	overall	2.533704	3.532036	-6.727	32.118	N = 675
	between		1.93493	-1.431409	6.062864	n = 27
	within		2.977232	-6.079796	30.8932	T = 25
SB	overall	-0.7690741	5.570265	-23.857	14.23	
	between		3.908498	-6.528045	6.629091	
	within		4.036395	-20.71016	15.07484	

Table 3 displays the correlation matrix of the variables for which descriptive statistics are provided in Table 2. An analysis of the pairwise correlations indicates that the level of association between the independent variables is not high enough to raise concerns about multicollinearity (Tosunoğlu, 2024). Furthermore, the correlations among all variables are positive and statistically significant.

Table 3: Correlation Matrix

	NX	FB	SB
NX	1		
FB	0.249*** (0.000)	1	
SB	0.719*** (0.000)	0.253*** (0.000)	1

The symbols "****", "***" and "**" indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Methodology

For econometric analysis, firstly, equation 4 below is estimated by Pooled Least Squares Model (POLS), Random Effects Model (RE) and Fixed Effects Model (SE). Following the methodology of Elhorst (2012), the basic models (FE, RE, and POLS) were initially estimated. Appropriate specification tests were then conducted in accordance with this methodology. Based on these tests, a model selection was carried out among the basic models, and it was determined that the spatial model would be based on a fixed-effects specification.

$$NX_{it} = \alpha_1 + \beta_1 FB_{it} + \beta_2 SB_{it} + \varepsilon_{it} \quad (4)$$

Equation No. 4 addresses the triple deficit hypothesis by ignoring the spatial effects. However, the spatial methodology developed by Anselin, Gallo and Jayet (2008) allows us to separate these effects from the model and evaluate them separately. For this purpose, the Spatial the Durbin Model (SDM), the Spatial-AutoRegressive Model (SAR) and the Spatial error model (SEM) can be used.

SAR Model is a model in which the spatial effect depends on the dependent variable (Anselin et al., 2008). The spatial neighborhood matrix containing the border neighborhoods is multiplied by the dependent variable and included in the model. While SEM Model shows the model in which the spatial effect is in the error terms, SDM model states that the spatial effect is in both the dependent variable and the error terms (Anselin et al., 2008). The functional form of the SAR Model is presented in Equation No. 5.

$$NX_{it} = \alpha_2 + \rho \sum_{j=1}^N W_{ij}NX_{jt} + \beta_3 FB_{it} + \beta_4 SB_{it} + \varepsilon_{it} \quad (5)$$

In the SAR model, the ρ coefficient, obtained by multiplying the spatial weight matrix with the independent variable, indicates whether the external trade balance is influenced not only by the fiscal and savings balances but also by neighboring countries. A positive ρ coefficient signifies that the external trade balances of bordering countries have a mutually reinforcing effect. A negative result indicates that the external trade balances of the border neighbors are negatively affected by each other. The insignificance of the coefficient indicates that there is no spatial effect (Elhorst, 2012).

Finally, there are four specification tests called LM Spatial Lag, Robust LM Spatial Lag, LM Spatial Error and Robust LM Spatial Error, which show whether the spatial effect really exists and which model should be selected. The LM Spatial Lag and Robust LM Spatial Lag tests indicate that the spatial effect is present in the dependent variable, suggesting that the SAR model should be employed (Kışla, Muradoğlu and Önder, 2022; Polat, Tosunoğlu and Aslan, 2025). LM Spatial Error and Robust LM Spatial Error tests show that the obtained spatial effect is in the error terms (Kışla et al., 2022). However, statistical significance in all four tests suggests the use of the SDM model, whereas insignificance in all four tests indicates the absence of a spatial effect (Elhorst, 2012).

4.3. Findings

Table 4 presents the findings of the non-spatial POLS, RE and FE models. If the selected sample comprises cross-sections chosen based on specific characteristics, the fixed effects model can be applied regardless of other tests (Gujarati, Porter and Gunasekar, 2012). Additionally, the results of the Hausman test also support the use of the fixed effects model. Therefore, the FE results are interpreted first. However, for transparency reasons, the findings of all compared models are presented.

