Turkey's Rising Imports from BRICS: A Gravity Model Approach

Dinçer, Gönül

Gazi University

11 October 2014

Turkey's Rising Imports from BRICS: A Gravity Model Approach

Gönül Dinçer*

ABSTRACT

The share of BRICS countries in the world trade is significantly rising for more than a decade and it was approximately 3 % in 1980, 6 % in 2000 and 16 % in 2013 in the total world imports. The same rising pattern of BRICS is also being seen in Turkey's trade since early 2000s. In this study, the imports of Turkey from BRICS are analyzed using an augmented gravity model over the period 2002-2012. The results indicate that the basic gravity variables are consistent with the theory. Furthermore, R&D expenditures in Turkey is negatively correlated with Turkey's imports from BRICS countries whereas R&D expenditures in BRICS countries are positively correlated.

Key Words: International Trade, the Gravity Model, Panel Data Analysis, BRICS, Turkey

Jel Classification: F10, F14, C33

1. INTRODUCTION

Since 2000, the emergence of Brazil, China, India, Russian Federation and South Africa in the world economy is a well-known fact. This phenomenon can also be seen in the world trade statistics. Table 1 and Table 2 shows the shares of BRICS countries in the world trade over the period 2000-2013.

Table 1: Shares of BRICS Countries and Turkey in the Total World Exports (%)

	Brazil	China	India	Russian F.	S. Africa	Turkey
2000	0.81	3.50	0.76	1.43	0.46	0.67
2005	1.03	6.44	1.24	2.07	0.52	0.81
2010	1.22	9.14	1.97	2.34	0.54	0.81
2013	1.20	10.36	1.98	2.52	0.46	0.90

Source: World Bank, World Development Indicators Database.

The share of Brazil in total world exports was 0.81 % in 2000. In 2013, it accounted for the 1.20 % of the world exports. The share of China tripled from 3.5 % in 2000 to 10.4 % in 2013. India more than doubled from 0.76 to approximately 2 %. Russian Federation's share has also increased and reached the level 2.5 % in 2013. On the other hand, South Africa's share in total world exports slowly increased and decreased during the period thus South Africa kept its share at approximately 0.50 % level (Table 1).

* PhD, Gazi University, Faculty of Economics and Administrative Sciences, Department of Economics, gnldincer@gmail.com

Table 2: Shares of BRICS Countries and Turkey in the Total World Imports (%)

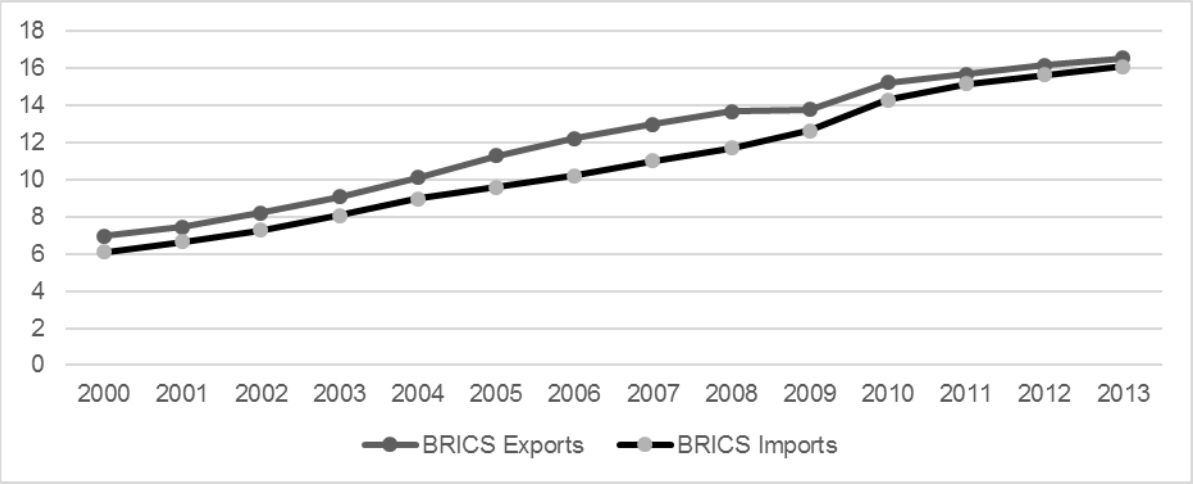
	Brazil	China	India	Russian F.	S. Africa	Turkey
2000	0.95	3.14	0.82	0.78	0.41	0.77
2005	0.79	5.54	1.43	1.28	0.54	0.95
2010	1.37	8.19	2.42	1.74	0.55	1.05
2013	1.48	9.67	2.34	2.07	0.52	1.16

