

Trade, Exports and Local Development In Turkey's Border Cities: A Panel Data Approach

Türkiye'nin Sınır Şehirlerinde Ticaret, İhracat ve Yerel Kalkınma: Bir Panel Veri Yaklaşımı

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ABSTRACT

This study investigates the bidirectional relationship between trade, exports, and local development in 14 border cities of Turkey from 2004 to 2021, utilizing variables such as patent and trademark registrations, population, government expenditures and time dummy variables by using panel data analysis. The findings reveal that border trade and exports, along with GDP per capita, do not have statistically significant effects on each other. However, a positive relationship is found between total trade, exports, and GDP per capita, indicating the importance of expanding trade beyond neighboring countries. Population growth negatively impacts GDP per capita and total exports, but positively affects total trade. The study suggests that border provinces need strategies to manage population growth, improve workforce quality, and promote value-added production. Central government expenditures positively influence all variables except for total trade, indicating the importance of state investments in local economic development. Furthermore, the increase in brand registrations positively impacts exports and GDP per capita, while patents contribute to total exports. The study highlights the need for a more comprehensive approach to trade, encouraging diversification and reassessment of heterodox economy policies for sustainable growth.

KEYWORDS

Export, Development, Patent and Brand Registration, Government Spending, Population Growth

ÖZ

Bu çalışma, 2004-2021 yılları arasında Türkiye'nin 14 sınır ilinde ticaret, ihracat ve yerel kalkınma arasındaki iki yönlü ilişkiyi patent ve marka tescilleri, nüfus, kamu harcamaları ve zaman kukla değişkenleri gibi değişkenleri kullanarak panel veri analizi yöntemiyle araştırmaktadır. Bulgular, sınır ticareti ve ihracatın, kişi başına düşen GSYİH ile birlikte birbirleri üzerinde istatistiksel olarak anlamlı etkilerinin olmadığını ortaya koymaktadır. Ancak, toplam ticaret, ihracat ve kişi başına düşen GSYİH arasında pozitif bir ilişki bulunmuştur ve bu da ticaretin komşu ülkelerin ötesine genişletilmesinin önemini göstermektedir. Nüfus artışı, kişi başına düşen GSYİH ve toplam ihracatı olumsuz etkilerken, toplam ticareti olumlu etkilemektedir. Çalışmada, sınır illerinin nüfus artışının yönetilmesi, işgücü kalitesinin iyileştirilmesi ve katma değerli üretimin teşvik edilmesine yönelik stratejilere ihtiyaç duyulduğu belirtilmektedir. Merkezi hükümet harcamaları, toplam ticaret hariç tüm değişkenleri olumlu etkilemektedir ve bu da yerel ekonomik kalkınmaya yapılan devlet yatırımlarının önemini göstermektedir. Ayrıca, marka tescillerindeki artış, ihracatı ve kişi başına düşen GSYİH'yi olumlu etkilerken, patent tescilleri toplam ihracata katkıda bulunmaktadır. Çalışmada, sürdürülebilir kalkınma için ticarete yönelik daha kapsamlı bir yaklaşımın geliştirilmesi, ticarette çeşitlendirmenin teşvik edilmesi ve heterodoks ekonomi politikalarının yeniden değerlendirilmesinin gerekliliği vurgulanmaktadır.

ANAHTAR KELİMELELER

İhracat, Kalkınma, Patent ve Marka Tescili, Kamu Harcamaları, Nüfus Artışı

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INTRODUCTION

Border trade is a complex process that has profound effects on the economic, social and cultural structures of cities located on the border of a country. Border trade has become an important component of global trade policies and regional integration processes, both because it has the potential to accelerate economic development and because it develops inter-regional trade relations. Türkiye is an important trade center due to its geographical location. These cities have strategic importance in terms of both trade relations with neighboring countries and regional development policies. However, research on Türkiye's border trade has been limited and has been evaluated more specifically for certain cities.

Border trade plays a crucial role in the global economy, often serving as a mechanism to enhance regional cooperation, reduce trade barriers, and stimulate economic growth in border regions (Perkmann & Sum, 2002). Türkiye, positioned at the crossroads of Europe, Asia, and the Middle East, is uniquely poised to benefit from border trade. The liberalization of trade and regional integration processes, such as the European Union's customs union and the North American Free Trade Agreement (NAFTA), have demonstrated the potential for border trade to accelerate economic development (Lévy, 1994). However, despite these advantages, border trade is also influenced by political tensions, trade disputes, and regulatory barriers, which complicate its dynamics (Smith, 2000).

Border regions, particularly in developing economies, may face unique challenges, especially following trade liberalization, as it can increase inequalities. (Brühlhart, 2011). This can restrict their ability to fully capitalize on cross-border trade opportunities. On the other hand, border trade presents opportunities for economic diversification, employment generation, and regional integration, particularly when trade is well-managed and supported (Tanyanyiwa & Hakuna, 2014).

This study aims to examine the trade and export structures of Türkiye's provinces with land borders during the 2004-2021 period, filling an important gap in the literature by providing a comprehensive analysis of these regions. Unlike previous studies that focused on specific cities, this research covers all border provinces, assessing their contributions to regional development and situating Türkiye's border trade within the context of global trade dynamics. The relationship between total and border trade, exports, and GDP per capita is analyzed bidirectionally using 16 regressions. Additionally, the effects of patent and trademark registrations, central government expenditures, and population growth on per capita GDP, total trade, border trade, and exports are examined. This study offers valuable insights for policymakers and companies to shape their strategies, contributing to the literature on trade and regional development while offering broader applications for regions facing similar challenges.

1. LITERATURE REVIEW

Türkiye's border trade plays an important role in the economic development of the Eastern and Southeastern Anatolia regions in particular. In this context, Güneş et al. (2010) examined the factors that hinder border trade in the Eastern and Southeastern Anatolia regions. The study determined that border trade faces problems such as inadequate infrastructure, frequent changes in legislation, and limited product diversity. The authors developed recommendations based on interviews with local chambers of commerce and companies engaged in border trade.

Öztürk (2006) analyzed trade with Iran from 1979 to 2006 in the study on the development of Türkiye's border trade, the problems encountered, and solution suggestions. The study emphasized that restrictions on petroleum products negatively affected trade and the resumption of oil imports could be beneficial. The study is based on surveys and interviews conducted with companies engaged in border trade.

Sayım and Zengin (2012) examined the applicability of foreign trade financing and delivery methods in terms of legislation in Türkiye's border trade. The study found that financing and delivery methods are obstacles in terms of legislation in border trade, but there are capacity problems in the implementation processes. In interviews conducted with various banks in Kilis and the Turkish Statistical Institute, the usability of different financial methods in border trade was analyzed. Data were collected through semi-structured interviews in 2012.