According to the FE results, the fiscal balance has a positive and statistically significant effect on the external trade balance. A 10% increase in the fiscal balance increases the external trade balance by 0.66%. In addition, the savings balance has a positive and statistically significant effect on the external trade balance. A 10% increase in the savings balance increases the external trade balance by 9.13%. In the FE model with time effects accounted for, the impact of the fiscal balance increases, while the effect of the savings balance decreases slightly. A 10% increase in the fiscal balance increases the external trade balance by 0.95%, while a 10% increase in the savings balance increases the external trade balance by 8.22%. These findings are statistically significant. In addition, RE and POLS findings, similar to FE findings, show that the fiscal balance and savings balance affect the external trade balance statistically significantly and positively.

However, all estimated models exhibit heteroscedasticity and autocorrelation. Therefore, robust standard errors were employed when evaluating significance levels. The p-values presented in parentheses below the coefficients are based on these robust standard errors.

Table 4: Non-spatial Regression Findings

	POLS	RE	FE	POLS (Time Effect)	RE (Time Effect)	FE (Time Effect)
FB	0.172** (0.016)	0.068** (0.029)	0.066** (0.034)	0.223** (0.011)	0.097** (0.010)	0.095** (0.012)
SB	1.073*** (0.000)	0.915*** (0.000)	0.913*** (0.000)	1.052*** (0.000)	0.825*** (0.000)	0.822*** (0.000)
C	3.240*** (0.000)	2.853** (0.10)	2.848*** (0.000)	1.883 (0.105)	1.255 (0.284)	1.245*** (0.003)
R-Square	0.521	0.740	0.740	0.528	0.778	0.778
Observations	675	675	675	675	675	675
Heteroskedasticity ⁴	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Autocorrelation ⁵	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
VIF (Mean)	1.26	1.89	2.12	1.99	2.01	2.91

The symbols "****", "***" and "**" next to the coefficients correspond to the significance levels of "1%", "5%" and "10%".

Table 5 presents the results of the Hausman Test and LR Test for model selection. As stated in Gujarati et al. (2012), although information and common features about the sections are known, the selected model is also verified with statistical tests. Hausman is used for the selection between RE and FE models, and LR Test, Sosa-Escudero-Yoon LM Test-One Side and Sosa-Escudero-Yoon ALM Test-One Side tests are used for the selection between FE and POLS models. The results of all applied tests recommend that the fixed effect model be preferred in both cross-section and time and cross-section effect models.

Table 5: Model Selection

	Individual Effect Models		Both Effect Models	
Hausman Test	H0: RE H1: FE	Chi-Square P: 0.000***	H0: RE H1: FE	Chi-Square P: 0.000***
LR Test	H0: POLS H1: FE	Chi-Square P: 0.000***	H0: POLS H1: FE	Chi-Square P: 0.000***
Sosa-Escudero-Yoon LM Test -One Side	H0: POLS H1: FE	Half Chi-Square P: 0.000***	H0: POLS H1: FE	Half Chi-Square P: 0.000***
Sosa-Escudero-Yoon ALM Test -One Side	H0: POLS H1: FE	Half Chi-Square P: 0.000***	H0: POLS H1: FE	Half Chi-Square P: 0.000***

The symbols "****", "***" and "**" next to the coefficients correspond to the significance levels of "1%", "5%" and "10%".

The spatial regression findings are presented in Table 6. While the LM Spatial Lag and Robust LM Spatial Lag tests support the spatial effect in the dependent variable, the LM Spatial Error and Robust LM Spatial Error tests could not detect a spatial effect in the error term. For this reason, the SEM and SDM models were excluded, and the findings of the SAR model are reported.

According to the SAR Model results, both the fiscal balance and the savings balance positively affect the external trade balance. A 10% increase in the fiscal balance increases the external trade balance by 0.63%. Similarly, a 10% increase in the savings balance increases the external trade balance by 8.65%. The ρ coefficient reflecting spatial effects appears to be positive and statistically significant.

According to the time-effect SAR model results, the fiscal balance and the savings balance positively affect the external trade balance. A 10% increase in the fiscal balance increases the external

⁴ Modified Wald Test.