Source: World Bank, World Development Indicators Database.

The shares of BRICS countries in total world imports are increasing too. The share of Brazil in world imports was 0.95 % in 2000. In 2013, it accounted for the 1.5 % of the world imports. The share of China more than tripled from 3.14 % in 2000 to 9.67 % in 2013. India more than doubled from 0.82 to approximately 2.3 %. Russian Federation's share has also increased and reached the level 2.07 % in 2013. South Africa's share in total world imports slowly increased and it accounted for the 0.52 % of the world imports (Table 2).

Figure 1 shows the share of BRICS in total world exports and imports over the period 2000-2013:

Figure 1: Share of BRICS in the Total World Trade (%)



Source: World Bank, World Development Indicators.

In 2000, the total share of BRICS in world exports was approximately 7 %, and the total share of BRICS in world imports was approximately 6 %. By 2013, both shares reached significantly high levels. The share of BRICS accounted for 16.5 % of the total world exports and 16 % of the total world imports.

In Table 1 and Table 2, it is also seen that Turkey's shares in the world trade are rising, but they are rising slowly. On the other hand, the share of BRICS in Turkey's trade is rising rapidly. Table 3 shows that BRICS shares of Turkey's exports and imports were 3 % and 11 % in 2000. By 2013, exports share of BRICS was approximately 8 % and imports share of BRICS climbed up to 23.5 %.

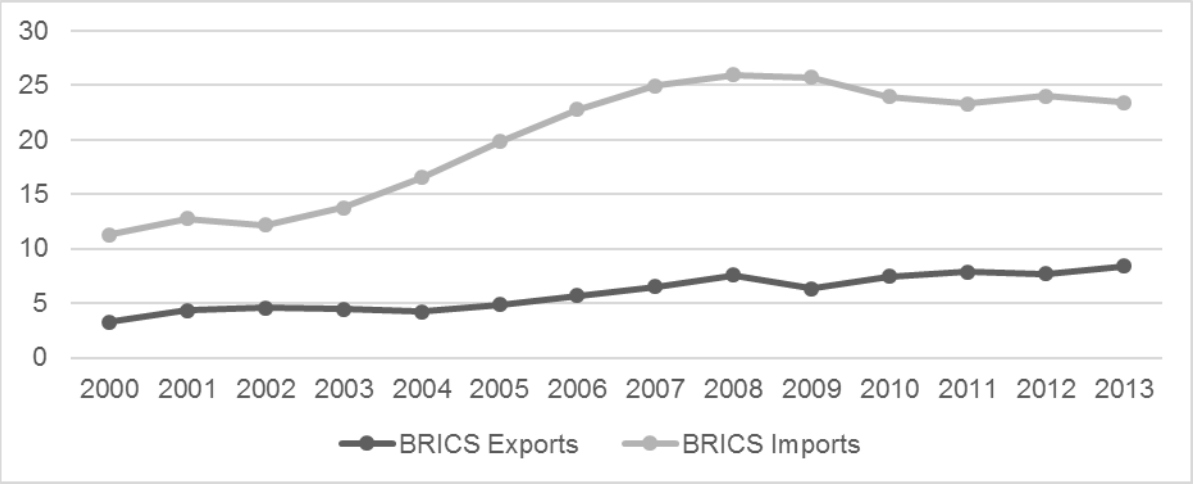
Table 3: Shares of BRICS in Turkey's Exports and Imports (%)

	Exports	Imports
2000	3.3	11.3
2005	4.9	19.8
2010	7.5	23.9
2013	8.4	23.5

Source: Turkish Statistical Institute, Foreign Trade Statistics Database.