Ertürk et al. (2013) examined the potential of border trade to eliminate economic imbalances between regions in Türkiye. The study comprehensively examined the development of border trade since 1978 and the incentives implemented by the state. The authors stated that border trade made a great contribution to regional

development, but the constantly changing legislation negatively affected trade relations. The study is based on a literature review analyzing developments in customs and border gates.

Yulu (2014) examined the socio-economic effects of the Dilucu Border Gate on Iğdır. This study addressed the economic and social changes in the region after the opening of the Dilucu Border Gate in 1992. The author emphasized that the local people made significant profits from border trade, but the new regulations made between Türkiye and Nakhchivan limited the trade volume. Data were collected from institutions such as the Turkish Statistical Institute and the Iğdır Chamber of Commerce.

Aras (2014) addressed the studies on borders and border regions in Türkiye in terms of political, economic and security dimensions and stated that anthropological research was needed on these issues. These studies, which started in the 2000s in particular, cover the history of border determination processes of the Türkiye and the economic, administrative and security effects of these determined borders. This study emphasized the deficiencies in the existing literature and the need for a more comprehensive examination of this area.

Deniz and Batu Ağırkaya (2015) examined the effects of border trade on local firms in Iğdır. They emphasized that border trade, which started in 1978-1979, provided employment in this region in particular and had positive effects on the socio-economic structure. The study was conducted through surveys conducted with 70 companies engaged in border trade in 2015. The results show that border trade supports economic activities in the region, but customs gates need to be modernized and commercial processes need to be accelerated.

Özçelik et al. (2015) examined the economic effects of trade through the Sarp border gate on Artvin. It was determined that border trade decreased with the restrictions on petroleum products after 2001, but commercial activities in the region developed an entrepreneurial spirit. The data were analyzed through surveys conducted with 230 tradesmen.

Ulusoy and Turan (2016) examined the role of Gaziantep in border trade and the city's contributions to economic development. The study analyzed Gaziantep's trade relations with Middle Eastern countries as of 2016 and revealed that regional instabilities such as war negatively affected the trade volume. The data were collected from local chambers of commerce and various trade organizations.

Beceren and Koç (2016) examined the effects of the closure of the Habur border gate on economic activities in Şırnak and its surroundings. It was determined that the closure, which lasted 25 days, had a negative impact especially on truck drivers and commercial activities. The study was based on surveys conducted with local producers and data obtained from regional chambers of commerce.

Özcan and Taş (2017) investigated the effects of border trade on regional entrepreneurship and examined commercial activities targeting customers from Bulgaria and Greece. The study includes analysis of surveys conducted with 100 tradesmen in 2017, and it was determined that trade did not create a positive effect at the expected level and that tradesmen could not maintain their commercial relations in the long term.

Foreign literature on border trade has focused on regional integration, economic growth and the development of border cities.

Hanson (1996) examined the effects of US-Mexico economic integration on US-Mexico border cities. The study assessed economic integration in six large city pairs on the US-Mexico border during the period 1975-1989. The data showed a relationship between the growth of export assembly facilities (maquiladoras) on the US-Mexico border and the increase in production and employment in US border cities. The author argued that these findings would contribute to the formation of bilateral regional production centers in NAFTA border cities.

Manzanares and Phillips (2001) analyzed the increasing need for infrastructure in border regions due to the increasing trade with Mexico and the difficulties this situation brought to border cities. The study offered suggestions for solving the increasing trucking and pressure on border infrastructure between the US and Mexico after NAFTA. In particular, the job opportunities brought by the growth in the border transportation sector were emphasized. The study suggested that steps were needed to increase the efficiency of the current system in border transportation.

Nugent (2012) emphasized the importance of border towns and cities in his study, stating that border regions symbolize differences between states and that these regions function especially as social laboratories. The author stated that cities constitute important areas of research in terms of regional integration efforts, smuggling, human trafficking, and border security. The study addressed the increasing research in recent years in border regions in Asia and Africa and suggested that border cities will be examined more in the future.

Cañas et al. (2013) examined the impact of the maquiladora industry on US-Mexico border cities during the period 1990-2006. The study analyzed the impact of maquiladora production growth on employment in US border cities and found that US border cities became less sensitive to maquiladora growth after 2001 with the increase in border security. Using data from the period 1990-2006, it was concluded that this effect was more pronounced in the service sectors of the US.

Ge et al. (2014) examined China's border trade with neighboring countries and the factors affecting this trade. The study used detailed trade data on a firm-product basis for the period 2000-2014. It was found that trade liberalization encouraged new firms to enter the export market and enabled the transition to more sophisticated products in border regions. The authors used the gravity model to analyze the factors affecting border trade in this process and found that regional integration, market size, and institutional quality played important roles. Ge et al. (2014) stated that border trade not only promotes trade growth but also strengthens regional integration, and that market size and institutional quality are decisive factors in border trade. It is stated that border cities also serve as the field of implementation of states' international border policies, and that these cities are of strategic importance in terms of regional development.

Gerstein et al. (2018) emphasized in their study that border management and economic integration contribute to regional development, and that local economies are strengthened by the efficient management of trade flows. Carter and Poast (2020) state that border barriers will reduce official trade and increase illegal trade. Wang and Garduno-Rivera (2021) state that the literature approaches border issues from social and political perspectives and address the trade of the country as a whole, but do not focus on the issue of intra-country distribution.

In the literature review, it is seen that studies on border trade in Turkey are generally conducted in specific cities and there is no comprehensive and holistic examination. It is also understood that studies conducted specifically for Turkey consist of surveys and interviews measuring citizen and company perceptions. This article aims to reveal the general dynamics of border trade in 14 provinces with land borders in Turkey and its relationship with regional development.

2. DATA, METHODOLOGY AND THEORETICAL BACKGROUND

2.1. Data

The data used in the study covers the period 2004-2021. The study period begins in 2004, as provincial GDP data are only available from this year onward. To ensure a balanced panel and avoid issues related to missing data, the analysis is limited to 2021, the latest year for which all required data are available. Explanations regarding the data are summarized in Table 1.

