Analysis of Intra-industry Trade of The Paper Pulp, Paper and Paperboard Machines Sector: The Case of Turkey and CEE Countries

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Abstract

In this study, it was aimed to the analysis of intra-industry trade of paper pulp, paper and paperboard machines sector of Turkey and Central and Eastern European (CEE) countries and compare. In this context, product codes HS 8439 and HS 8441 were calculated using the Grubel-Llyod (GL) and Brülhart (A and B) indeces. While the index values of seven countries were over 0.5 for 8439 product groups according to averages of 2009-2018, the index values of six countries were over 0.5 for 8441 product groups. For 8439 and 8441 products, the Czech Republic had highest GL index value. Countries which had lowest GL index value were Turkey and Ukraine for 8439 and 8441 products, respectively. Turkey's trade form in 8439 and 8441 product groups was inter-industry trade. Also, it was found that foreign trade position of Turkey and and Central and Eastern European (CEE) countries varies according to product groups (8439 and 8441) and periods (2009-2013 and 2014-2018).

Anahtar Kelimeler: Paper machines sector, intra-industry trade, Turkey, CEE countries.

Kağıt Hamuru, Kağıt ve Karton Makineleri Sektörünün Endüstri-içi Ticaret Analizi: Türkiye ve CEE Ülkeleri Örneği

Öz

Bu çalışmada, Türkiye, Orta ve Doğu Avrupa (ODA) ülkelerinin kağıt hamuru, kağı ve karton makineleri sektörünün endüstri-içi ticaretinin analiz edilmesi ve karşılaştırılması amaçlanmıştır. Bu bağlamda HS 8439 ve HS 8441 ürün kodları Grubel-Llyod (GL) ve Brülhart (A ve B) indeksleri kullanılarak hesaplanmıştır. 2009-2018 ortalamalarına göre, 8439 ürün grubu için yedi ülkenin indeks değeri 0.5'in üzerinde olduğu bulunmuş iken, 8441 ürünü için ise altı ülkenin indeks değeri 0.5'in üzerinde olduğu bulunmuştur. 8439 ve 8441 ürünleri için en yüksek GL indeks değerine sahip ülke Çek Cumhuriyeti çıkmıştır. GL indeks değeri en düşük ülkeler ise sırasıyla Türkiye ve Ukrayna olmuştur. Türkiye'nin 8439 ve 8441 ürün gruplarındaki ticaret şekli endüstriler-arası ticaret şeklindedir. Ayrıca, Türkiye, Orta ve Doğu Avrupa (ODA) ülkelerinin ihracatçı ve ithalatçı konumlarının ürüne ve incelenen döneme göre faklılık gösterdiği tespit edilmiştir.

Keywords: Kağıt makineleri sektörü, endüstri-içi ticaret, Türkiye, CEE ülkeleri.

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1. Introduction

Intra-industry trade can be defined as the simultaneous export and import of differentiated commodities in the same industry (Grubel and Llyod 1975). The first study on intra - industry trade, which is also used as two - way trade and trade conflict, was conducted in 1960 on the countries of the European Economic Community. Since 1960, it has been observed that intra-industry trade has started to take place between developed countries as well as developing countries (Azgün 2017; Köse 2018). Intra-industry trade, which is an important part of the total trade between developed countries, can be divided into vertical and horizontal (Mangır and Fidan 2017). Vertical intra-industry trade is determined by country-specific differences and explains trade between countries with different levels of development. Horizontal intra-industry trade includes two-way trade of commodities belonging to the same sector with the same quality but with different characteristics (Erün 2010; Ishchukova and Smutka 2014).

In addition, a number of factors determining intra-industry trade have been identified as a result of the studies. These; country-specific determinants, industry-specific determinants, political determinants and institutional determinants (Bano 2013; Köse 2018).

The country-specific determinants: (1) the average level of development of trade partners; (2) differences in development and income distribution of trade partners; (3) relative market size and differences in market size; and (4) geographical proximity.

Industry-specific determinants: (1) prevalence of economies of scale; (2) degree of aggregation; (3) degree of product differentiation; (4) human capital density; (5) technological innovation / factor density; and (6) dominance of multinational companies.

Political determinants: (1) tariffs; (2) export incentives, export and import subsidies; and (3) other commercial arrangements and agreements.

Institutional determinants are: Institutional determinants: (1) communication, transport and commercial connections; and (2) language, cultural and religious ties.

In this study, the analysis of intra-industry trade of paper pulp, paper and paperboard machines sector of Turkey and Central and Eastern European (CEE) countries belonging to the 2009-2018 period was made using Grubel-Llyod index and compared.

