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AN ANALYSIS OF SECTORAL EXPORT POTENTIAL OF TURKEY BY USING STRUCTURAL GRAVITY MODEL

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Abstract

Purpose: The main purpose of this study is to analyze the sectoral export potential of Turkey with the Structural Gravity Model. It is aimed to find the average effects of a variable (such as GDP, real exchange rate, trade agreements) on Turkey's sectoral exports. It has been researched in which countries and sectors that Turkey exports below or above the potential.

Method: The gravity model was used in this study to analyze Turkey's sectoral export potential.

Findings: The aggregated results show that Turkey exports below its potential. The potential deficit of the agricultural sector in the 2010-2019 period is between 21-36 billion dollars. This corresponds to almost twice the volume of unused potential in Turkey's agricultural sector. On the other hand, the potential gap of the industrial sector in general is 5-31 billion dollars. The aforementioned values can be interpreted as the fact that Turkey has achieved some success in the industrial sector compared to the agricultural sector in terms of closing the potential gap in the historical process, but as of recent periods, both sectors have exported below the potential and policies that can approach the potential level are needed.

Originality: Turkey's sectoral export potential was analyzed with the Structural Gravity Model, and the Gravity Model was first built for 179 countries and the period 2010-2019. Then, export potentials were estimated for the country pair at the sectoral level. Second, the average effects of a variable (such as GDP, real exchange rate, trade agreements) on Turkey's sectoral exports are examined. The study has a unique quality in terms of making a sectoral distinction and keeping the number of countries wide.

Keywords: Structural Gravity Model, Export Potential, Sectors, Agriculture, Industry

JEL Classification: C21, F14

TÜRKİYE'NİN SEKTÖREL İHRACAT POTANSİYELİNİN YAPISAL ÇEKİM MODELİ İLE ANALİZİ

Özet

Amaç: Bu çalışmanın temel amacı, Türkiye'nin sektörel ihracat potansiyelini Yapısal Çekim Modeli ile analiz etmektir. Bir değişkenin (GSYİH, reel döviz kuru, ticaret anlaşmaları gibi) Türkiye'nin sektörel ihracatı üzerindeki ortalama etkilerini bulmak amaçlanmıştır. Türkiye'nin hangi ülke ve sektörlerde potansiyelin altında veya üzerinde ihracat yaptığı araştırılmıştır.

Yöntem: Bu çalışmada, Türkiye'nin sektörel ihracat potansiyelini analiz etmek için çekim modeli kullanılmıştır.

Bulgular: Toplu sonuçlar, Türkiye'nin potansiyelinin altında ihracat yaptığını göstermektedir. 2010-2019 döneminde tarım sektörünün potansiyel açığı 21-36 milyar dolar arasındadır. Bu, Türkiye'nin tarım sektöründeki kullanılmayan potansiyel hacminin neredeyse iki katına tekabül etmektedir. Öte yandan, genel olarak sanayi sektörünün potansiyel açığı 5-31 milyar dolardır. Bahse konu değerler Türkiye'nin tarihsel süreç içerisinde potansiyel açığın kapatılması açısından sanayi sektöründe tarım sektörüne göre belli başarılar elde edilsede son dönemler itibarı ile iki sektörde de potansiyelin altında ihracat gerçekleştirdiği ve potansiyel düzeye yaklaşılabilecek politikalara ihtiyaç duyulduğu şeklinde yorumlanabilir.

Özgünlük: Türkiye'nin sektörel ihracat potansiyeli Yapısal Çekim Modeli ile analiz edilmiş olup, ilk olarak Çekim Modeli 179 ülke ve 2010-2019 dönemi için inşa edilmiştir. Ardından sektörel düzeyde ülke çifti için ihracat potansiyelleri tahmin edilmiştir. İkinci olarak, bir değişkenin (GSYİH, reel döviz kuru, ticaret anlaşmaları gibi) Türkiye'nin sektörel ihracatı üzerindeki ortalama etkileri incelenmiştir. Sektörel ayrım yapılması ve ülke sayısının geniş tutulması açısından çalışma özgün bir niteliğe sahiptir.

Anahtar Kelimeler: Yapısal Çekim Modeli, İhracat Potansiyeli, Sektörler, Tarım, Sanayi

JEL Sınıflandırması: C21, F14

INTRODUCTION

Before 1980, Turkey used protectionist economic policies, which refer to higher tariff rates constraint on foreign currencies (briefly limit on both goods and capital). The Decision of 24th January changed Turkey's economic system structurally. After 1980, protectionism left its place in the liberalization policy (briefly decreasing and eliminating constraints on goods and capital) and initiating export-led growth and outward-oriented development. In 1996, Turkey established the Customs Union with the EU, which can be considered a milestone for Turkey's external trade and economy, which agreement provides a price advantage on industrial goods. Turkey applies Common Customs Tariff on third parties. Turkey's export reached 171 billion dollars in 2019. As a leading exporter of agricultural products in Europe and the Middle East, Turkey's total exports of agricultural products (HS: 01-24) have been US $ 18,2 billion in 2019 and about 10.5% of Turkey's total export in the same period. Turkey's competitive power in industrial products (HS: 25-97) depends on the proximity of main markets (EU, ME), developed infrastructure demographic structure, and sufficient domestic market. Turkey has an advantage in auto parts and vehicles, iron and steel, textiles and clothing, and electronics sectors. Manufacturing industry exports exceed US$ 152,1 billion in 2019, which is about 88,3% of total exports.