Figure 2 shows the rising pattern of BRICS in Turkey's trade. The obvious fact here is that the imports share of BRICS is almost three times greater than the exports share and it was rising faster than the exports share until 2010.

Figure 2: Share of BRICS in Turkey's Exports and Imports (%)



Source: Turkish Statistical Institute, Foreign Trade Statistics Database.

An important point here is that Turkey's share in total world imports increased only 0.39 points, the share of BRICS countries in Turkey's exports increased approximately 5 points but the share of BRICS in Turkey's imports increased 12.2 points during the period. The exports and imports shares of BRICS increased in similar ratios in the world trade. However, the imports share of BRICS in Turkey's trade increased faster than the exports share, it almost tripled the exports share and reached a much more significant level.

This study aims to analyze the imports of Turkey from BRICS using a gravity model. The equation is specified for testing the effects of incomes of the trading countries, R&D expenditures of them and the effect of geographic distance on the imports of Turkey from BRICS.

2. RELATED LITERATURE

A joint study of the World Trade Organization and the United Nations Conference on Trade and Development (2012) declares the gravity model the work-horse of international trade analysis.

The gravity model of international trade has an intense history. Bergeijk and Brakman (2010) state that there are a number of 'fathers' of gravity who got very close to formulate the model such as Isard and Peck, and Ravenstein who used a similar logic to the gravity model of international trade in his migration studies. But Jan Tinbergen was the first to publish a mathematical formulation and an empirical application of the gravity model in international trade.

The basic gravity equation which was introduced in "Shaping the World Economy: Suggestions for an International Economic Policy" by Tinbergen (1962) is as follows:

$$E_{ij} = \alpha_0 \frac{Y_i^{\alpha_1} Y_J^{\alpha_2}}{D_{ij}^{\alpha_3}}$$

Where;

E_{ij} = exports of country i to country j

$Y_i^{\alpha 1}$ = GNP of country i

$Y_j^{\alpha 2}$ = GNP of country j

$D_{ij}^{\alpha 3}$ = distance between country i and country j and α_0 is the constant.

Tinbergen (1962) stated that the main factors determining the size of the trade flows between any pair of countries are the economic size of the exporting country, the economic size of the importing country and the distance between them. He explains their relevance as follows:

i) the amount of exports a country is able to supply depends on its economic size

ii) the amount that can be sold to a particular country varies with the size of that country's market

iii) the volume of trade depends on transportation costs (these correspond with the geographic distance between the two countries)

After Tinbergen's pioneer work, a wide range of studies are published in regard to the model. Linnemann (1966), Anderson (1979, 2003, 2010), Bergstrand (1985, 1989), Helpman (1987), Deardorff (1995), Smarzynska (2001), Evenett and Keller (2002), Greenaway and Milner (2002), Head (2003) and Feenstra (2004) investigated the theoretical foundations of the gravity model.
Matyas (1997, 1998), Egger (2000, 2002) and Baltagi, Egger and Pfaffermayr (2014) contributed to the econometric specifications of the model.

Since the gravity model became so popular, more research has been invested on it and a vast literature has grown. It should be emphasized that augmented gravity equations with additional variables are applied rather than the basic model in the majority of the studies. Also, the gravity model is now the work-horse of many other topics such as foreign direct investment flows, migration and economic integrations.

Pöyhönen (1963), Eichengreen and Irwin (1998), Wall (1999), Feenstra, Markusen and Rose (2001), Egger (2002), Filippini and Molini (2003), Anderson and Wincoop (2003), Batra (2004), Kimura and Lee (2006), Walsh (2006), Helpman, Melitz and Rubinstein (2008), Mayer (2009), Baldwin and Taglioni (2011), Greene (2013) are some of the main studies of the gravity model which analyze bilateral trade flows between countries.