1.1. Foreign Trade of Paper Pulp, Paper and Paperboard Machines of Turkey

The paper is an indispensable product of the modern world. It is used is used various area such as health, education, panel industry with decoration purpose and packaging material. The data on paper and its derivatives, which are one of the most consumed industrial products in life, reveal the development level of a country. While the machinery industry and its technology are directly affected by the developments in these products, the need for new information and technologies in this field also increases (Soykan 2009; Bardak et al. 2011; Atik and Ok 2017).

According to 2018 data, the export of 8439 (machinery for making pulp of fibrous cellulosic material or for making or finishing paper or paperboard) has a share nearly 5.174 billion dollars in the global market. Turkey has nearly 1% share in this product. The export of 8441 (machinery for making up paper pulp, paper or paperboard) has a share nearly 7.236 billion dollars in the global market. Turkey has share 41.289 million dollars in 8441. The imports of products of 8439 and 8441 have a share nearly 5.187 and 6.809 billion dollars, respectively. In the products of 8439 and 8441, Turkey's imports are higher than exports (URL1 2019).   In other words, Turkey's foreign trade deficit in these products is available (Table 1).

1.2. Foreign Trade of Paper Pulp, Paper and Paperboard Machines of CEE countries

After the collapse of the Soviet Union, CEE countries experienced a transition from the central economy to the market economy and the economic development in these countries was lower than that of the northern and western regions of Europe. Because these countries do not have the necessary resources and their technological level is insufficient. In addition, their economic growth depends mostly on foreign investments. CEE countries also compete with Turkey in many sectors in terms of export markets (Soyyiğit 2019; Simionescu 2018).

As seen in Table 1, in the exports of products of 8439 and 8441, CEE countries have a share nearly 203.6 and 203.2 million dollars, respectively. Exporter from the CEE countries in product of 8439 is Poland whereas the country that exports the most product of 8441 is the Czech Republic. The countries that import the most products of 8439 and 8441 are Czech Republic and Poland, respectively. Countries with foreign trade surplus in the 8439 are Poland and Estonia, while Czech Republic and Lithuania in the 8441 (URL1 2019).

Table 1. The export and import values of 8439 and 8441product groups of Turkey and CEE countries in 2018 (Thousand $) (URL1 2019)

Countries	8439		8441	
	Export	Import	Export	Import
Poland	70115	67759	41455	168103
Estonia	57539	11182	1322	2458
Czech Republic	46941	84043	87975	67544
Hungary	8776	12842	33735	35232
Romania	7594	16333	5298	45414
Lithuania	4954	8749	10124	15798
Slovakia	4532	11987	15577	32363
Ukraine	1730	18943	1238	21177
Bulgaria	974	13119	3033	19151
Latvia	427	676	3458	2876
Turkey	4962	60779	41289	133504
World	5174663	5186975	7236559	6809737
CEE Aggregation	203582	245633	203215	410116

1.3. Literature

Hellvin (1996) calculated the level of intra-industry trade between China and Organisation for Economic Co-operation and Development (OECD) countries for the years 1980-1992. As a result of the study, it was found that the intra-industry trade level between China and OECD countries increased and a significant portion of intra-industry trade was realized as vertical intra-industry trade.

In this paper, it was examined the level of intra-industry trade for 22 countries in East, Southeast, South, and Central Asia in 2003 and the determinants of intra-industry trade were investigated using a Tobit regression model. It was found that the Association of Southeast Asian Nations (Brunei, Indonesia, Malaysia, the Philippines, Singapore, and Thailand) and the high-income countries in East Asia have the highest levels of intra-industry trade. In addition, it was determined that Central and South Asian regional trade agreements had a positive influence on intra-industry trade in primary products (Sawyer et al. 2010).

Biesebroeck (2011) stated that trade in the US, European Union and China in the manufacturing industry has become increasingly intra-industry. In Japan, however, inter-industrial trade was observed to be at the forefront.

Leitao (2011) examined the link between intra-industry trade and international tourism flow using Grubel and Llyod and Brülhart indeces. It was determined that the intra-industry trade is very significant between Portugal and countries such as Spain, USA, Italy, Greece, Turkey and Canada.

Han and Lee (2012) calculated that what percentage of total trade between China and Korea takes place as vertical intra-industry trade.   It has been determined that approximately 50% of the trade between China and Korea since 1990 was realized as intra-industry trade.

Çoban et al. (2015) examined intra-industry trade of Turkey and some selected countries using GL index. It was determined that when the average GL Index value of 2000-2013 is examined, Georgia has the highest index value. In addition, it was found that Turkey is the country with the lowest GL index values for both annual and average of the period.

Şahin (2016a) analyzed intra-industry trade structure and competitiveness of Turkey's furniture industry. In this analysis, GL index and Revealed Comparative Advantage Index were used. Trade in the furniture sector was realized as intra-industry trade. Intra-industry trade occurs in the form of low-quality vertical intra-industry trade. It was observed that the competitiveness in the furniture sector increased over the years.