The primary goal of this study is to analyze Turkey's sectoral export potential with the Structural Gravity Model (SGM). Thus firstly, the Gravity Model (GM) built for 179 countries and the 2010-2019 period. After that, export potentials for countries pair on the sectoral level were predicted. Secondly, to find the mean effects of a variable (like GDP, real exchange rate, trade agreements) on Turkey's sectoral export. It is expected from the model to show Turkey's export potential by considering the sectoral distinction. We expect that larger countries trade more, different distance trade less, because of mainly transportation costs.

Several papers analyzed Turkey's sectoral level export by using the GM approach. The majority of workings carried out about the Turkey-EU customs union relationship. Nowak (2007) trade analysis at sectoral level shows that the EU increases Turkey's exports slightly. Mainly, the Customs Union excludes agriculture, coal, and steel. Ata (2012) analyzed Turkey's export potential with Gravity Model. According to results, GDPs, common language, usage of the same currency, and contiguity have a positive effect on bilateral trade; on the other hand, distance affects trade flows negatively.

LITARATURE

The Gravity Model's first application is the initial paper of Tinbergen (1962) on international trade relations. On the theory side, the first explanation was developed by Anderson (1979). Essential studies that developed the theoretical structure of the model include the work of Helpman and Krugman (1985), Bergstrand (1989), and Deardorff (1998). The other most known studies in the Gravity Model literature are John McCallum's (1995) demonstration of the commercial potential and distance of country borders (USA-Canada) with Gravity Model. For years, Gravity equations have been used as a tool to model international trade (Brun et al.,2002; Reddingand Venables, 2004; Liu and Xin,2011; Novy,2013). These models generally analyze countries trade flows in terms of distance, geography, free trade agreements, and border effects (Soloaga and winters, 2001; Antonucci and Manzocchi,2006; Baier and Bergstrand,2007).

Nowak and Lehmann (2007) analyzed Turkey's sectoral trade flows from 1988 to 2002 (16 export sectors) with Structural Gravity Model. Frede and Yetkiner (2017) Turkey's export flows by using a Gravity Model. Ata (2012) analyzed Turkey's export potential in 67 countries and the 1980-2009 period with FE Panel Estimator. Morland and Schier (2020) analyzed the forest product sector by using the Structural Gravity Model approach. In this working paper, the author uses econometric methods for the forest sector on the 13 forest products. For the period 1999-2006, Makochekanwa (2010) applied the Structural Gravity Model at the sectoral level. Papazoglou (2007) worked Greece's Potential Trade Flows with Gravity Model. The dataset covers 1993-2003 period and 26 countries. GDP, population, distance and dummy variables used as variables in working paper. Erdem and Nazlioglu (2008) analyzed the Turkish agricultural exports to the European Union. Neumann (2018) studied on EU integration effects on sectoral trade (25 sector categorized by ISIC Rev) integration effect with gravity model. Abbas and Waheed (2019) research Pakistan Trade Potential with Gravity Model. Researchers used panel dataset for 1980-2013 period and 47 countries. Bilateral trade flow, real gdp, real Exchange rate and dummy variables used in working paper. Mulabdic and Yasar (2021) worked on Export Potential with Gravity Model. Researchers used panel dataset for 2010-2017 period and 105 country at industry levels. GDP, distance, tariffs and dummy variables used in research.

Table 1. Literature

Author and Date	Method	Modelling Parameters
Tinbergen (1962)	Gravity Model	1958, 18 countries , Distance, GNP, dummy variables
Anderson (1979)	Gravity Model	Distance, Income ,Population
Nowak & Lehmann (2007)	Structural Gravity Model	1988-2002 period, Distance, bilateral real effective exchange rates trade agreements, common language, other dummy variables (common language, same country etc)
Papazoglou (2007)	Structural Gravity	1993-2003 period, 26 countries, GDP, population, distance, dummy variables
Makochekanwa (2010)	Structural Gravity Model	1999-2006 period, GDP, distance, , sectoral capital investment population
Sezai Ata (2012)	Structural Gravity Model, Fixed Effects Panel Estimator	1980-2009 period, GDP, population, distance, trade agreements, common language, other dummy variables(common language, same country etc)
Frede & Yetkiner (2017)	Structural Gravity Model	1994-2010 period, Distance, trade agreements, common language, other dummy variables(common language, same country etc)
Abbas & Waheed, (2019)	Structural Gravity Model	1980-2013, 47 countries, Bilateral trade flow, Real GDP, Real Exchange Rate and dummy variables
Morland & Schier (2020)	Structural Gravity Model	2000-2019 period, GDP, population, distance, forest rent, consumption, production, other dummy variables(common language, one partners in EU FTA etc)
Mulabdic & Yasar, (2021)	Structural Gravity Model	2010-2017 period ,105 country, industry level, GDP, distance, tariffs and dummy variables