Aitken (1973), McCallum (1995), Bayoumi and Eichengreen (1997), Olarreaga, Soloaga and Winters (1999), Sharma and Chua (2000), Hassan (2001), Sapir (2001), Nilsson (2002), Zarzoso and Lehmann (2003), Antonucci and Manzocchi (2006), Caliendo and Parro (2009) are some of the prominent studies of the gravity model which analyze trade between and within economic integrations.

Christie (2003), Buch, Kokta and Piazolo (2003), Egger and Pfaffermayr (2004), Ledyaeva and Linden (2006), Bénassy-Quéré, Coupet and Mayer (2007), Bergstrand and Egger (2007), Kleinert and Toubal (2010) are some of the studies of the gravity model which analyze foreign direct investment flows between countries and blocs.

Gould (1994), Head and Ries (1998), Karamera, Oguledo and Davis (2000), Girma and Yu (2002), Piperakis, Milner and Wright (2003), Leblang, Fitzgerald and Teets (2014), Lewer and Berg (2008), Ramos and Surinach (2013) are some of the studies of the gravity model which analyze migration flows between countries.

In this study, an augmented gravity model is used to analyze the imports of Turkey from BRICS countries over the period 2002-2012.

3. MODEL AND DATA

The dependent variable used in this paper is the natural log of imports of Turkey from BRICS countries over the period 2002-2012 and the gravity equation of the model is as follows:

$$\ln(imports_{ijt}) = \alpha_i + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(dist) + \beta_4 \ln(texports_i) + \beta_5 (RD_i) + \beta_6 (RD_j) + u_{it}$$

All non-ratio variables are in logs where;

- $imports_{ijt}$ is the imports of Turkey from BRICS countries
- GDP_i is the GDP of Turkey
- GDP_j is the GDP of BRICS
- Dist is the geographic distance between the capital cities of the country pairs
- $texports_i$ is the total exports of Turkey
- RD_i is the GDP share of research and development expenditures in Turkey
- RD_j is the GDP share of research and development expenditures in BRICS
- u_{it} is the error term
- α_i is the constant which denotes unobservable individual effects (cross-sectional effects)
- β_1, β_2, β_3, β_4, β_5 and β_6 are the coefficients of the independent variables.

The sources and the units of the data used in the analysis are described in Table 4.

Table 4: Data Sources

Variables	Source	Unit
Turkey's imports from BRICS	Turkish Statistical Institute	Current, US $
GDP	World Bank, WDI	Current, US $

Distance	CEPII	Km
R&D expenditures	World Bank, WDI	% of GDP
Turkey's exports	Turkish Statistical Institute	Current, US $

4. ESTIMATION RESULTS

The most commonly used methods for estimating a gravity model with panel data includes simple ordinary least squares (OLS), the fixed-effect models (FEM), and the random-effect models (REM). Since the regressions include individual effects it is essential to determine if they are either random or fixed. The literature suggests that a random-effect estimations is better when estimating trade flows between a randomly selected group of trading partners taken from a larger population. The literature also suggests that fixed-effect estimations are preferable when estimating trade flows between ex-ante predetermined groups of trading nations (Greene, 2013).

In this study, an ex-ante predetermined group of trading nations are selected which are Turkey and BRICS countries. Hence, fixed-effects estimation is applied. In order to verify the preference, The Hausman specification test is also applied and the fixed-effects estimation is approved. The estimation results of the augmented gravity equation is presented in Table 5:

Table 5: Gravity Model Estimation for Turkey's Imports from BRICS Countries, 2002-2012