Table 1: Variable Descriptions

Variable Name	Description	Source
lnbtrade	Total trade of the border city with the country(ies) specified in Table 2 (USD). The natural logarithm of the data was taken.	Turkstat (2023)
lnbexp	Exports of the border city to the country(ies) specified in Table 2 (USD). The natural logarithm of the data was taken.	Turkstat (2023)
lntrade	Total trade of the border city with abroad (USD). Natural logarithm of the data is taken.	Turkstat (2023)
lnexp	Total exports of the border city abroad. (USD) The natural logarithm of the data was taken.	Turkstat (2023)
gdppc	GDP per capita in border city (USD).	Turkstat (2023)

lnpop	Total population of the border city. The natural logarithm of the data is taken.	Turkstat (2023)
lngspend	Total central government expenditure (USD) in the border city. Central government spending data was denominated in Turkish lira and, the data converted to USD. The logarithm of the data was calculated and utilized in the analysis.	Republic of Türkiye Ministry of Treasury and Finance (2023)
patent	Number of patents registered in the border city.	Turkstat (2023)
brand	Number of trademarks registered in the border city.	Turkstat (2023)
d_eu_crisis	Dummy variable used to represent the EU Sovereign Debt crisis, which particularly affected Türkiye in 2008-2009.	-
d_hxpolicy	A dummy variable was used for the years 2018-2021 to represent the heterodox economic policies implemented by Türkiye.	-
d_syria	Dummy variable representing the years 2011-2017, when the refugee flow to Türkiye after the Syrian civil war was at its peak.	-

The border city and trade partner pairings used in the study are shown in Table 2. Although Kars has a border with Armenia, its customs gate is not active, therefore it is excluded from the analysis. Kırklareli has a border with Bulgaria, it does not have a border with Greece, but since it is one of the two provinces on the western border of Türkiye, together with Edirne, its trade with both countries was taken into account. Since Edirne and Kırklareli are neighboring provinces, such a method was followed to take into account the clusters that may occur between these provinces. In this respect, the pairings in Table 2 were used when calculating *lnbtrade* and *lnbexp* data.

Table 2: Border cities and their border trade partner countries

Border City	Trade Partner	Border City	Trade Partner
Edirne	Greece	Şırnak	Iraq
Edirne	Bulgaria	Şırnak	Syria
Artvin	Georgia	Mardin	Syria
Ardahan	Georgia	Şanlıurfa	Syria
Iğdır	Azerbaijan (Nakhchivan)	Gaziantep	Syria
Iğdır	Iran	Kilis	Syria
Ağrı	Iran	Hatay	Syria
Van	Iran	Kırklareli	Bulgaria
Hakkari	Iran	Kırklareli	Greece
Hakkari	Iraq		

2.2 Hypotheses and Theoretical Background

H1: The province's total trade and exports, along with its trade and exports with neighboring border neighbor(s), will contribute to economic development.

H2: Economic development will boost the province's total trade and exports as well as its trade and exports with neighboring regions.

The relationship between trade, exports, and economic development has been widely discussed in both theoretical and empirical literature. While classical economic theories emphasize the positive impact of trade on growth, critical perspectives highlight potential dependency risks for less developed regions. Empirical studies provide mixed evidence, demonstrating both bidirectional causality and context-specific effects. Based on these perspectives, the study formulates the first two hypotheses to examine the dynamics of trade, exports, and economic development at the provincial level.

Discussions on whether trade and export affect growth and development positively or negatively are quite old. While classical economists Smith (1776), Ricardo (1817), and Mill (1848) argue that foreign trade plays an important and indispensable role in growth and development, critical economists such as Prebisch

(1950), Singer (1975), Nurkse (1953), and Myrdal (1957 & 1968) state that this will lead to a situation that will create dependency and disadvantage for underdeveloped countries.

Studies examining macro variables with econometric analysis methods have also added a separate dimension to theoretical discussions. Bakari and Krit (2017) found that exports increase GDP while imports decrease it. On the other hand, it has been concluded that GDP growth increases imports. Aktaş (2009) has concluded that there is a two-way causality relationship between imports, exports and economic growth in the short term in Türkiye. He has revealed that growth triggers exports and imports in the long term. Aktaş and Öztürk (2016) have similarly concluded that GDP growth triggers exports and imports in Türkiye. On the other hand, in the same study, it has been stated that exports and imports increase income, and income growth triggers exports and imports. In other words, imports, exports and GDP form a cycle that triggers each other.

However, since this study examines the trade and development relationship of border cities, it is difficult to determine how the theories for countries will be valid at the local level. In the study, it is expected that trade and export will have a positive effect on economic development due to reasons such as making resource allocation efficient based on comparative advantages, developing and transferring knowledge and technology, benefiting from economies of scale with increased production, and creating new employment opportunities.

In many studies in different fields such as Ram (1988), Terjesen and Amorós (2010), Elgin and Oztunali (2014), Charfeddine and Mrabet (2017), Islam et al. (2017), Mansi et al. (2020), GDP per capita has been used as a proxy variable for economic development. Economic development is expected to positively affect trade and exports due to reasons such as the increase in the logistics capacity of the region, the increase in production capacity and diversity, the development of administrative and production processes based on technology and innovation, the increase in research and development, and the increase in domestic investments.

H3: Population growth will increase economic development, the province's total trade and exports, as well as its trade and exports with bordering countries.

Population growth is often linked to economic activity, influencing both production and consumption patterns. An increasing population can expand the labor force and domestic demand, fostering trade and economic development. However, the impact of population growth is not always straightforward, as labor market dynamics and employment conditions also play a role. The third hypothesis is based on these theoretical and empirical insights.

Population growth can lead to an increase in labor force and therefore production capacity. In addition, the needs of the increasing population can also cause an increase in additional demand. Additional production and consumption increase both GDP and trade. However, the increase in labor supply due to population growth may not translate into employment at the same rate and may lead to an increase in unemployment. In this case, GDP per capita will decrease in particular. Indeed, Degu (2019) concluded that there is a negative relationship between population growth and GDP.

Studies on Türkiye show that there is a positive relationship between population and economic growth. Güneş (2005) states that the effect of population on growth is short-term and that economic growth increases the population in the long term. Telatar and Terzi (2010) have concluded that the increase in GDP per capita causes a decrease in population, while the number of vocational high school graduates increases GDP per capita. Polat (2018) found that population causes economic growth.

H4: An increase in central government spending will boost economic development, along with the province's total trade and exports, and its trade and exports with neighboring countries.

Government expenditures have long been considered a significant determinant of economic growth and trade performance. While infrastructure, education, and health investments can stimulate development and trade, excessive public spending may crowd out private investment. The fourth hypothesis aims to assess these potential effects in the context of border provinces.