⁵ Serial LM Test.

trade balance by 2.15%. Similarly, a 10% increase in the savings balance increases the external trade balance by 10.9%. The ρ coefficient, which reflects spatial effects, appears positive and statistically significant.

Based on the SAR model results incorporating both temporal and spatial effects, both the fiscal balance and the savings balance exert a positive and statistically significant impact on the external trade balance. A 10% increase in the fiscal balance increases the external trade balance by 0.79%. Similarly, a 10% increase in the savings balance increases the external trade balance by 7.94%. The ρ coefficient, which reflects spatial effects, appears positive and statistically significant.

Another key finding is the decomposition of the SAR model into direct and indirect effects, with the total effects also reported. Analysis of the direct effects indicates that both the fiscal balance and the savings balance exert a positive and statistically significant impact on the external trade balance. However, the indirect effect of the fiscal balance is statistically insignificant. A 10% increase in the fiscal balance increases the external trade balance by 0.64%, while the total effect is 0.70%. Similarly, the direct effect on the savings balance is 8.71% for a 10% increase, while the indirect effect is 0.76% and the total effect is 9.47%. The ρ coefficient, which reflects spatial effects, appears to be positive and statistically significant.

Table 6: Spatial Regression Findings (SAR Model)

	SAR-FE	SAR-FE (Time Effect)	SAR-FE (Spatial and Time Effect)	SAR (Direct)	SAR (Indirect)	SAR (Total)
FB	0.063** (0.035)	0.215** (0.013)	0.079** (0.029)	0.064** (0.042)	0.006 (0.121)	0.070** (0.042)
SB	0.865*** (0.000)	1.091*** (0.000)	0.794*** (0.000)	0.871*** (0.000)	0.076*** (0.004)	0.947*** (0.000)
ρ	0.096*** (0.003)	0.072** (0.024)	0.073** (0.033)		0.092*** (0.004)	
R-Square	0.739	0.731	0.740		0.739	
LogL	-1304.66	-1894.15	-1259.82		-1385.22	
AIC	2617.32	3796.30	2527.64		2782.44	
BIC	2634.87	3813.85	2545.19		2808.76	
LM Spatial Lag			9.71***			
Robust LM Spatial Lag			7.99***			
LM Spatial Error			2.21			
Robust LM Spatial Error			0.99			

The symbols "****", "***" and "**" next to the coefficients correspond to the significance levels of "1%", "5%" and "10%".

The spatial regression findings estimated by excluding Cyprus, which has no borders with any EU country, are presented in Table 7. While the LM Spatial Lag and Robust LM Spatial Lag tests support the spatial effect in the dependent variable, the LM Spatial Error and Robust LM Spatial Error tests could not detect a spatial effect in the error term. Consequently, the SEM and SDM models were discarded, and the analysis focuses on the results obtained from the SAR model.

According to the SAR Model results, both the fiscal balance and the savings balance positively affect the external trade balance. A 10% increase in the fiscal balance increases the external trade balance by 0.65%. Similarly, a 10% increase in the savings balance increases the external trade balance by 8.77%. The ρ coefficient reflecting spatial effects appears to be positive and statistically significant.

According to the time-effect SAR model results, the fiscal balance and the savings balance positively affect the external trade balance. A 10% increase in the fiscal balance increases the external

trade balance by 2.95%. Similarly, a 10% increase in the savings balance increases the external trade balance by 12.0%. The ρ coefficient reflecting spatial effects appears to be positive and statistically significant.

Based on the SAR model results accounting for both temporal and spatial effects, both the fiscal balance and the savings balance exert a positive and statistically significant influence on the external trade balance. A 10% increase in the fiscal balance increases the external trade balance by 0.92%. Similarly, a 10% increase in the savings balance increases the external trade balance by 9.71%. The ρ coefficient reflecting spatial effects appears to be positive and statistically significant.