				Number of obs = 58 **F(9, 48) = 678.13** **Prob > F = 0.0000** **R-squared = 0.9788** **Root MSE = .22319**
	Coef.	Std. Err.	T	P>|t|
$IGDP_j$	.5076845	.1942987	2.61	0.012*
$IGDP_i$	.8790192	.3076715	2.86	0.006*
Ldist	-1.59029	.0426223	-37.31	0.000*
$Itexports_i$	.4374979	.2092301	2.09	0.042*
RD_j	.8105331	.1981664	4.09	0.000*
RD_i	-1.289699	.4772122	-2.70	0.009*
Cons	-10.43835	3.727547	-2.80	0.007*
Hausman specification test				0.0000
Pesaran's test of cross sectional independence				1.4985
Modified Wald test for groupwise heteroskedasticity				0.0000
Wooldridge test for autocorrelation				0.0571
Shapiro-Wilk W test for normal data				0.0627

Note: All non-ratio variables are in logs, and *represents statistical significance at 5% level.
Source: Author's own estimates.

According to the results, the estimated coefficient for Turkey's GDP has the expected positive sign and is statistically significant. Also, the estimated coefficient for the exporting countries' (BRICS) GDPs has the expected positive sign and is statistically significant too. A higher GDP of Turkey suggests that an increase in GDP will increase its purchasing power and the capacity to absorb imports whereas an increase in the income of the BRICS countries translates into a higher production capacity and an increased ability to exports.

Geographic distance has a negative and statistically significant estimated coefficient that is consistent with the gravity model's theoretical assumptions. Distance, a proxy for transportation costs, mirrors the costs associated with physically shipping a product from its production location to its export destination. Geographic distance is the most significant determinant of Turkey's imports from BRICS and a coefficient of -1.59 implies that a 1 percent increase in the distance will cause Turkey's imports from BRICS to decline by 1.59 percent.

The estimated coefficient for Turkey's R&D expenditures has a negative sign and is statistically significant whereas the estimated coefficient for the R&D expenditures in BRICS countries has a positive sign.

Finally, the estimated coefficient for Turkey's total exports has a positive sign and is statistically significant. This means that Turkey's exports and imports are moving together which may also imply that Turkey's exports are dependent on imports.

5. CONCLUSION

The objective of this paper is to employ an augmented gravity model of international trade to empirically analyze the imports of Turkey from BRICS during the years 2002-2012. The period started from 2002 due to the availability of the R&D data. The gravity equation included basic gravity variables plus other variables designed to capture the rise of the imports from BRICS. The results are based on the study of five trading partners over an eleven year period. Regression analysis was performed on panel data fixed-effects model.

The results of the analysis indicate that Turkey's imports from BRICS are positively correlated with Turkey's GDP and GDPs of BRICS countries. Turkey's GDP determines its capacity of imports and BRICS countries incomes determine their capacity of production and exports. These findings of the GDP variables are consistent with the gravity model's main assumption: The larger the countries, the stronger the economic interaction between them.

Turkey's imports are also positively correlated with R&D expenditures in BRICS. On the other hand, Turkey's imports from BRICS are negatively correlated with Turkey's R&D expenditures. These results may suggest that the technological progress of BRICS countries is an important reason of Turkey's rising imports from BRICS.

Geographic distance is also negatively correlated with Turkey's imports from BRICS. Geographic distances are fairly high between Turkey and BRICS countries. Due to this fact, distance is the most significant determinant of Turkey's imports from BRICS. This finding supports gravity model's assumption regarding distance and transportation costs.

Furthermore, Turkey's imports from BRICS are positively correlated with Turkey's total exports. This fact may suggest that Turkey's exports are depending on imports. This is an important problem for Turkish economy because higher levels of exports require even higher levels of imports therefore export revenues cannot be realized. Turkey's imports majorly consist of intermediate goods. BRICS countries are important intermediate goods exporters. Hence the findings about the total exports variable in the analysis point to the import dependence of exports problem of Turkey.

The results altogether indicate that Turkey's imports from BRICS countries can mostly be explained by the gravity model. Distance is an important determinant of foreign trade. The economic growth of BRICS and Turkey reflects on the trade between them. The rise of the R&D expenditures of BRICS positively effects Turkey's imports whereas the rise of the R&D expenditures of Turkey negatively effects it.