There are various results and discussions on the different effects of government spending on GDP and trade. When empirical studies are examined, it is seen that Hays et al. (2005) concluded that there is a positive relationship between government spending and trade. Müller (2008) found that government spending increases net exports. Dimoso (2024) also states that government spending leads to growth in GDP per capita. Adıgüzel (2014) states that public spending in Türkiye increases the foreign trade deficit. Türker (2020), on the other hand, unlike the literature, concluded that the increase in government spending reduces exports and imports.

Government spending increases direct consumption and investments by providing public services such as infrastructure, health, and education. This causes an increase in GDP. Infrastructure investments positively affect private firms in sectors such as construction, transportation and energy. Education and health expenditures can play a role in increasing exports and GDP as they contribute to the increase in the quality and productivity of the workforce. On the other hand, high levels of public expenditures can lead to the shrinkage of the private sector due to the crowding-out effect, which negatively affects GDP and exports. In this study it is expected that government expenditures will positively affect trade, exports and economic development of border provinces.

H5: The increase in patent registrations will promote economic development, along with the province's total trade and exports, and its trade and exports with bordering countries.

H6: The increase in brand registrations will enhance economic development, alongside the province's total trade and exports, and its trade and exports with bordering countries.

Intellectual property rights, including patents and brand registrations, are crucial for innovation-driven growth. While successful patents and brands can enhance trade competitiveness and economic development, not all registered patents or brands necessarily translate into economic benefits. The last two hypotheses explore these relationships at the provincial level.

Patent and brand registration can be expected to increase domestic and foreign trade by increasing product diversity. On the other hand, it cannot be expected that every patent received or every brand created will be successful. For this reason, it cannot be said that the number of brand and patent registrations can definitely positively or negatively affect the economic development, trade or exports of a region. However, if patent and brand rights are valuable, they provide additional income to the relevant companies and therefore to the economy.

Ivus (2010) concluded that patent rights increase the value of high-tech export products. Petrie et al. (2019) concluded that brand registration increases exports. Buchinskaia and Stremousova (2021) concluded that patent and trademark registrations provide high-tech exports and, together with the increase in exports, an increase in GDP.

Durmuşkaya and Ersoy (2016) concluded that trademark and patent applications have a mutually positive effect on exports. Yıldırım (2016) found that an increase in patent applications increases exports. Cura and Selek (2022) revealed in their study on Konya province that brand awareness increases the export performance of firms.

H7: The EU debt crisis will positively impact economic development, as well as the province's total trade and exports, and its trade and exports with neighboring countries.

The sub-prime mortgage crisis that began in the United States in 2007 manifested as a debt crisis in Europe during 2008-2009. Given that the European Union, Türkiye's largest trading partner, was heavily affected, it is natural for the macroeconomic effects of this crisis to be felt. Therefore, a dummy variable for the EU debt crisis, covering the years 2008 and 2009, was created to account for this period.

There are not many studies examining the effects of the EU debt crisis on Türkiye. Ayık and Özer (2022) concluded that the EU debt crisis increased Türkiye's exports to the EU. Özkardeş (2016) revealed that the EU debt crisis directed Turkish exporting companies from the shrinking European market to different world markets.

When the data is examined, it is seen that Türkiye's total and per capita GDP decreased in 2009 due to the crisis, but reached the same level in the following year (Worldbank, 2024). Therefore, it can be inferred that the crisis affected Türkiye for a shorter time and relatively less than other countries. However, there is no study on how the effects of this crisis affected the provinces of Türkiye. For this reason, this effect is expected to be positive with the deductive assumption.

H8: Irregular migration from Syria and other countries will increase economic development, as well as the province's total trade and exports, and its trade with bordering countries.

A significant irregular migration influx has occurred to Türkiye with the Syrian civil war that began in 2011. Although data on irregular migration influx is published, it is estimated that there are more unregistered

refugees and/or immigrants. For this reason, the period 2011-2017, when migration from Syria was most intense, was used as a dummy variable.

An increase in GDP is expected due to additional production and informal employment that emerge to meet the increased demand resulting from the population growth driven by the migration influx. The provinces most affected by irregular migration, particularly those along the Syrian border or near it, are included in the research. Consequently, GDP in these provinces is likely to rise. However, irregular migrants are not included in the total population when calculating GDP per capita. Therefore, GDP per capita in the provinces studied is expected to increase during this period. Additionally, irregular migration from Syria is anticipated to boost border trade, particularly with Syria, thereby increasing total trade.

H9: Heterodox economic policies will reduce economic development but increase the province's total trade and exports, along with its trade and exports with neighboring countries.

It is anticipated that the heterodox economic policies that Türkiye has been pursuing since 2018, based on low indicator interest rates and the weakness of the Turkish Lira, will increase exports and trade. The combination of cheap, easily accessible loans and exchange rate policies lowering the real value of labor is expected to enhance Türkiye's competitiveness and increase exports in the short term. However, GDP per capita is likely to remain low due to the impact of these policies on maintaining high exchange rates.

2.3 Methodology

2.3.1 Econometric Models

In order to examine the relationships between trade, exports and GDP per capita, 32 equations were examined with panel data analysis and the most efficient 16 of them are utilized.

The econometric models created in this framework can be shown as follows according to the dependent variables:

$$\text{Model 1-2 : } gdppc_{it} = \beta_0 + \beta_1 lnbtrade_{it} + C + \epsilon_{it} \quad (1)$$

$$\text{Model 3-4 : } lnbtrade_{it} = \beta_0 + \beta_1 gdppc_{it} + C + \epsilon_{it} \quad (2)$$

$$\text{Model 5-6 : } gdppc_{it} = \beta_0 + \beta_1 lnbexp_{it} + C + \epsilon_{it} \quad (3)$$

$$\text{Model 7-8 : } lnbexp_{it} = \beta_0 + \beta_1 gdppc_{it} + C + \epsilon_{it} \quad (4)$$

$$\text{Model 9-10 : } gdppc_{it} = \beta_0 + \beta_1 lntrade_{it} + C + \epsilon_{it} \quad (5)$$

$$\text{Model 11-12: } lntrade_{it} = \beta_0 + \beta_1 gdppc_{it} + C + \epsilon_{it} \quad (6)$$

$$\text{Model 13-14: } gdppc_{it} = \beta_0 + \beta_1 lnexp_{it} + C + \epsilon_{it} \quad (7)$$

$$\text{Model 15-16: } lnexp_{it} = \beta_0 + \beta_1 gdppc_{it} + C + \epsilon_{it} \quad (8)$$

$$C = \beta_2 lnpop_{it} + \beta_3 lngspend_{it} + (\beta_4 brand_{it} | \beta_4 patent_{it}) + \beta_5 d_{eu_crisis_{it}} + \beta_6 d_{hxpolicy_{it}} + \beta_7 d_{syria_{it}} \quad (9)$$

The reason for the number of equations examined being 16 instead of 8 is that a high correlation (0.8676) was observed between the patent and brand variables as a result of the examination of the correlation coefficients given in Table 3. Although the Stata software utilized in the econometric analysis automatically omits variables with high correlations from the calculations, these variables were not used in the same models to ensure the accuracy of the results. If the correlation coefficients are between 0 and +/- 0.3, it is a weak relationship, if they are between +/- 0.3 and +/- 0.7, it is a medium relationship, and if they are above/below +/- 0.7, it can be an indicator of a strong relationship (Ratner, 2009, p.139-140). In order to avoid the multicollinearity problem, the trademark and patent registration numbers with very high correlation coefficients were not used at the same time and were examined in different equations.