Şahin (2016b) analyzed the intra-industry trade structure and competitiveness of the forest-based sectors in Turkey. As a result of the analysis, it was determined that intra-industry trade is high and competitiveness is low in forest-based sector. However, competitiveness in some sub-sectors increased in recent years.

Kemer and Aydemir (2017) analyzed the intra-industry trade of Turkish manufacturing industry. In this context, they used GL index which is the most used in the literature and 3-digit foreign trade data within the scope of manufacturing industry between 2001 and 2014. They found that the highest values in terms of intra-industry trade values were in the machinery and transport sector.

Mangır and Fidan (2017) analyzed the intra-industry foreign trade of Turkey's agricultural sector and the study covers the period of 1996-2016. Turkey's intra-industry trade level is high in food industry while it is low in raw agricultural products.

Kurt and İmren (2018) determined that Turkey is both importer and exporter in products such as capers, soap root, lime, and coriander, exporter in products bay, thyme, mahaleb, mint, fennel and sumac, and importer in products such as nigella and ginger. Also, Turkey's intra-industry trade with G-8 countries was found to have minimum. Static analysis was performed with the standard GL index and then dynamic analysis was performed using A and B indices to determine Brülhart's Marginal Intra-Industry Trade.

2. Material and Method

2.1.   Material

Harmonized Commodity Description and Coding Systems and International Standard Trade Classification (SITC Rev.4) are used for the products subject to trade. The export and import data of the paper machinery sector of Turkey and CEE countries were used. 2009-2018 period was used in this study. The paper pulp, paper and paperboard machines sector includes the products in 8439 (machinery for making pulp of fibrous cellulosic material or for making or finishing paper or paperboard) and 8441(machinery for making up paper pulp, paper or paperboard) from GTIP (Customs Tariff Statistics Position) codes according to HS (Harmonized System). The export and import data used were taken on the Trademap website (URL1 2019).

2.2.   Method

Although there are a variety of measurement methods for intra-industry trade, the most widely used is the Grubel-Llyod index (Aydın 2008). This index was written as follow (Grubel and Lloyd 1975).

$$GL_i = 1 - \frac{|X_i - M_i|}{(X_i + M_i)} \tag{1}$$

where GL_i is the index value of intra-industry trade and X_i and M_i refer to exports and imports, respectively. The GL_i value has between 0 and 1. If the $GL_i = 0$, it indicates that there is no intra-industry trade in that i commodity in the country trade. If the $GL_i = 1$, it indicates that the values of exports and imports made in i commodity in the country trade are close to each other. If the $GL_i > 0.5$, intra-industry trade is high. If the $GL_i < 0.5$, intra-industry trade is low (Mangır and Fidan 2017).

The Grubel Llyod index does not provide information on the specialization and change in trade flows between the two periods. To overcome this shortcoming, Hamilton and Kniest (1991) developed the concept of marginal intra-industry trade (ΔIIT). The purpose of this index is to measure the structural changes in trade over the years with measuring changes in intra-industry trade (Brülhart and Thorpe 2000). The most common of the marginal intra-industry trade indices is the Brülhart A and B indeces. The Brülhart A index is calculated as follows (Brülhart 1994):

$$\Delta IIT = A = 1 - \left(\frac{|(X_t - X_{t-1}) - (M_t - M_{t-1})|}{|X_t - X_{t-1}| + |M_t - M_{t-1}|} \right) \quad \text{or} \quad A = 1 - \frac{|\Delta X - \Delta M|}{|\Delta X| + |\Delta M|} \tag{2}$$

The A index, like the GL index, varies between 0 and 1. If the A=0, it indicates that the marginal trade in

industry is purely of inter-industry trade whereas if the A=1, it indicates that the marginal trade in industry is entirely of the intra-industry trade. The A index may provide appropriate results in studies involving more than one country. However, the benefits of index A will be limited in the studies to be conducted for one country (Brülhart 1994; Altay and Şen 2009). For this reason, Brülhart (1994) developed a new index which he referred to as index B:

$$B= \frac{\Delta X - \Delta M}{|\Delta X| + |\Delta M|} \qquad\qquad\qquad (3)$$

The B index can take values between -1 and +1. This index contains two important information about both the marginal intra-industry trade rate and country-specific sectoral performances. If the B value approaching to zero, it indicates an increase in intra-industry trade, whereas if the B=0, it indicates that marginal trade in the relevant industry is completely intra-industry trade. Conversely, if the index value is both -1 and +1, then marginal trade is considered to be completely inter-industrial trade. B value directly also shows the sectoral performance. Sectoral performance is defined as the exchange in exports and imports in relation to each other. In other words, when B>0 then this means that ΔX>ΔM, and when B<0 then this means that ΔX<ΔM (Brülhart 1994; Altay and Şen 2009).

3. Results

GL index values belonging to Turkey and the CEE countries for 8439 product groups were given in Table 2. Moreover, the trend of GL index of 8439 products in Turkey and CEE countries was shown in Figure 1.