REFERENCES

Aitken, N. D. 1973. "The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis." *American Economic Review, Vol. 63*(5), 881-892.

Anderson, J. 1979. "A Theoretical Foundation for the Gravity Equation." *American Economic Review, No: 69*, 106-116.

Anderson, J. 2010. "The Gravity Model." *Annual Review of Economics, Annual Reviews, Vol: 3,* No: 1, 133-160.

Anderson, J. & Wincoop, E. V. 2003. "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review, American Economic Association, Vol. 93*(1), 170-192.

Antonucci, D. & Manzocchi, S. 2006. "Does Turkey Have a Special Trade Relation with the EU? A Gravity Model Approach." *Economic Systems,* No: 30, 157-169.

Baldwin, R. & Taglioni, D. 2006. "Gravity for Dummies and Dummies for Gravity Equations." *NBER Working Paper Series,* Working Paper No. 12516. http://www.nber.org/papers/w12516.

Baltagi, B. H. & Egger, P. & Pfaffermayr, M. 2014. "Panel Data Gravity Models of International Trade." *CESifo Working Paper Series 4616*, CESifo Group Munich.

Batra, A. 2004. "India's Global Export Potential: The Gravity Model Approach." *Global Economic Review, Vol: 35,* No: 3, 2004, 327-361.

Bayoumi, T. & Eichengreen, B. 1997. "Is Regionalism Simply a Diversion? Evidence from the Evolution of the EC and EFTA." *NBER Chapters, in: Regionalism versus Multilateral Trade Arrangements,* NBER-EASE, National Bureau of Economic Research, Inc., Volume 6, 141-168.

Bénassy-Quéré, A. & Coupet, M. & Mayer, T. 2007. "Institutional Determinants of Foreign Direct Investment." *The World Economy, Vol. 30,* No. 5, 764-782.

Bergeijk, P. V. & Brakman, S. 2010. *The Gravity Model in International Trade: Advances and Applications.* New York: Cambridge University Press.

Bergstrand, J. H. 1985. "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence." *Review of Economics and Statistics, No: 67*(3), 474-481.

Bergstrand, J. H. 1989. “The Generalized Gravity Equation Monopolistic Competition, and the Factor-Proportions Theory in International Trade.” *Review of Economics and Statistics,* No: 71, 143-153.

Bergstrand, J. H. & Egger, P. 2007. “A Knowledge-And-Physical-Capital Model of International Trade Flows, Foreign Direct Investment, and Multinational Enterprises.” *Journal of International Economics, Elsevier, Vol. 73*(2), 278-308.

Buch, C. M. & Kokta, R. M. & Piazolo, D. 2003. “Foreign Direct Investment in Europe: Is There Redirection from the South to the East*?” Journal of Comparative Economics, Elsevier, Vol. 31*(1), 94-109.

Caliendo, L. & Parro, F. 2009. “Gains from Trade: A Model for Counterfactual Trade Policy Analysis.” *The University of Chicago Working Papers,* The University of Chicago. http://www.bvrie.gub.uy/local/File/JAE/2009/iees03j3071009.pdf.

CEPII; Centre d’estude Prospectives et d’informations International. *Distance Data.* 2011. http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

Christie, E. 2003. “Foreign Direct Investment in Southeast Europe.” *WIIW Working Papers,* No. 24. http://ideas.repec.org/ p/wii/wpaper/24.html.

Deardorff, A. V. 1995. “Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?” *NBER Working Papers,* No: 5377, National Bureau of Economic Research, Inc. http://www.nber.org/ papers/w5377.pdf.

Egger, P. 2000. “A Note on the Proper Econometric Specification of the Gravity Equation.” *Economic Letters,* No: 66, 25-31.

Egger, P. 2002. “An Econometric View on the Estimation of Gravity Models and the Calculation of Trade Potentials.” *The World Economy,* No: 25, 297-312.