METHOD

The gravity model has become an important tool for the empirical analysis of international trade. The model has been widely used since Tinbergen's (1962) first application to estimate the impact of geography and institutions on trade flows. Gravity comes from Newton's law equation, which asserts that every particle in the universe pulls another particle according to mass size and distance between two-particle. International trade adopted the Gravity Model as a tool for explaining bilateral external trade.

$$X_{ij} = C\frac{Y_i Y_j}{Trade\ Cost} \quad (1)$$

Jan Tinbergen (1962) claimed that the Gravity Theory could estimate trade flows. Countries with larger GPD tend to trade more according to purchasing power (GDP can be seen as an indicator of purchasing power) and production power (GDP can be seen as an indicator of production power). The primary determinant of trade can be defined as income, price of product, and preferences(which in this model is fixed). In these studies, the following gravity equation is going to be used.

Gravity equation:

$$X_{s,i,j,t} = \exp[B_1 Distance_{i,j} + B_2 GDP_{i,t} + B_3 REX_{i,t} + B_4 Pop_{i,t} + B_4 Remoteness_{i,t} + B_5 Dummyvariables_{i,t}] + e_{s,i,j,t} \quad (2)$$

Implementing a gravity model with a PPML estimator solves zero trade problems and heteroskedasticity problems (Anderson and Yotov. 2015). Countries have internal and external resistances on trade flows, called "multilateral resistance" if this term is not controlled, estimation results can be biased. To control this term, "remoteness indexes" have been used commonly, which method weight exporters by importers shares of world GDP (Anderson, J., M. Larch, and Y. Yotov. 2015).

$$Rem_i = \sum_1^j \frac{dist_{ij}}{GDP_j/GDP_w} \quad (3)$$

The fixed effects model provides a straightforward method for estimating the theoretical gravity model: dummy variables account for unobservable multilateral resistance. The approach is straightforward to develop and is merely a basic OLS application. However, it has one significant disadvantage: we must eliminate any variables collinear with the fixed effects from the model. This restriction means that it is only possible to estimate a fixed effects model with data that only vary by the exporter (constant across all importers) or by the importer (constant across all exporters) if the dataset includes intra-national trade. It is possible to include an interaction term of the type specified.

Baier and Bergstrand (2009) offer an alternate method that accounts for arbitrary distributions of inward and outward multilateral resistance without requiring the addition of fixed effects or difficult-to-obtain data. The literature assumes that the remoteness index controls the multilateral resistance terms. Baier and Bergstrand (2009) demonstrate that the subsequent model yields estimate nearly indistinguishable from those derived using fixed effects but exclude dummy variables. It is assumed that in this study that exporter- and importer-related factors are controlled by contignation, common language, common ethnicity, historical colonial relationship, and standard colonial relationship variables. In addition, it is assumed that the characteristics of exporter-importer relationships are controlled by economic integration types such as free trade agreements, regional trade agreements, customs unions, and partial scope trade agreements. Furthermore, the characteristics between exporter and importer relationships are controlled by the remoteness index, which controls the multilateral resistance term between nations(Shepherd,2013)

DATA

Variables which is the part of the model can be listed under three main category. Main variables can be listed as; Export, Gross Domestic Product, Population, Distance, and Dummy variables (trade agreements, colonial linkage). While the GDP of the exporting country is used as the supply side (production), the GDP of the importing country is used as the external demand (consumption) side. And the population variables are also included in the equation with the same logic. Distance and other variables like a common language, colonial links variables are used to proxy trade costs. In the model, CEPII database was used for market accessibility and Mario Larch's Database was used for Free Trade Agreements.

Gravity model set up by;

- Bilateral sectoral (HS-2) export values
- GDP which can be used as an indicator of supply and demand
- Distance (bilateral distance) which is an indicator of trade cost
- Remoteness distances weighted by GDP share in the world (thanks to the remoteness it can be handled with multilateral resistance trade barriers)
- Other dummy variables like contiguity (common border etc.)

Detailed information about data is in the below Table 2.