Another finding is the separation of the direct and indirect effects of the SAR model and the presentation of their total effects. When both direct and indirect effects are examined, it is seen that both the fiscal balance and the savings balance positively affect the external trade balance. The direct effect on the fiscal balance is 0.68% for a 10% increase, while the indirect effect is 0.09% and the total effect is 0.77%. Similarly, the direct effect on the savings balance is 9.00% for a 10% increase, while the indirect effect is 0.96% and the total effect is 9.96%. The ρ coefficient, which reflects spatial effects, appears positive and statistically significant. When Cyprus, which has no borders with EU countries, is removed from the model, the indirect effect of the fiscal balance becomes statistically significant, while the ρ coefficient, which expresses spatial effects, also increases.

Table 7: Spatial Regression Findings Excluding Cyprus (SAR Model)

	SAR-FE	SAR-FE (Time Effect)	SAR-FE (Spatial and Time Effect)	SAR (Direct)	SAR (Indirect)	SAR (Total)
FB	0.065** (0.032)	0.295** (0.011)	0.092** (0.012)	0.068** (0.023)	0.009* (0.091)	0.077** (0.031)
SB	0.877*** (0.000)	1.201*** (0.000)	0.971*** (0.000)	0.900*** (0.000)	0.096*** (0.000)	0.996*** (0.000)
ρ	0.112*** (0.000)	0.099** (0.015)	0.104** (0.025)		0.101*** (0.000)	
R-Square	0.747	0.745	0.755		0.747	
LogL	-1289.11	-1894.15	-1099.88		-1299.25	
AIC	2475.22	3796.30	2200.91		2501.18	
BIC	2488.01	3813.85	2205.09		2554.90	
LM Spatial Lag			9.92***			
Robust LM Spatial Lag			8.75***			
LM Spatial Error			2.01			
Robust LM Spatial Error			1.34			

The symbols "****", "***" and "**" next to the coefficients correspond to the significance levels of "1%", "5%" and "10%".

5. CONCLUSION AND POLICY RECOMMENDATIONS

The external trade deficit becomes a serious problem when financed through short-term capital movements, borrowing and/or serious privatizations. A sudden outflow of short-term capital from a country can lead to the deterioration of macroeconomic indicators and, similar to external borrowing, may trigger financial crisis. Another financing method, privatizations, causes important assets belonging to the country to change hands. Both short-term capital movements, external borrowing and financing methods such as privatization can bring about significant problems. The largest part of the external trade deficit is the external trade deficit.

The situation in which the external trade deficit, fiscal deficit and savings gap occur together is called the Triple Deficit Hypothesis in economics literature, while the situation in which only the

external trade deficit and fiscal deficit occur together is called the Twin Deficit Hypothesis. When the 25-year period covering the years 2000-2024 in EU countries is analyzed with spatial econometric methods, findings indicating the existence of a positive relationship between the external trade balance and the fiscal balance and savings balance have been identified. When the findings of the SAR-FE model are examined, it is determined that a 10% increase in the fiscal deficit increases the foreign trade deficit by 0.63%, and a 10% increase in the savings gap increases the foreign trade deficit by 8.65%. The spatial effect calculated in this model is 0.096 and is statistically significant. According to the findings of the SAR-FE (Spatial and Time Effect) model, a 10% increase in the fiscal deficit increases the foreign trade deficit by 0.79%, and a 10% increase in the savings gap increases the foreign trade deficit by 10.91%. The spatial effect calculated in this model is 0.072 and is statistically significant. Similarly, in the SAR-FE model for the analysis conducted excluding Cyprus, it is determined that a 10% increase in the fiscal deficit increases the foreign trade deficit by 0.65%, and a 10% increase in the savings gap increases the foreign trade deficit by 8.77%. The spatial effect of this model is 0.112 and is statistically significant. In the SAR-FE (Spatial and Time Effect) model, which was analyzed excluding Cyprus, it was determined that a 10% increase in the fiscal deficit increased the foreign trade deficit by 0.92%, while a 10% increase in the savings gap increased the foreign trade deficit by 9.71%. The spatial effect of this model is 0.104 and is statistically significant. In the models excluding Cyprus, the coefficients for both the fiscal and savings balances, as well as the spatial effects, are more pronounced. This is likely because Cyprus does not share a land border with other EU countries and is relatively geographically isolated. This positive relationship suggests that the three balances move in the same direction simultaneously. The results provide support for the Twin Deficit Hypothesis, consistent with the findings of Salvatore (2006), Holmes (2011), Theofilakou and Stournaras (2012), Trachanas and Katrakilidis (2013), Xie and Chen (2014), Ahmad et al. (2015), Aydın and Afsal (2018), Sayar and Bayar (2019), and Ahmed and Akin (2019). They also support the Triple Deficit Hypothesis, as evidenced by Tülümce (2013), Bolat et al. (2014), Tang (2014), Karanfil and Kılıç (2015), İpek and Kızılgöz (2016), Samuel (2017), Shastri et al. (2017), Altunöz (2018), Kızılkaya and Öztutuş (2018), Saraç (2019), Ejder and Çaşkurlu (2020), Magoti et al. (2020), Tülümce and Saykal (2021), and Mehrara et al. (2022). Moreover, the results indicate that the savings deficit has a greater impact on the external trade deficit than the fiscal deficit. This is an important finding that shows that the savings gap is a more structural problem than the fiscal deficit and that the possible causal relationship between the fiscal deficit and the external trade deficit is weakened in EU countries where the weight of the state in economic life is relatively less (Akpınar and Çelik, 2025). These findings reveal that priority should be given to closing the saving deficit in closing the external trade deficit. Various policy recommendations are offered for both the fiscal deficit and the savings gap.