According to Table 2 and Figure 1, it is possible to reach the following results for 8439 (machinery for making pulp of fibrous cellulosic material or for making or finishing paper or paperboard) products:

Poland's GL index values were higher than 0.5 in all years except 2013. 2016 was the year in which Poland had the highest value. When the averages of 2009-2018 were examined, it was found that Poland's GL index value was 0.827. In short, this shows that intra-industry trade is dominant in the foreign trade structure of Poland 8439 products. Poland's GL index shown an upward and downward trend over the years. In 2018, compared to 2009, Poland's GL index increased by 32%.

Estonia's GL index values were lower than 0.5 in all years except 2011 and 2014 as well as in averages of 2009-2018. In other words, generally, intra-industry trade value of Estonia was lower. The GL index value of Estonia decreased after 2014.

When the GL index values of the Czech Republic were examined, it was seen that the index values were above 0.7. The lowest value was 0.717 and the highest value was 0.985. Other values varied between these two values. Although the GL index value of Czech Republic has fluctuated over the years, the index value has decreased by 24% in 2018 compared to 2009.

Hungary's index values were higher than 0.5 after 2010 and this value was only less than 0.5 in 2009. Hungary's average index value was also high (0.789). In other words, the trade form of this country was intra-industry trade. The GL index value of Hungary increased by 3.5 times in 2018.

Generally, Romania's index value was lower than 0.5 until 2015. This index value was higher than 0.5 after 2015. After 2015, Romania had intra-industry trade. When the average of Romania's intra-industry trade value was examined, it was determined that Romania's value was 0.566. Romania's index value increased in 2010 compared to 2009 and then it fluctuated up and down until 2016. After 2016, there was a decrease.

Lithuania's GL index value decreased to 0.331 in 2010 and then index value was higher than 0.5 until 2015. After 2015, this value dropped below 0.5. Index value again increased to 0.5 in 2018. When Lithuania's averages of 2009-2018 were examined, it was found that GL index value was higher than 0.5. The GL index value of Lithuania increased in 2018 compared to 2009.

When Slovakia and Latvia's averages of 2009-2018 were examined, it was found that the trade form of these countries were intra-industry trade. The index values of Slovakia and Latvia generally decreased.

Since the GL index values of Ukraine and Bulgaria were less than 0.5, it was found that the trade form of these countries for 8439 products were inter-industry trade. The index values of Ukraine and Bulgaria fluctuated over

the years. Compared to 2009, the index value of Ukraine increased by 52% in 2018, while the index value of Bulgaria decreased by 35%.

When the GL index values for Turkey's 8439 product were analyzed, it was found that Turkey's index values were relatively low. The trade form of Turkey was inter-industry trade. The GL index value of Turkey generally decreased over the years.