Table 2. Variables and Definations

Variable	Data Defination	Source
x	Bilateral sectorel exports by country pairs(134 country) for 2002-2018 yearly time period thousand $	Trademap
rta	Dummy variable equal to 1 if any one of cu, fta, eia, or ps is in place, and 0 otherwise	Mario Larch's Regional Trade Agreements Database
cu	Dummy variable equal to 1 if a Customs Union (CU) as defined in Paragraph 8(a) of Article XXIV of GATT 1994 is in place,	Mario Larch's Regional Trade Agreements Database
Fta	Dummy variable equal to 1 if a Free Trade Agreement (FTA) as defined in Paragraph 8(b) of Article XXIV of GATT 1994 is in	Mario Larch's Regional Trade Agreements Database
Eia	Dummy variable equal to 1 if a Economic Integration Agreement (EIA), as defined in Article V of GATS is in place, and 0	Mario Larch's Regional Trade Agreements Database
cuandeia	Dummy variable equal to 1 if cu==1 and eia==1, and zero otherwise.	Mario Larch's Regional Trade Agreements Database
ftaandeia	Dummy variable equal to 1 if fta==1 and eia==1, and zero otherwise	Mario Larch's Regional Trade Agreements Database
pop1	Population of exporter country million person	IMF Data Outlook 2019 October
pop2	Population of importer country million person	IMF Data Outlook 2019 October
nomgdp1	Current GDP of exporter country billion $	IMF Data Outlook 2019 October-April and our calculations
nomgdp2	Current GDP of exporter country billion $	IMF Data Outlook 2019 October-April and our calculations
nomgdpoct1	Current GDP of exporter country billion $	IMF Data Outlook 2019 October
nomgdpoct2	Current GDP of exporter country billion $	IMF Data Outlook 2019 October
contig	Dummy for whether the two countries are contiguous, common border	CEPII Geodist Database
comlang_off	Dummy for common official or primary language.	CEPII Geodist Database
comlang_etno	Dummy for language spoken by at least 9% of the population in both countries.	CEPII Geodist Database
colony	Dummy for origin and destination ever in colonial relationship.	CEPII Geodist Database
comcol	Dummy for common colonizer of origin and destination post 1945.	CEPII Geodist Database
curcol	Dummy if origin and destination currently in colonial relationship.	CEPII Geodist Database
col45	Dummy for origin and destination in colonial relationship post 1945.	CEPII Geodist Database

smctry	Dummy if were/are the same country	CEPII Geodist Database
dist	Bilateral distance between origin and destination in kilometer	CEPII Geodist Database
Rem	Remoteness Index	CEPII Geodist Database and our calculations
REX	Real exhange rate	Bruegel Database
distwces	Weighted bilateral distance between origin and destination in kilometer (population weighted). CES distances with theta= -1	CEPII Geodist Database

RESULTS

Table.3. Results of PPML and OLS

	(1)	(2)
VARIABLES	PPML	OLS
logdist	-0.858***	-27,744***
	(0.0111)	(399.1)
logpop1	0.526***	13,915***
	(0.00705)	(162.3)
logpop2	0.624***	16,424***
	(0.00600)	(142.8)
lognomgdp2	0.0168***	-2,672***
	(0.00311)	(113.0)
contig	0.296***	72,803***
	(0.0251)	(1,149)
comlang_off	-0.285***	-16,596***
	(0.0393)	(1,095)
comlang_ethno	0.485***	20,297***
	(0.0301)	(1,050)
colony	0.299***	-7,388***
	(0.0203)	(1,241)
comcol	-0.699***	-8,533***
	(0.0407)	(965.6)
curcol	0.273***	35,108***
	(0.0772)	(8,617)
rta	0.346***	30,197***
	(0.0383)	(1,507)
cu	-0.487***	-60,172***
	(0.0462)	(1,865)
fta	-0.401***	-35,322***
	(0.0288)	(1,478)
eia	0.543***	37,261***
	(0.0277)	(936.9)
ps	-1.771***	-71,648***
	(0.0379)	(1,412)
cuandeia	0.787***	26,132***
	(0.0382)	(1,918)
logremotenessimp	0.992***	39,901***

	(0.0239)	(819.0)
logremotenessexp	1.691***	52,710***
	(0.0361)	(969.7)
Constant	-10.68***	-608,155***
	(0.347)	(10,200)
Observations	5,366,958	5,366,958
R-squared	0.032	0.009

***%1 **%5 *%10 Number in Parenthesis represent standard deviation

Table.3 presents the results of the analysis performed in total exports. The importer's GDP/population has a positive and expected result; the distance between partners reduces exports in two models. The above model was estimated using a data period of 10 years, 2010 to 2019. Results from preliminary investigations presented in Table-3 reveal that exports, market size, population have significant explaining variations in bilateral trade flows. After potential was calculated, it was aggregated HS (1-24) for the agricultural sector and HS (25-97) for industrial goods.