Table 3: Correlation Coefficients

Variables	gdppc	lnbtrade	lnbexp	lntrade	lnexp	lnpop	lngspend	patent	brand
gdppc	1.0000								
lnbtrade	0.1102	1.0000							
lnbexp	-0.0033	0.9623	1.0000						
lntrade	0.1697	0.7067	0.6953	1.0000					
lnexp	0.1521	0.7826	0.7851	0.9208	1.0000				
lnpop	-0.2053	0.3573	0.3483	0.6157	0.5832	1.0000			
lngspend	-0.1138	0.4736	0.4744	0.6411	0.5711	0.6448	1.0000		
patent	0.1960	0.2279	0.2268	0.4438	0.3542	0.3687	0.3366	1.0000	
brand	0.1491	0.2824	0.3027	0.5876	0.4685	0.5271	0.4415	0.8676	1.0000

Source: Author's calculations.

The Correlation Coefficients table in Table 3 shows that the correlation between border trade, border exports, total trade, and total exports exceeds 0.70. This can be attributed to the fact that total trade includes total exports, border trade includes border exports, and border exports are a subset of border trade. To address potential multicollinearity and suppressor variable issues, the models were designed so that these variables were examined separately as dependent variables rather than being included together in the same model.

Table 4: Variance Inflation Factor Analysis Results

Models / Variables	lnbtrade	lnbexp	lntrade	lnexp	gdppc	lnpop	lngspend	brand	patent	d_eu_crisi s	d_hxpolic y	d_syria
(1) gdppc	1.35	-	-	-	-	7.33	8.27	1.56	-	1.28	2.88	2.38
(2) gdppc	1.34	-	-	-	-	6.68	8.13	-	1.34	1.28	2.95	2.33
(3) lnbtrade	-	-	-	-	1.29	7.27	7.46	1.65	-	1.3	2.88	2.57
(4) lnbtrade	-	-	-	-	1.3	6.62	7.36	-	1.43	1.3	2.94	2.54
(5) gdppc	-	1.39	-	-	-	7.45	8.47	1.59	-	1.28	2.9	2.38
(6) gdppc	-	1.36	-	-	-	6.74	8.27	-	1.34	1.28	2.96	2.33
(7) lnbexp	-	-	-	-	1.29	7.27	7.46	1.65	-	1.3	2.88	2.57
(8) lnbexp	-	-	-	-	1.3	6.62	7.36	-	1.43	1.3	2.94	2.54
(9) gdppc	-	-	2.42	-	-	7.75	7.46	1.72	-	1.29	2.85	2.41
(10) gdppc	-	-	2.3	-	-	7.42	7.36	-	1.41	1.29	2.93	2.38
(11) lntrade	-	-	-	-	1.29	7.27	7.46	1.65	-	1.3	2.88	2.57
(12) lntrade	-	-	-	-	1.3	6.62	7.36	-	1.43	1.3	2.94	2.54
(13) gdppc	-	-	-	1.7	-	7.26	7.54	1.6	-	1.3	2.85	2.4
(14) gdppc	-	-	-	1.66	-	6.75	7.42	-	1.35	1.3	2.93	2.36
(15) lnexp	-	-	-	-	1.29	7.27	7.46	1.65	-	1.3	2.88	2.57
(16) lnexp	-	-	-	-	1.3	6.62	7.36	-	1.43	1.3	2.94	2.54

Source: Author's calculations.

To further ensure model stability, variance inflation factors (VIF) were also analyzed alongside the variable coefficients. The results, evaluated at both the model and variable levels, indicate that the VIF values remain below 10, confirming that there are no strong inter-variable relationships that could distort the analysis. O'brien (2007) stated that the VIF is used as a generally accepted method to examine the correlation between variables. Author also stated that it is widely accepted that a VIF result between two variables of 10 and above will create a strong multicollinearity. The VIF results for the variables used in this study are presented in Table 4, demonstrating that none of the models contain variables with VIF values exceeding this threshold.

2.3.2 Hausman Test and Efficient Estimator Selection

Random effects and fixed effects are among the most common estimators used in panel data analysis. Panel data analysis includes observations over different times and units. Random and fixed effects estimators are used to model relationships in panel data. However, the assumptions and applications of these estimators are different.

In the fixed effects model, it is assumed that each unit has a fixed effect. In the model, the unobserved, unique individual characteristics of the units are fixed and do not change over time. With this approach,

individual differences are assumed to be fixed over time, thus controlling the effects of unobserved variables. In the random effects model, it is assumed that individual differences are not fixed and are randomly distributed for each unit. In other words, the unobserved effects of each unit are not fixed, but are assumed to be randomly distributed. With this method, it is suggested that individual effects are random and can be added to the model as an error term.

Hausman (1978) test is a widely used specification test that helps determine whether to choose between fixed effects and random effects estimators. It is commonly adopted in studies utilizing panel data. It examines the differences in estimators between the two models and tests whether the random effects model is valid. If the unobserved individual effects are unrelated to the explanatory variables, the random effects estimator will be more efficient. However, if it is determined that the individual effects are related to the explanatory variables, the fixed effects model should be preferred. In this context, the null-hypothesis of the Hausman test shows that the random effects and the alternative hypothesis show that the fixed effects estimator are more efficient.

Table 5: Hausman Test Results

Model No	Hausman Test Result (p-Value)	Estimator	Model No	Hausman Test Result (p-Value)	Estimator
(1)	0.0027	Fixed Effects (FE)	(9)	0.8190	Random Effects (RE)
(2)	0.3401	Random Effects (RE)	(10)	0.9384	Random Effects (RE)
(3)	0.4698	Random Effects (RE)	(11)	0.6226	Random Effects (RE)
(4)	0.7733	Random Effects (RE)	(12)	0.7878	Random Effects (RE)
(5)	0.2341	Random Effects (RE)	(13)	0.7420	Random Effects (RE)
(6)	0.5906	Random Effects (RE)	(14)	0.7364	Random Effects (RE)
(7)	0.5317	Random Effects (RE)	(15)	0.0001	Fixed Effects (FE)
(8)	0.8120	Random Effects (RE)	(16)	0.0003	Fixed Effects (FE)

Source: Author's calculations.