Egger, P. & Pfaffermayr, M. 2004. “Foreign Direct Investment and European Integration in the 1990s.” *University of Innsbruck and Austrian Institute of Economic Research,* Blackwell Publishing, Oxford, UK.

Eichengreen, B. & Irwin, D. A. 1998. “The Role of History in Bilateral Trade Flows.” *NBER Chapters, in: The Regionalization of the World Economy,* National Bureau of Economic Research Inc., 33-62.

Evenett, S. J. & Keller, W. 2002. “On Theories Explaining the Success of the Gravity Equation.” *Journal of Political Economy,* No: 110, 281-316.

Feenstra, R. C. & Markusen, J. R. & Rose, A. K. 2001. “Using the Gravity Equation to Differentiate among Alternative Theories of Trade.” *The Canadian Journal of Economics, Vol. 34,* No. 2, 430-447.

Feenstra, R. C. 2004. *Advanced International Trade: Theory and Evidence.* Princeton University Press.

Filippini, C. & Molini, V. 2003. “The Determinants of East Asian Trade Flows: A Gravity Equation Approach.” *Journal of Asian Economics, Elsevier, Vol. 14*(5), 695-711.

Girma, S. & Yu, Z. 2002. “The Link between Immigration and Trade: Evidence from the United Kingdom.” *Weltwirtschaftliches Archiv 2002, Vol. 138,* No. 1.

Gould, D. M. 1994. “Immigrant Links to the Home Country: Empirical Implications for U.S. Bilateral Trade Flows.” *The Review of Economics and Statistics, Vol. 76,* No. 2, 302-316.

Greenaway, D. & Milner, C. 2002. “Regionalism and Gravity.” *Scottish Journal of Political Economy, Vol. 49,* No. 5, 574-585.

Greene, W. H. 2013. “Export Potential for U.S. Advanced Technology Goods to India Using a Gravity Model Approach.” *Office of Economics Working Paper,* No. 2013-03B. http://www.usitc.gov/ publications/332/working_papers/EC201303B.pdf.

Hassan, M.K. 2001. “Is SAARC a Viable Economic Bloc? Evidence from Gravity Model.” *Journal of Asian Economics, Vol. 12,* 263-290.

Head, K. & Ries, J. 1998. “Immigration and Trade Creation: Econometric Evidence from Canada.” *The Canadian Journal of Economics, Vol. 31,* No. 1, 47-62.

Head, K. 2003. “Gravity for Beginners.” *MIMEO, University British Columbia Press.* http://pioneer.netserv.chula.ac.th/~kkornkar/inter/trade/undergrad/term/ paper/gravity.pdf.

Helpman, E. 1987. “Imperfect Competition and International Trade: Evidence from Fourteen Industrial Countries.” *Journal of the Japanese and International Economies, No: 1*(1), 62-81.

Helpman, E. & Melitz, M. & Rubinstein, Y. 2008. “Estimating Trade Flows: Trading Partners and Trading Volumes.” *The Quarterly Journal of Economics, MIT Press, No: 123*(2), 441-487.

Karamera, D. & Iwuagwu, O. & Davis, B. 2000. “A Gravity Model Analysis of International Migration to North America.” *Applied Economics, Vol. 32,* 1746-1755.

Kimura, F. & Lee, H. 2006. “The Gravity Equation in International Trade in Services.” *Review of World Economics, Volume 142,* Issue 1, 92-121.

Kleinert, J. & Toubal, F. 2010. “Gravity for FDI.” *Review of International Economics, Wiley Blackwell, Vol. 18*(1), 1-13.

Leblang, D. & Fitzgerald, J. & Teets, J. C. 2014. “Defying the Law of Gravity: The Political Economy of International Migration.” *World Politics, 66*(3), 406-445.