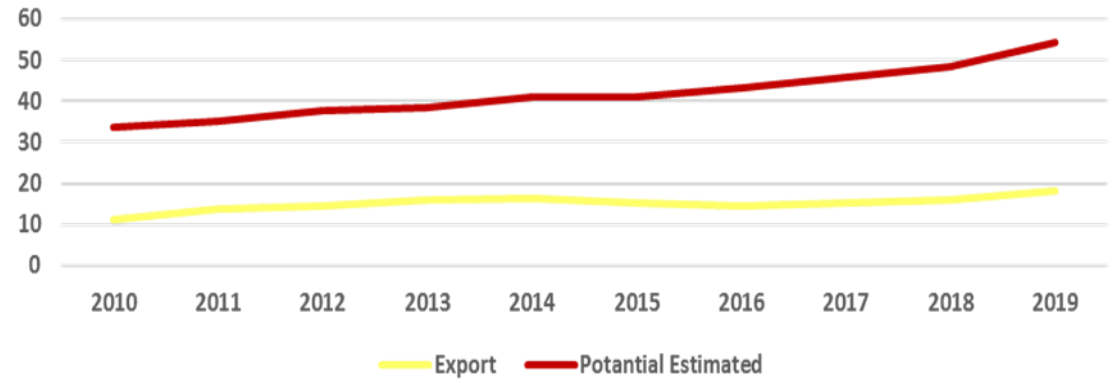

Figure.1 Turkey Agricultural Export Potential (2010-2019, Billion Dolar)
Source: Authors' Calculation by TSI Micro Data.

Turkey has a structural gap in the agricultural sector for a 2010-2019 period. The output gap in the agricultural sector seems related to other effects and subject to further studies. When we look at the 2019 gap between real and potential increase, it can be evaluated as an opportunity to increase in the agricultural sector.

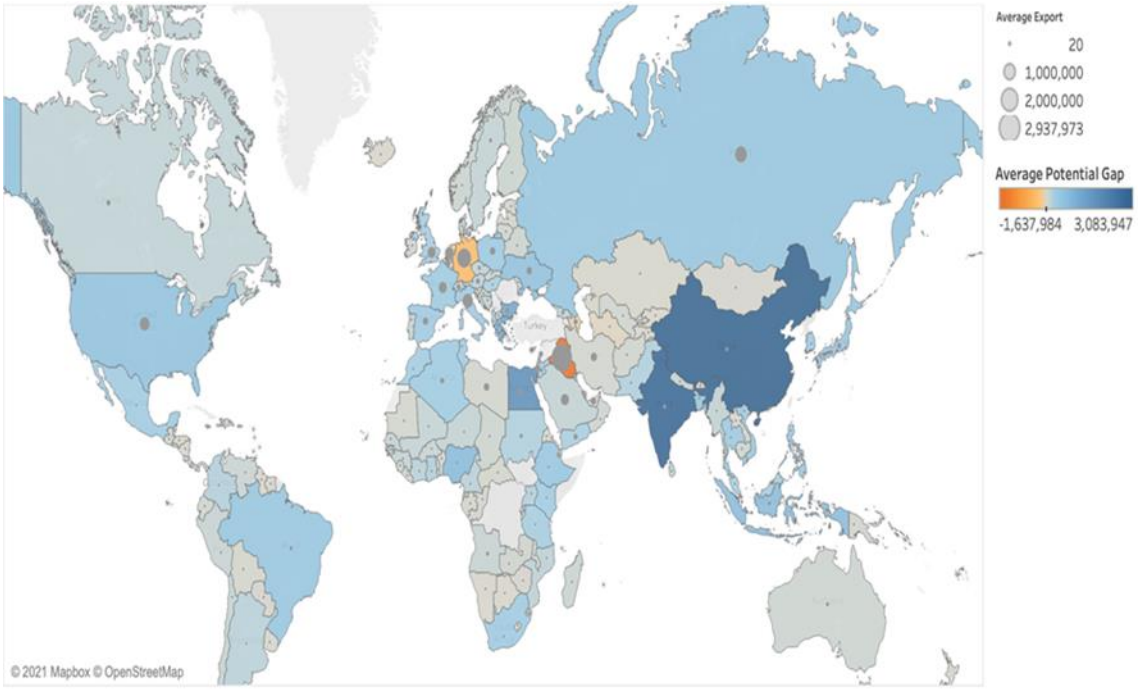

Figure 2. Turkey's Agricultural Export Potential (2010 – 2019, Billion Dolar)

The green color represented Turkey's Agricultural average Export in 2010-2019 is above the potential; on the other hand, the blue color represents untapped potential in that period. Turkey has untapped export potential in India, China, Egypt, Russia, and Greece in the Agricultural sector. Therefore, Turkey has untapped potential in some countries, which can be interpreted as using trade barriers against Turkey.