In this context, the Hausman test was applied to the 32 equations created and the most efficient 16 estimators were determined and the results were interpreted. The test results given in Table 5 show that the fixed effects estimator is the most efficient for equations (1), (15) and (16), and the random effects estimator for the others.

While examining the relationship between local development, foreign trade and export, population, central government expenditures, trademark and patent registration numbers were used as control variables. In order to control the time dimension, the EU debt crisis covering the years 2008-2009, the period of 2011-2017 when migration from Syria was at its most intense, and the heterodox economic policies implemented by Türkiye in the years 2018-2021 were used as dummy variables.

3. RESULTS AND DISCUSSION

In order to better examine the effects of trade between Türkiye's 14 border cities, the total foreign trade and exports of the cities with all countries and their border neighbors were used as dependent variables. In addition, the effects of both types of trades and exports on the GDP per capita of the cities were also examined. In this context, the GDP per capita of the cities was used as a dependent proxy variable to examine local development. These dependent variables analyzed with trademark and patent registration, government spending, population, time dummy variables.

The results of these regressions are presented in Table 6 and Table 7. Models where economic development is the dependent variable and its relationships with other variables are analyzed are listed as models 1, 2, 5, and 6 in Table 6, and models 9, 10, 13, and 14 in Table 7. Additionally, models examining border trade as the dependent variable are presented in models 3 and 4, while those analyzing border exports are shown as models 7 and 8 in Table 6. The models in which total trade and export are the dependent variables are given in models 11, 12 and 15, 16, respectively, and are given in Table 7. The models where total trade is the dependent variable (models 11 and 12) and those where total exports are the dependent variable (models 15 and 16) are all presented in Table 7.

By utilizing the regression results, 9 hypotheses were examined:

H1: The province's total trade and exports, along with its trade and exports with neighboring border neighbor(s), will contribute to economic development.

H2: Economic development will boost the province's total trade and exports as well as its trade and exports with neighboring regions.

It is observed that the trade and export of cities with their border neighbors does not have a statistically significant effect on GDP per capita. On the other hand, the total foreign trade and export of these cities has a statistically significant and positive effect on GDP per capita. In other words, while border trade and export do not have a significant effect on local development, total foreign trade has a positive contribution. This finding aligns with the classical economic theories of Smith (1776), Ricardo (1817), and Mill (1848), who emphasized the importance of trade in fostering economic development. However, it also partially supports the concerns raised by Prebisch (1950) and Singer (1975) regarding dependency dynamics, as localized trade (i.e., border trade) does not exhibit the same growth-enhancing effects as broader trade relationships.

Table 6: Panel Regression Results

Variables / Models	(1) gdppc	(2) gdppc	(3) lnbtrade	(4) lnbtrade	(5) gdppc	(6) gdppc	(7) lnbexp	(8) lnbexp
lnbtrade	28.53 (44.78)	48.30 (44.89)						
lnbexp					40.87 (42.98)	48.72 (43.41)		
lntrade								
lnexp								
gdppc			9.15e-05 (8.72e-05)	0.000102 (8.63e-05)			8.04e-05 (9.02e-05)	9.38e-05 (8.94e-05)
lnpop	-4,726*** (1,119)	-2,530*** (631.4)	-0.506 (0.636)	-0.384 (0.618)	-2,946*** (670.7)	-2,527*** (634.3)	-0.750 (0.662)	-0.606 (0.647)
lngspend	2,046*** (303.0)	1,857*** (298.0)	1.234*** (0.436)	1.226*** (0.436)	1,854*** (296.2)	1,845*** (300.0)	1.504*** (0.451)	1.500*** (0.452)
brand	0.773*** (0.249)		0.000313 (0.000328)		0.617*** (0.233)		0.000508 (0.000339)	
patent		18.14 (12.37)		0.00852 (0.0176)		17.53 (12.40)		0.0210 (0.0182)
d_eu_crisis	566.2*** (174.2)	551.7*** (176.9)	0.418 (0.258)	0.414 (0.258)	551.7*** (174.6)	548.7*** (177.0)	0.480* (0.267)	0.475* (0.267)
d_hxpolicy	-514.6* (278.5)	-526.9* (281.5)	-0.148 (0.399)	-0.125 (0.402)	-541.9** (276.3)	-517.3* (281.6)	-0.336 (0.413)	-0.328 (0.416)
d_syria	919.1*** (202.2)	936.3*** (203.6)	0.111 (0.302)	0.121 (0.303)	910.3*** (201.1)	941.4*** (203.3)	0.00783 (0.312)	0.0186 (0.313)
Constant	38,693*** (13,281)	12,437* (7,210)	6.570 (6.588)	5.068 (6.323)	17,963** (7,764)	12,572* (7,235)	5.802 (6.864)	3.964 (6.641)
Observations	252	252	252	252	252	252	252	252
R-squared	0.609	0.109	0.261	0.259	0.117	0.104	0.250	0.239
Pid Number	14	14	14	14	14	14	14	14

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations.

Studies conducted on the economic effects of trade and export of certain border provinces in Türkiye generally indicate that this trade has a positive effect. However, since these studies are based on surveys, interviews, observations, various inferences and assumptions, they may only reflect perceptions. The econometric results of this study, which differ from perception-based studies, suggest that border trade may not be as impactful as previously assumed, reinforcing the importance of objective, data-driven methodologies. All econometric models in our study, which include different control variables, give similar results. In this respect, it is prominent that methods based on objective data and techniques should be used in studies to be conducted on border trade and export.

Similarly, it is observed that GDP per capita does not have a statistically significant effect on border trade and exports. However, it is understood that GDP per capita affects total trade and exports statistically significantly and positively. This supports previous findings by Bakari and Krit (2017), who identified a strong link between GDP growth and exports. The bidirectional relationship between trade and growth, as suggested

by Aktaş (2009) and Akkaş & Öztürk (2016), is also validated in this study, though with a distinction between total trade and localized trade activities.

In this case, it is evaluated that there is a two-way, positive and statistically significant relationship between GDP per capita and total trade and exports. In this case, the increase in trade of border provinces in Türkiye with all countries, not only with their land border neighbors, in today's globalizing world will contribute to the increase in the welfare of their citizens. This result aligns with the expectations of international trade theories that emphasize economies of scale, resource allocation efficiency, and technological spillovers. Similarly, this increase in welfare will further increase trade and exports and create a positive cycle.