Table 2. Grubel-Llyod index values of countries for 8439 product group

| Countries	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2018
Poland	0.745	0.905	0.951	0.671	0.481	0.963	0.698	0.991	0.881	0.983	0.827
Estonia	0.354	0.457	0.797	0.477	0.494	0.882	0.375	0.480	0.257	0.325	0.490
Czech Republic	0.941	0.897	0.957	0.933	0.841	0.722	0.985	0.956	0.927	0.717	0.888
Hungary	0.182	0.899	0.813	0.858	0.932	0.867	0.795	0.927	0.805	0.812	0.789
Romania	0.417	0.843	0.200	0.485	0.329	0.485	0.528	0.950	0.785	0.635	0.566
Lithuania	0.580	0.331	0.821	0.885	0.835	0.696	0.421	0.137	0.366	0.723	0.579
Slovakia	0.962	0.866	0.583	0.636	0.446	0.330	0.320	0.608	0.432	0.549	0.573
Ukraine	0.110	0.551	0.428	0.315	0.287	0.397	0.086	0.061	0.178	0.167	0.258
Bulgaria	0.212	0.187	0.294	0.097	0.187	0.212	0.424	0.232	0.116	0.138	0.210
Latvia	0.826	0.800	0.160	0.911	0.642	0.705	0.247	0.440	0.391	0.774	0.590
Turkey	0.212	0.150	0.061	0.050	0.026	0.010	0.021	0.046	0.091	0.151	0.082
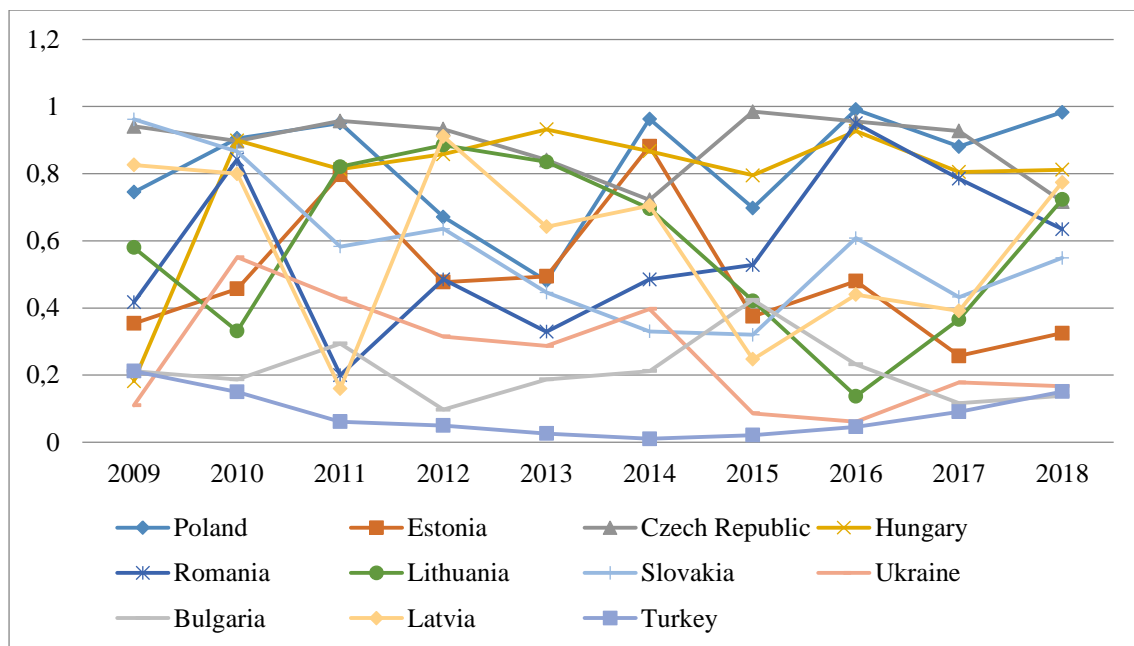
Figure 1. The trend of Grubel-Llyod index of 8439 products in Turkey and CEE countries

GL index values belonging to Turkey and the CEE countries for 8441 product groups were given in Table 3. Moreover, the trend of GL index of 8441 products in Turkey and CEE countries was shown in Figure 2.

When GL index values belonging to Turkey and the CEE countries for 8441 product groups were analyzed, according to both years and the averages of 2009-2018, five (Poland, Romania, Ukraine, Bulgaria, and Turkey) countries were below the value of 0.5. The GL index values of Romania, Ukraine, Bulgaria and Turkey increased in 2018 compared to 2009. The index value of Poland decreased.

According to both years and the averages of 2009-2018, four (Estonia, Czech Republic, Hungary, Lithuania) countries were over the value of 0.5. Slovakia's trade for 8441 products was intra-industry trade except 2009. Estonia's index value increased until 2013 and it declined after this year. In general, the index value of Czech Republic decreased. The index value of Hungary increased in 2018 compared to 2009, while the index value of Lithuania decreased. The index value of the Slovakia declined considerably after 2016.

It was seen that the GL index values of Latvia are fluctuating. When the average index value of Latvia was examined, it was seen that this value was higher than 0.5. The index value of Latvia increased in 2018.