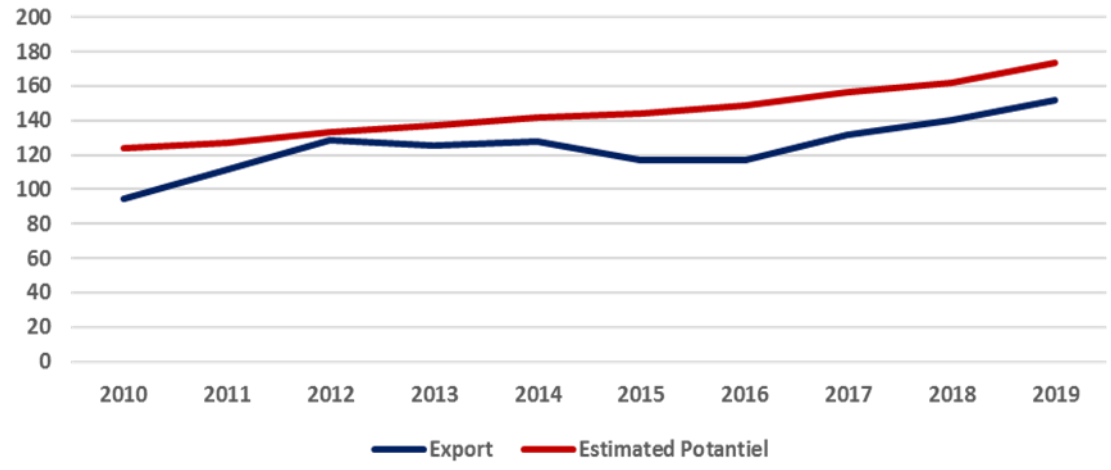

Figure 3. Turkey Industrial Export Potential (2010-2019, Billion Dolar)
Source: Authors' Calculation by TSI Micro Data.

According to Figure 3, Turkey's industrial export has a trend, which is above the potential. It is related to the proximity of main markets (EU, ME), developed demographic infrastructure structure, and sufficient domestic market. Turkey has an advantage in auto parts and vehicles, iron and steel, textiles and clothing, and electronics sectors.

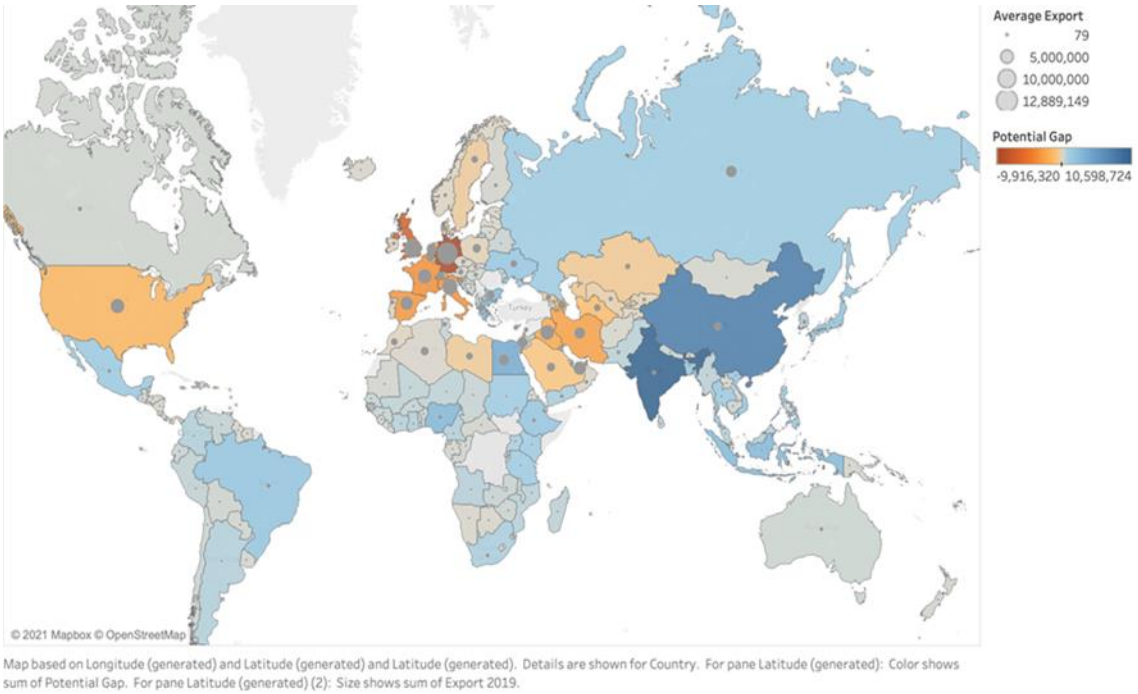

Figure 4. Turkey's Industrial Export Potential (2010-2019, Billion Dolar)

The fact that trade exceeds the theoretically calculated expected value (potential) indicates that trade between the two countries enjoys preferential treatment compared to trade with other countries and that the importing country engages in positive discrimination (Tinbergen, 1962). On the other hand, the fact that trade is less than the theoretically calculated value (potential) indicates that the importing country discriminates against imports from other countries. Turkey has untapped export potential in India, China, Egypt, Russia, and Bulgaria in the Industrial sector.