Table 7: Panel Regression Results

Variables / Models	(9) gdppc	(10) gdppc	(11) lntrade	(12) lntrade	(13) gdppc	(14) gdppc	(15) lnexp	(16) lnexp
lnbtrade								
lnbexp								
lntrade	498.7*** (89.69)	509.2*** (90.61)						
lnexp					122.9*** (36.68)	125.7*** (37.10)		
gdppc			0.000226 *** (4.05e-05)	0.000225 *** (4.01e-05)			0.000300 *** (0.000109)	0.000318 *** (0.000107)
lnpop	-3,176*** (624.6)	-2,826*** (598.5)	1.085*** (0.421)	1.030** (0.412)	-2,691*** (651.9)	-2,321*** (621.1)	-7.936*** (1.900)	-7.408*** (1.783)
lngspend	1,567*** (278.6)	1,565*** (281.9)	0.269 (0.198)	0.278 (0.198)	1,764*** (285.3)	1,769*** (288.8)	1.123** (0.537)	1.099** (0.536)
brand	0.544** (0.219)		4.79e-05 (0.000149)		0.604*** (0.227)		0.000728* (0.000418)	
patent		13.16 (11.70)		0.00673 (0.00778)		16.75 (12.12)		0.0350* (0.0211)
d_eu_crisis	365.9** (167.7)	362.6** (169.7)	0.287** (0.113)	0.288** (0.112)	452.8*** (173.5)	451.4** (175.8)	0.865*** (0.292)	0.852*** (0.292)
d_hxpolicy	-596.6** (260.8)	-569.1** (265.4)	0.208 (0.177)	0.190 (0.178)	-609.1** (271.1)	-585.2** (276.1)	0.867* (0.463)	0.832* (0.466)
d_syria	731.2*** (192.7)	757.8*** (194.7)	0.162 (0.133)	0.161 (0.133)	827.1*** (198.9)	857.7*** (201.0)	0.571 (0.348)	0.566 (0.349)
Constant	16,168** (7,239)	11,501* (6,831)	-0.211 (4.719)	0.390 (4.590)	14,359* (7,575)	9,504 (7,116)	104.0*** (22.10)	97.41*** (20.61)
Observations	252	252	252	252	252	252	252	252
R-squared	0.249	0.245	0.616	0.614	0.159	0.142	0.299	0.298
Pid Number	14	14	14	14	14	14	14	14

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations.

H3: Population growth will increase economic development, the province's total trade and exports, as well as its trade and exports with bordering countries.

It is observed that the increase in population, one of the control variables, has a statistically significant and negative effect on GDP per capita and total exports, and a positive effect on total trade. It does not have a statistically significant effect on border trade and exports. The fact that population growth reduces GDP per capita can be interpreted as an indication that GDP will not increase in parallel with the increase in the number of people living in border cities. In other words, the increase in the number of citizens living in these cities does not increase production and consumption at a level that will keep GDP per capita constant or increase it. This finding is in line with Degu (2019), who concluded that population growth negatively affects GDP. This result can be associated with the absence of value-added production or the high idle capacity.

In terms of foreign trade, it is seen that total exports decrease with population growth while trade increases. This situation may be due to the increase in domestic demand and imports with population growth, but a decrease in exports. Güneş (2005) highlights that while economic growth can increase population in the long term, the short-term effects of population growth on economic variables may be complex. Population growth can increase consumption demand in the local economy. Specifically, the demand for imported

consumer goods may rise, leading to an increase in total trade volume. However, a decrease in exports could occur if domestic production is redirected to meet growing domestic demand. Another possibility is that the rising population may prompt domestic producers to focus more on the local market. In this case, the quantity of goods and services available for export may decline. Simultaneously, the increase in imports to satisfy the needs of the expanding population also contributes to the growth in total trade. As a result, while population growth boosts domestic demand and shifts production and resources toward the local market, total trade volume may increase due to higher imports, even as exports decline. Polat (2018) found a positive link between population and economic growth, but the current study suggests that the nature of this relationship depends on trade composition and regional dynamics.

H4: An increase in central government spending will boost economic development, along with the province's total trade and exports, and its trade and exports with neighboring countries.

While government expenditures have a statistically positive effect on border trade, exports, total exports, and GDP per capita, they do not have a significant effect on total trade. The positive effect of government expenditures on border trade, exports, total exports, and GDP per capita indicates that public expenditures play a role in increasing economic growth and productivity. These expenditures can support exports and border trade through infrastructure investments, policies that encourage production, and projects that support trade. In addition, economic activities can be stimulated and GDP per capita can rise thanks to increased public expenditures. These findings align with the conclusions of Dimoso (2024), who stated that government spending leads to growth in GDP per capita, and Müller (2008), who found that government spending positively affects net exports.

However, the lack of a significant effect on total trade may indicate that government expenditures have a neutral or limited effect on imports. This means that expenditures mostly support domestic production and exports, but imports are not directly affected by these expenditures. In other words, government expenditures can increase domestic production capacity and exports, but they can have a limited effect on imports. This partially contradicts Adıgüzel (2014), who found that public spending in Türkiye increases the foreign trade deficit, suggesting that in the case of border provinces, spending is more directed toward productive investments rather than consumption-driven imports. This does not change total trade, but with the increase in exports, there is a positive effect on border trade and overall economic growth.

These results may indicate that while government spending has growth-oriented and export-inducing effects, imports are determined more by other dynamics such as the private sector or global trade conditions. Unlike Türker (2020), who found that government spending reduces both exports and imports, the findings of this study suggest that in the case of border provinces, public spending stimulates exports without a significant impact on imports.

H5: The increase in patent registrations will promote economic development, along with the province's total trade and exports, and its trade and exports with bordering countries.

H6: The increase in brand registrations will enhance economic development, alongside the province's total trade and exports, and its trade and exports with bordering countries.

When the effects of the brand registration numbers among the explanatory variables are examined, it is seen that while it does not have a statistically significant effect on total trade, border trade and exports, it positively affects total exports. On the other hand, there is a statistically positive effect on GDP per capita in each model. These results show that brand differentiation increases total exports as well as domestic production and consumption, thus creating an increase in GDP per capita. This aligns with the findings of Petrie et al. (2019), who concluded that brand registration enhances export performance, and Buchinskaia and Stremousova (2021), who found that trademark registrations contribute to exports and GDP growth. However, it should not be overlooked that brand differentiation does not lead to a significant change in trade and exports with its neighbors. This suggests that while branding strengthens overall export competitiveness, regional trade patterns may be influenced by additional factors such as logistics, trade policies, and production structures.