Table 3. Grubel-Llyod index values of countries for 8441product group

| Countries	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2018
Poland	0.262	0.222	0.403	0.281	0.254	0.237	0.249	0.264	0.297	0.396	0.287
Estonia	0.734	0.882	0.782	0.857	0.992	0.818	0.671	0.739	0.672	0.699	0.785
Czech Republic	0.928	0.993	0.915	0.864	0.863	0.759	0.833	0.870	0.779	0.869	0.867
Hungary	0.806	0.587	0.808	0.858	0.727	0.585	0.863	0.708	0.894	0.978	0.782
Romania	0.276	0.283	0.520	0.414	0.328	0.400	0.411	0.351	0.260	0.209	0.345
Lithuania	0.808	0.892	0.998	0.754	0.972	0.808	0.609	0.534	0.726	0.781	0.788
Slovakia	0.481	0.851	0.973	0.870	0.909	0.985	0.847	0.910	0.651	0.650	0.813
Ukraine	0.075	0.110	0.131	0.269	0.098	0.248	0.498	0.198	0.116	0.110	0.185
Bulgaria	0.205	0.376	0.235	0.293	0.459	0.430	0.307	0.252	0.303	0.273	0.313
Latvia	0.747	0.818	0.563	0.482	0.649	0.502	0.275	0.383	0.639	0.908	0.597
Turkey	0.284	0.409	0.318	0.424	0.391	0.287	0.376	0.370	0.531	0.472	0.386
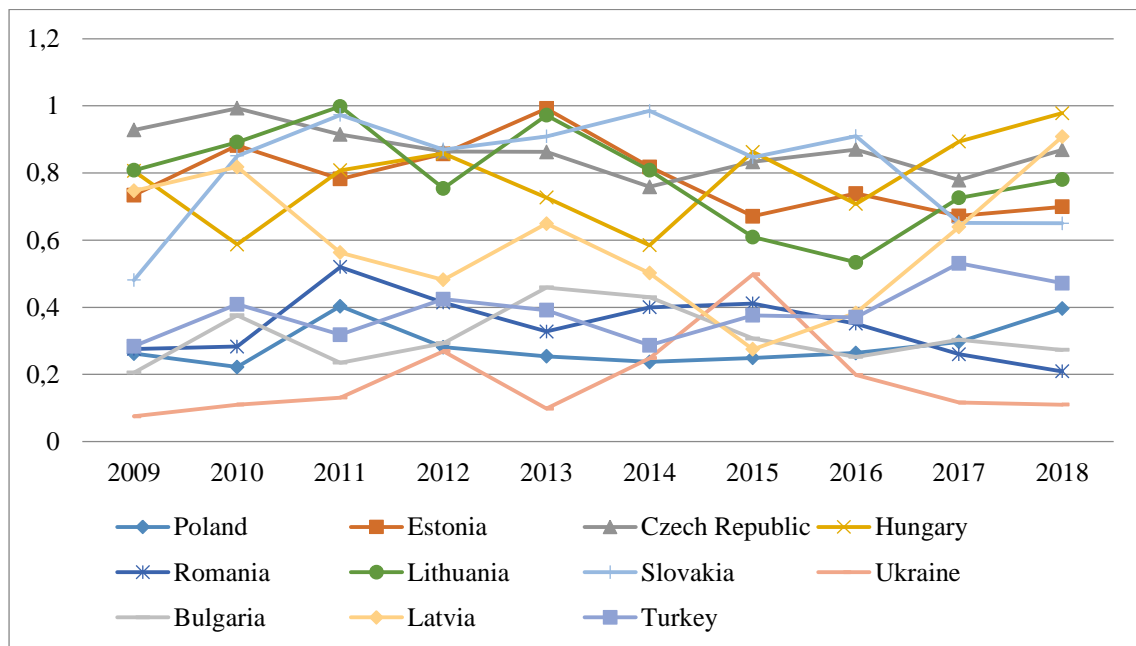
Figure 2. The trend of Grubel-Llyod index of 8441 products in Turkey and CEE countries

The calculations of Brülhart's A and B indices were considered in two periods as 2009-2013 and 2014-2018. Brülhart's A and B index values for 8439 products were given in Table 4 and Figure 3 whereas A and B index values for 8441 products were given in Table 5 and Figure 4 .

According to Table 4 and Figure 3, when the values of foreign trade of 8439 product groups of Turkey and CEE countries were evaluated with Brülhart's A index, it was seen that Slovakia, Ukraine, Bulgaria and Turkey have completely of marginal inter-industry trade in the period of 2009-2013. In the period of 2009-2013, Poland and

Romania had structure of marginal inter-industry trade since A index value was close to 0. Since A index value of Lithuania was close to 1, the marginal trade structure was intra-industry trade. In the period of 2014-2018, A index values of Slovakia and Turkey had not change. In other words, these countries had completely of inter-industry trade structure. In the period of 2014-2018, the marginal trade structure of Poland turned into an intra-industry trade structure. That is, A index value of Poland (0.90) was close to 1. Compared to the 2009-2013 period, there was a change in Estonia's marginal trade structure in the 2014-2018 period. In the period of 2014-2018, it was found that Latvia have the structure of marginal intra-industry trade.

According to Table 4 and Figure 3, when the values of foreign trade of 8439 product groups of Turkey and CEE countries were evaluated with Brülhart's B index, in the period of 2009-2013, the trade flows of Slovakia, Bulgaria and Turkey for 8439 product group were net imports whereas the trade flows of Hungary and Ukraine for this product group were net exports. In the period of 2014-2018, the trade flows of Slovakia and Turkey for 8439 product group were net exports. That is, change in foreign trade of Slovakia and Turkey showed increase towards imports in the period of 2009-2013 whereas this change showed increase towards exports in the period of 2014-2018.