Table.4 Sectoral Results for Turkey (2010-2019 Billion $)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Agricultural										
Export	11.3	13.7	14.5	15.8	16.3	15.2	14.6	15.4	16.1	18.2
Potential (Estimated)	33.7	34.9	37.8	38.5	41	41.1	43.1	45.8	48.2	54.4
Potential Gap	**22.4**	**21.2**	**23.3**	**22.6**	**24.7**	**25.9**	**28.5**	**30.3**	**32.1**	**36.2**
Industrial										
Export	94	112	128	125	128	117	117	131	140	152
Potential (Estimated)	124	127	133	137	142	144	148	157	162	173
Potential Gap	**29.3**	**15.6**	**5**	**11.6**	**13.8**	**26.8**	**31.2**	**25.1**	**21.3**	**20.9**

Source: Authors' Calculation by TSI Micro Data.

The aggregated results show that Turkey exports below its potential. The potential deficit of the agricultural sector in the 2010-2019 period is between 21-36 billion dollars. This corresponds to

almost twice the volume of unused potential in Turkey's agricultural sector. On the other hand, the potential gap of the industrial sector in general is 5-31 billion dollars.

CONCLUSİON

The Paper's main concerns are examining the effects of gross domestic production, distance, population, and dummy variables on Turkey's exports to 163 countries and finding sectoral export potential. GDP is still a powerful tool to explain bilateral trade in sectoral export.

In this study, the gravity model was estimated with PPML to solve bias and zero trade problems. According to studies, PPML estimation results are more reliable than OLS estimation results in the Gravity Model. Initially, according to regression results for the distance variable, it is estimated that about -0,98 and all of the estimated variables are statistically significant.

Turkey's exports reached 168 billion dollars in 2019. On a sectoral level, the total export of agricultural products (Harmonized System: 01-24) was 18,2 billion dollars in 2019 (10.5% of total export) 2019. Turkey has averaged 26,7 billion in the untapped potential in the agricultural sector. In 2019, manufacturing industry exports (Harmonized System: 25-97) reached 152 billion dollars (88.3% of total export) in total exports and an averagely 20.1 billion untapped potential for 163 countries.

This study has some limitations data problems, and internal trade cannot be reachable. Further studies can provide new knowledge and data about that topic. Despite the problems, this paper provides extra information to policymakers on Turkey's external trade.

REFERENCES

Abbas, S. & Waheed, A. (2019). Pakistan's global trade potential: a gravity model approach. *Global Business Review*. 20 (6). 1361-1371. https://doi:10.1177/0972150919848936

Anderson, J. (1979). A theoretical foundation for the gravity model. *American Economic Review*. 69(1). 106-116. Retrieved From: https://www.jstor.org/stable/1802501

Anderson, J. E. & van Wincoop, E. (2003). Gravity with gravitas: a solution to the border puzzle. *American Economic Review*. 93 (1). 170–92. https://doi:10.1257/000282803321455214

Anderson, J. E. & van Wincoop, E. (2004). Trade costs. *Journal of Economic Literature*. 42 (3). 691–751. https://doi:10.1257/0022051042177649

Anderson, J., Larch M. & Yotov Y. (2015). Estimating general equilibrium trade policy effects: GE PPML, CESI. *Working Paper*. No. 5592. Retrieved From: https://www.cesifo.org/DocDL/cesifo1_wp5592.pdf

Antoine, G. (2019). Indirect measures of trade costs: limitations and caveats. *Economics Letter*. 176(C). 96-102. https://doi:10.1016/j.econlet.2018.12.027

Antonucci, Daniele & Manzocchi, Stefano. (2006). Does Turkey have a special trade relation with the EU?: a gravity model approach. *Economic Systems*. Vol. 30(2). p. 157-169. Retrieved From: http://www.sciencedirect.com/science/article/pii/S0939-3625(06)00012-4

Ata, Sezai. (2012). Turkey's export potential: a gravity model analysis. https://doi.org/10.13140/RG.2.1.4856.7845.

Baier, S. L. & Bergstrand, J. H. (2007). Do free trade agreements actually increase members international trade?. *Journal of International Economics*. 71(1). 72–95. https://doi:10.1016/j.jinteco.2006.02.005

Baier, S. L. & Bergstrand, J. H. (2009). Bonus vetus OLS: a simple method for approximating international trade-cost effects using the gravity equation. *Journal of International Economics*. 77(1). 77–85. https://doi:10.1016/j.jinteco.2008.10.004

Baldwin, R. & Taglioni, D., (2006). Gravity for dummies and dummies for gravity equations, *National Bureau of Economic Research Working Paper*. 12516. Retrieved From: https://www.nber.org/papers/w12516

Bayar, G., Ünal, M. & Tokpunar, S. (2015). Determinants of Eurkish exports to European Union countries: a sectoral panel data analysis. *Emerging Markets Finance and Trade*. doi:51. 1-19, https://doi:10.1080/1540496X.2015.1011506

Bergstrand, Jeffrey. (1989). The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The Review of Economics and Statistics*. 71. 143-53. https://doi:10.2307/1928061

Bergstrand, Jeffrey. (1989). The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The Review of Economics and Statistics*. 71. 143-53. https://doi:10.2307/1928061

Brun, J.F., Carrère, C., Guillaumont, P. & de Melo, J. (2002). Has distance died? evidence from a panel gravity model. *Centre for Economic Policy Research (CEPR). Discussion Paper*. 3500.