Another explanatory variable, the number of patent registrations, does not have a statistically significant effect on total trade, border trade and exports, and GDP per capita. The increase in the number of patent registrations has a positive effect on total exports. This supports Ivus (2010) and Yıldırım (2016), who found that patent applications contribute to export growth. This shows that the patents received were successful in

increasing exports, but did not create an effect at a level that would provide welfare increase in domestic production and consumption.

H7: The EU debt crisis will positively impact economic development, as well as the province's total trade and exports, and its trade and exports with neighboring countries.

The positive effects of GDP per capita, border exports, total trade and total exports during the EU crisis in 2008-2009 indicate that Türkiye's border cities may have been relatively positively affected by this crisis. While the debt crisis was experienced in the European Union economies, neighboring countries such as Türkiye took a relatively more advantageous position in trade. This advantage can be explained as temporary increases in exports to EU countries and Türkiye's domestic economy being relatively less affected by this crisis. The relatively low production costs of Türkiye during the crisis period may have caused EU countries to import more from Türkiye. The lack of a statistically significant effect on border trade can be associated with the fact that the eastern and southeastern provinces were not directly connected to EU markets. Since the trade partners of these regions include countries outside the EU, the EU crisis may not have directly affected the border trade in this region. Therefore, although the impact of the EU crisis may be observed in the two provinces on the EU border, it is expected that a positive effect will emerge in the model as a whole, since the trade structures of the eastern and southeastern border provinces were less affected by this crisis.

H8: Irregular migration from Syria and other countries will increase economic development, as well as the province's total trade and exports, and its trade with bordering countries.

Türkiye received its most intense migration from Syria between 2011 and 2017 (Republic of Türkiye Ministry of Interior Presidency of Migration Management, 2024). It is seen that this migration did not create a statistically significant effect on total and border trade and exports. On the other hand, it is understood that there was an increase in GDP per capita.

Although this situation can be explained by the fact that population growth creates welfare by triggering consumption and production, it has been determined in the other hypothesis test that population growth decreases GDP per capita. Therefore, another explanation on this issue will be related to the calculation of GDP per capita. Since those coming from Syria are under temporary protection status, many of them do not work legally and with insurance. For this reason, these people contribute to GDP through production and consumption. However, while the contributions of these people are reflected in GDP while calculating GDP per capita, only the number of citizens in Türkiye is used in the denominator. Thus, although the economic contributions of these people seem to increase the welfare of the citizens, they may not fully reflect the real situation. Another reason for the increase in GDP per capita may be the aid and investments made to the southeastern provinces where people under temporary protection and irregular migrants are located. This situation is also consistent with the fact that the government expenditure variable determined in the econometric model increases GDP per capita.

H9: Heterodox economic policies will reduce economic development but increase the province's total trade and exports, along with its trade and exports with neighboring countries.

Heterodox economic policies have increased total exports while decreasing GDP per capita. The reason for this can be explained by the decrease in real wages reducing costs in exports and increasing competition in export products based on labor force. However, it is assessed that exports increased in sectors with low added value and returns, while there was a contraction in other sectors dependent on imports. This situation negatively impacted both production and exports in value-added sectors. As real wages decreased, GDP per capita also declined, leading to welfare losses for citizens. The statistically insignificant effect on trade can be explained by the contraction in imports, which offset the positive impact generated by exports.

CONCLUSION

This study examines the bidirectional relationship between trade, exports, and local development in 14 border cities of Turkey from 2004 to 2021. The analysis includes explanatory variables such as patent and trademark registrations, population growth, government expenditures, and time dummy variables representing the 2008-2009 European debt crisis, 2011-2017 Syrian irregular migration, and 2018-2021 heterodox economic policies.

In the study, it is found that border trade, border export and GDP per capita do not have a statistically significant effect on each other. This situation shows that border cities and firms located in cities would be

more effective and efficient if they worked on global opportunities rather than investing and marketing strategies only for their land neighbors. In fact, it is seen that there is a mutual, statistically significant and positive relationship between the cities' total trade, exports and GDP per capita.

It is seen that population growth does not affect border trade and exports, on the other hand, it has a negative effect on GDP per capita and total exports. However, it has a positive effect on total trade. Since the population data includes citizens of the Republic of Türkiye, this result also provides important clues in terms of population mobility resulting from irregular migration. Another inference in this regard is that the production and trade structure of border provinces does not have a structure that will accommodate population growth and therefore the workforce in value-added jobs. This suggests that the growing population contributes to an increase in idle labor capacity. In this context, it is crucial for policymakers to develop strategies that address this issue, given that population growth in border provinces does not currently enhance the region's trade and production capacities. These strategies should focus on managing population movements, improving workforce quality, and promoting value-added production in the cities.

Central government expenditures in border provinces have a positive effect on all variables examined, except for total trade. This shows that public expenditures stimulate economic activities in border provinces. Central government expenditures create an increasing effect on domestic production and exports abroad. This shows that state investments to be made in border provinces play an important role in the development of these regions.

While the increase in the number of brand registrations does not affect total trade, border trade and exports, it positively affects total exports and GDP per capita. In this context, it will be more effective for companies in border provinces to determine their strategies according to the preferences of global or regional customers rather than the preferences of their border neighbors and trends in these countries in their branding policies. The increase in GDP per capita shows that domestic consumers are also positively affected by the increase in the number of brands, and it is important to take domestic customer preferences into account. The increase in the number of patent registrations is seen to have a significant and positive effect only on total exports. In this context, it is seen that the patents registered are not at a level that will positively affect domestic production and trade, total trade, border trade and exports. In this context, it can be concluded that patents that will increase exports on a global scale are more successful.

Considering the dummy variables, it may be beneficial for exporting companies to prioritize trade with countries outside the European Union, as this could help diversify risks during times of crisis. While heterodox policies, including low interest rates and a weak Turkish Lira, may boost exports in the short term, they do not have a positive impact on social welfare. Given the existence of sectors where exports rely on imports, these policies should be reassessed to effectively increase exports.

Increasing the studies on the trade structure and development of border provinces and conducting research based on objective data beyond the perception of citizens and/or firms will play an important role in the strategies to be followed by local and national policy makers and decision makers as well as investors and firms. Obtaining different micro data on the provinces in the border regions and examining them with statistical and econometric tools will also be useful in terms of revealing the trade patterns specific to the provinces and the determinants of economic development.

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