Table 4. Brülhart (A and B) index values for 8439 product group

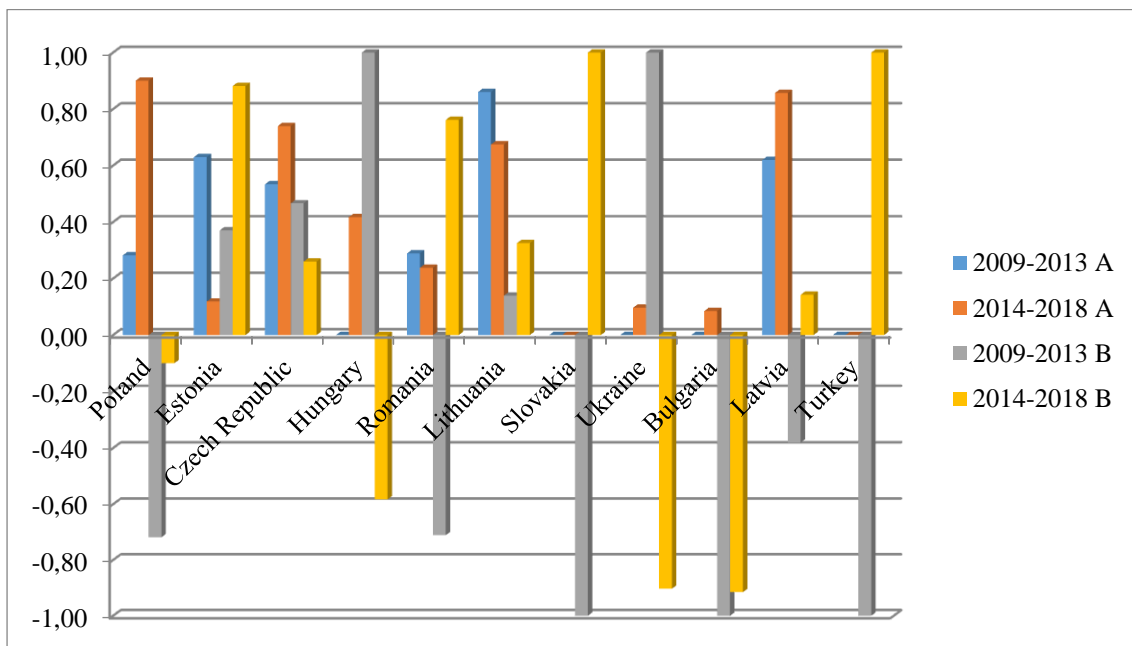| Countries	Brülhart A		Brülhart B	
	2009-2013	2014-2018	2009-2013	2014-2018
Poland	0.28	0.90	-0.72	-0.10
Estonia	0.63	0.12	0.37	0.88
Czech Republic	0.53	0.74	0.47	0.26
Hungary	0.00	0.42	1.00	-0.58
Romania	0.29	0.24	-0.71	0.76
Lithuania	0.86	0.67	0.14	0.33
Slovakia	0.00	0.00	-1.00	1.00
Ukraine	0.00	0.10	1.00	-0.90
Bulgaria	0.00	0.08	-1.00	-0.92
Latvia	0.62	0.86	-0.38	0.14
Turkey	0.00	0.00	-1.00	1.00

Figure 3. Graphical view of Brülhart (A and B) index values for 8439 product group

According to Table 4 and Figure 3, when the values of foreign trade of 8441 product groups of Turkey and CEE countries were evaluated with Brülhart's A index, it was seen that Slovakia has completely of marginal inter-industry trade in the period of 2009-2013. Since A index values of Lithuania(0.97), Bulgaria (0.88), Estonia (0.85) and Czech Republic (0.82) were close to 1, the marginal trade structures were intra-industry trade. In the period of 2014-2018, Czech Republic, Hungary, Romania, Slovakia, Ukraine, Bulgaria, Latvia and Turkey had completely of marginal inter-industry trade.

When the values of foreign trade of 8441 product groups of Turkey and CEE countries were evaluated with Brülhart's B index, the trade flow of Slovakia for 8441 product group was net exports in the period of 2009-2013. In the period of 2014-2018, the trade flows of Romania, Slovakia, Ukraine and Bulgaria for 8441 product group were net imports whereas the trade flows of Czech Republic, Hungary, Latvia and Turkey for this product group were net exports. Slovakia was a net exporter in the period of 2009-2013 whereas it was a net importer in the period of 2014-2018.