As a measure to increase revenue and reduce the fiscal deficit, the first step could be to raise taxes on digital service providers. In this regard, the EU could develop a common digital taxation policy. Secondly, various environmental measures could be implemented, including increasing taxes on carbon emissions, plastic usage, and other environmentally harmful activities. This can both increase budget revenues and contribute to sustainable development. Thirdly, economic growth and tax revenues can be increased thanks to reforms that will increase labor productivity (flexible working hours, education investments). To reduce expenditures and mitigate the fiscal deficit, EU countries could promote private retirement systems to ease the growing social security burden associated with an aging population.

Firstly, promoting savings through tax incentives can be considered as a measure to close the savings gap. Tax exemptions or discounts can be provided for individual retirement accounts, long-term deposits and contributions to investment funds to encourage increased savings. Secondly, tax incentives and subsidies could be offered to businesses in EU countries that invest in developing nations, encouraging them to reinvest their profits domestically. Finally, the channeling of domestic resources such as national investment funds and retirement funds to capital markets can be encouraged.

Moreover, spatial effects should be taken into account, and it should not be overlooked that geographical proximity may trigger external trade deficits. In order to close fiscal deficits without hampering growth, common fiscal discipline criteria could be established among EU countries – criteria that emphasize not only reducing public deficits but also improving the quality of public investment. If effectively monitored through a robust system, such a joint fiscal discipline could help foresee potential problems in advance and prevent fiscal deficits from leading to broader macroeconomic imbalances.

Considering spatial effects is particularly critical in relation to the savings gap, which has a stronger impact on external trade deficits. Establishing regional supply chains and joint industrial clusters in border regions between EU countries with savings deficits and those with savings surpluses—especially when these countries share land borders—could make a significant contribution to narrowing both savings and trade deficits. Such a policy could facilitate the conversion of idle savings into productive investments and reduce the reliance of savings-deficit countries on external capital inflows through joint investment initiatives. Furthermore, by increasing productivity, it could collectively reduce external trade deficits.

Another cooperative step toward reducing the savings gap could be the harmonization of mandatory individual pension systems across EU member states. This would not only enhance financial integration but also align the savings behavior of EU countries sharing a common currency (Euro). In turn, this could ease the financial integration of Balkan countries – where the savings gap is particularly prevalent – into the broader EU economic structure.

Finally, some limitations of this study are emphasized. First, the spatial effect is tested only with border neighborhoods. In future studies, the spatial effect can be expanded with the level of trade relations and financial neighborhoods. Secondly, a sample comprising developing and underdeveloped countries could be selected to more clearly reveal the triple deficit relationship. Since EU countries are predominantly developed, the impact of the fiscal balance is relatively limited. The effect has mainly shown itself in the savings balance. The reason for this can be considered as the shift of savings from developed EU countries to developing countries.

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