Ledyaeva, S. & Linden, M. 2006. “Testing for Foreign Direct Investment Gravity Model for Russian Regions.” *BOFIT Discussion Papers,* No. 17. http://epublications.uef.fi/pub/urn_isbn_952-458-782-3/urn_isbn_952-458-782-3.pdf.

Lewer, J. J. & Berg, H. 2008. “A Gravity Model of Immigration.” *Economics Letters, Vol. 99*(1), 164-167.

Linneman, H. 1966. *An Econometric Study of International Trade Flows.* North Holland Publishing Company: Amsterdam.

Matyas, L. 1997. “Proper Econometric Specification of the Gravity Model.” *The World Economy, No: 20*, 363-368.

Matyas, L. 1998. “The Gravity Model: Some Econometric Considerations.” *The World Economy, No: 21*/3, 397-401.

Mayer, T. 2009. “Market Potential and Development.” *CEPII Working Papers,* WP No 2009-24. http://www.cepii.fr/PDF_PUB/wp/ 2009/wp2009-24.pdf.

McCallum, J. 1995. “National Borders Matter: Canada-U.S. Regional Trade Patterns.” *American Economic Review,* No: 85, 615-23.

Nilsson, L. 2002. “Trading Relations: Is the Roadmap from Lome to Cotonou Correct?” *Applied Economics, Vol. 34,* Issue 4, 439-52.

Olarreaga, M. & Soloaga, I. & Winters, A. 1999. “What's Behind MERCOSUR's Common External Tariff?” *The World Bank Policy Research Working Paper Series,* No: 2231, The World Bank. http://wwwwds.worldbank.org/servlet/WDSContentServer/WDSP/IB/1999/12/11/000094946_ 99120105303489/Rendered/PDF/multi_page.pdf.

Piperakis, A. S. & Milner, C. & Wright, P. W. 2003. “Immigration, Trade Costs and Trade: Gravity Evidence for Greece.” *Journal of Economic Integration, Vol. 18,* No. 4, 750-762.

Pöyhönen, P. 1963. “A Tentative Model for the Volume of Trade between Countries.” *Weltwirtschaftliches Archiv, No: 90*, 93-99.

Ramos, R. & Surinach, J. 2013. “A Gravity Model of Migration between ENC and EU.” *IREA Working Papers 201317*, University of Barcelona, Research Institute of Applied Economics.

Sapir, A. 2001. “Domino Effects in Western European Regional Trade, 1960- 1992.” *European Journal of Political Economy, Vol.17,* 377-388.

Sharma, S.C. & Chua, S.Y. 2000. “ASEAN Economic Integration and Intra-Regional Trade.” *Applied Economic Letters, Vol. 17,*165-169.

Smarzynska, B. K. 2001. “Does Relative Location Matter for Bilateral Trade Flows? An Extension of the Gravity Model.” *Journal of Economic Integration, Center for Economic Integration, Sejong University, Vol. 16,* 379-398.

Tinbergen, J. 1962. *Shaping the World Economy: Suggestions for an International Economic Policy.* Twentieth Century Fund, New York.

Turkish Statistical Institute. 2014. *Foreign Trade Statistics Database.* http://www.turkstat.gov.tr/PreTabloArama.do?metod=search&araType=vt

Wall, H. 1999. “Using the Gravity Model to Estimate the Cost of Protection.” *Review, Vol: 81,* Issue: 1, 33-40.

Walsh, K. 2006. “Trade in Services: Does Gravity Hold? A Gravity Model Approach to Estimating Barriers to Services Trade.” *IIIS Discussion Paper Series No. 183.* http://ssrn.com/abstract=945335, 21.02.2011.

World Bank. 2014. *World Development Indicators Database.* http://databank.worldbank.org/data

WTO & UNCTAD. 2012. *A Practical Guide to Trade Policy Analysis*. Geneva, Switzerland.

Zarzoz, I. M. & Lehmann, F. N. 2003. “Augmented Gravity Model: An Empirical Application to MERCOSUR-European Union Trade Flows.” *Journal of Applied Economics, Vol: 6,* No: 2, 291-316.