Table 5. Brülhart (A and B) index values for 8441 product group

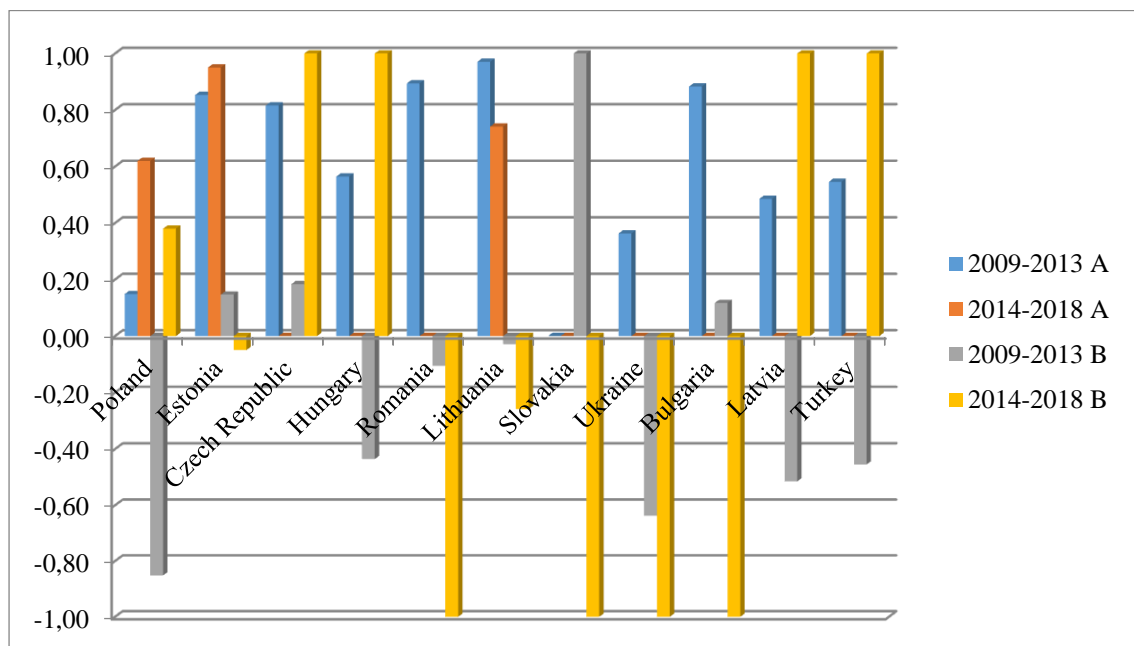| Countries	Brülhart A		Brülhart B	
	2009-2013	2014-2018	2009-2013	2014-2018
Poland	0.15	0.62	-0.85	0.38
Estonia	0.85	0.95	0.15	-0.05
Czech Republic	0.82	0.00	0.18	1.00
Hungary	0.56	0.00	-0.44	1.00
Romania	0.89	0.00	-0.11	-1.00
Lithuania	0.97	0.74	-0.03	-0.26
Slovakia	0.00	0.00	1.00	-1.00
Ukraine	0.36	0.00	-0.64	-1.00
Bulgaria	0.88	0.00	0.12	-1.00
Latvia	0.49	0.00	-0.51	1.00
Turkey	0.55	0.00	-0.45	1.00

Figure 4. Graphical view of Brülhart (A and B) index values for 8441 product group

4. Conclusion and Discussion

In this study, the intra-industry trade of paper pulp, paper and paperboard machines sector of Turkey and CEE countries were analyzed. 2009-2018 period was used in this study. GL index was used as the method. The following conclusions were reached.

When the averages of 2009-2018 of 8439 and 8441 product groups are examined, it was determined that the country having the highest index was Czech Republic. Czech Republic was followed by Poland and Hungary for 8439 product whereas it was followed by Slovakia and Lithuania for 8441. In terms of both the basis of years and average of period, Turkey was country which had lowest index value for 8439 product. The index value of Turkey for 8441product group was also lower. When the averages of 2009-2018 were examined, 5 countries (Czech Republic, Hungary, Lithuania, Slovakia, and Latvia) with an index value above 0.5 for both 8439 and 8441 products were found.

In the periods of 2009-2013 and 2014-2018, the exporting and importing countries for the 8439 and 8441 product groups were as follows; countries which are net exporter for 8439 product in the period of 2009-2013 were Ukraine and Hungary, countries which are net importer for 8439 product in the period of 2019-2013 were Slovakia, Bulgaria and Turkey, countries which are net importer for 8439 product in period of 2014-2018 were Slovakia and Bulgaria, country which is net importer for 8441 product in period of 2009-2013 was Slovakia, countries which are net exporter for 8441 product in period of 2014-2018 were Slovakia, Ukraine and Bulgaria, countries which are net importer for 8441 product in period of 2014-2018 were Czech Republic, Hungary, Latvia and Turkey.

When the analysis results of this study were compared with the study of Narin (2002), it was seen that the similar results. In a study conducted by Narin (2002), it was found that Turkey's intra-industry trade rate was very low (9.71) for machinery and equipment used in paper making. In the study made using standard grubel-llyod and marginal intra-industry trade indeces, trade in chemical products sector of Turkey was found to be generally in the form of inter-industry trade (Kaya and Atış 2007). Şahin (2016b) determined that intra-industry trade is high and competitiveness is low in forest-based sector. In this study, it was found that trade in the furniture sector was realized as intra-industry trade (Şahin 2016a). Kurt and İmren (2018) determined that Turkey is both importer and exporter in products such as capers, soap root, lime, and coriander, exporter in products bay, thyme, mahaleb, mint, fennel and sumac, and importer in products such as nigella and ginger.

According to the obtained results, it is seen that Turkey is dependent on foreign trade for trade in machinery used papermaking. Therefore, necessary incentives should be given to the enterprises producing paper machines.

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