Dahi, O. & Demir F. (2013). Prefential trade agreements and manufactured goods exports: does it matter whom you PTA with?. *Applied Economics*. 45(34). 4754-4772. https://doi:10.1080/00036846.2013.804169

Deardorff, Alan. (1998). Determinants of bilateral trade: does gravity work in a neoclassical world?. p. 7-32. *The Regionalization of the World Economy, National Bureau of Economic Research*, https://EconPapers.repec.org/RePEc:nbr:nberch:7818 .

Erdem, E., & Nazlioglu, S. (2008). Gravity model of Turkish agricultural exports to the European Union. *International Trade and Finance Association Conference Papers*. (p. 21). Retriewed Form: https://ideas.repec.org/p/bep/itfapp/1126.html .

Fally, T. (2015). Structural gravity and fixed effects. *Journal of International Economics*. 97(1). 76-85. https://doi:10.3386/w21212 .

Frede J. & Yetkiner I., (2017). The regional trade dynamics of Turkey: a panel data gravity model. *The Journal of International Trade & Economic Development*. 26. (6). 633-648. https://doi.org/10.1177/00157325211047001

Helpman, E. & Krugman, P. (1985). Market structure and foreign trade: increasing returns, imperfect competition, and the international economy. *MIT press*. Cambridge.

Liu, X. & Xin, X. (2011). Transportation uncertainty and international trade, *Transport Policy*, 18, pp.156-162. https://doi.org/10.1016/j.tranpol.2010.07.005

Makochekanwa. A. (2010). An econometric analysis of Botswana's sectoral export trade flows. Retrieved From: https://mobt3ath.com/uplode/books/book-45908.pdf

McCallum, John. (1995). National borders matter: Canada-U.S. regional trade patterns. *American Economic Review*. pp. 615-23. Retrieved From: https://www.scirp.org/(S(oyulxb452alnt1aej1nfow45))/reference/ReferencesPapers.aspx?ReferenceID=707737

Morland,C., Schier, F. & Weimar H. (2020). The structural gravity model and its implications on global forest product trade. 11(2). 178. https://doi:10.3390/f11020178 .

Mulabdic, A. & Yasar, P. (2021). Gravity model–based export potential an application to Turkey. *World Bank Policy Research Working Paper*. https://doi:10.1596/1813-9450-9557

Novy, D. (2013). International trade without CES: estimating trans-log gravity, *Journal of International Economics*. 89. pp. 271–282. https://doi.org/10.1016/j.jinteco.2012.08.010

Nowak-Lehmann, F., Herzer, D., Martinez-Zarzosa, I. & Vollmer, S. (2007). The impact of a customs union between Turkey and the EU on Turkey's exports to the EU. *JCMS: Journal of Common Market Studies*. 45: 719-743. https://doi.org/10.1111/j.1468-5965.2007.00728.x

Odularu, G. (2020). Fostering trade in Africa. *Springer*. https://doi:10.1007/978-3-030-36632-2_1

Papazoglou, C. (2007). Greece's potential trade flows: a gravity model approach. *International Atlantic Economic Society*. 13(4). 403-414. doi:10.1007/s11294-007-9107-x

Redding, S., & Venables, A.J. (2004). Economic geography and international inequality. *Journal of International Economics*. 62(1). pp. 53-82. https://doi.org/10.1016/j.jinteco.2003.07.001 Retriewed Form: https://www.researchgate.net/publication/5217632_Has_Distance_Died_Evidence_from_a_Panel_Gravity_Model

Shepherd, Ben. (2016). The gravity model of international trade: a user guide, ARTNeT, Retrieved From: https://www.unescap.org/sites/default/d8files/knowledge-products/GravityUserGuide-REVISED-02.pdf

Soloaga, I. & Winters, A. (2001). How has regionalism in the 1990s affected trade? *North American Journal of Economics and Finance*. 12. pp. 1-29. Retrieved From: https://www.researchgate.net/publication/23722199_How_Has_Regionalism_in_the_1990s_Affected_Trade

Virag-Neumann, I. (2015). Analysing EU sectoral trade integration with gravity model of trade. 2016 *ENTRENOVA Conference Proceedings*, Available at SSRN: https://ssrn.com/abstract=3282258

World Trade Organisation. (2012). A practical guide to trade policy analysis, Retrieved From: https://www.wto.org/english/res_e/publications_e/wto_unctad12_e.pdf

World Trade Organisation. (2016). An advanced guide to trade policy analysis, Retrieved From: https://www.wto.org/english/res_e/booksp_e/advancedwtounctad2016_e.pdf