International Business and Global Economy 2023/2024, no. 42, pp. 23-36

Edited by the Institute of International Business, University of Gdańsk ISSN 2300-6102 e-ISSN 2353-9496 https://doi.org/10.20

https://doi.org/10.26881/ibage.2023.42.02

Barbara Majerczyk-Graczykowska

SGH Warsaw School of Economics

# The evolution of Poland's intra-industry trade in transport services in 2004–2020

International intra-industry trade (IIT) is a significant prerequisite for a higher level of economic integration and development of an industry. It enhances benefits of trade, grows economies of scale, lowers production costs and prices, and increases product range. The aim and novelty of this study is to identify and assess changes in Poland's international IIT in transport services that took place in the years 2004–2020 based on an examination of geographical and sectoral structures. One of the main findings concerning Poland's international trade in transport services is that after its accession to the EU, Poland's IIT index in postal and courier services increased, and its IIT index in sea transport, air transport and other modes of transport decreased.

Keywords: intra-industry trade, international trade in services, intra-industry trade in services, transport services

JEL classification: F140, F150, O140

# Introduction

Trade in services is characterized by a high level of intra-industry trade (IIT). Sea, air and other modes of transport services as well as postal and courier services are key subsectors that increase international tradability and play a significant role in international fragmentation of production processes. However, theoretical and empirical studies in this area are not very extensive. Thus, the aim and novelty of this study is to identify and asses changes in Poland's IIT in transport services that took place in the years 2004–2020.

The study verifies the following hypothesis: in the period in question, in the field of international trade in transport services, Poland's IIT shares in sea transport, air transport, other modes of transport and postal and courier services increased (due to economies of scale resulting from the opening of the Polish economy and

European integration<sup>1</sup>). Within the scope of this hypothesis, the following research question will be analysed: in the studied period, did Poland's IIT indices in sea transport, air transport, other modes of transport and postal and courier services increase? As regards the years 2019–2020, the analysis will also be performed in the context of the COVID-19 pandemic.

For the purpose of answering the research question and verifying the hypothesis, Grubel–Lloyd (GL) indices were calculated, and descriptive statistic tools were applied. The data were gathered based on the balance of payments (BOP) using two datasets: EBOPS 2002 and EBOPS 2010.

The article is divided into four main parts. Part one outlines a theoretical background of the concept of IIT, necessary to understand the empirical results presented in part three. Since issues concerning IIT measurement methods are widely discussed in the literature [e.g. Czarny, 2002; Ambroziak, 2013], this work presents only selected publications important for the attainment of the research objectives. Part two provides information on the research methodology, data collection and research limitations. Part three presents the most important results of the analysis of changes in Poland's IIT in transport services in the years 2004–2020 from geographical and sectoral perspectives. Part four presents a general overview of Poland's international trade in transport services, as well as an assessment of the changes that took place in the years 2004–2020. The article ends with scientific conclusions and suggestions for further research.

## 1. Research review

Intra-industry trade is a significant prerequisite for economic integration and development of an industry. It enhances the benefits of trade, grows economies of scale, lowers production costs and prices, as well as increases product range. Economic theories concerning IIT are used intensively in analysing trade in goods. However, research in the area of IIT in services is very limited.

IT in services was first examined by Kierzkowski [1989] with regards to transport services. Other studies were provided i.a. by Lee and Lloyd [2002], on nine service industries on a sample of countries using an OECD database, Shelburne and Gonzalez [2004], on the role of IIT in the service sector, Sichei et al. [2007], on South Africa–US IIT in selected services, Tang et al. [2013], on China's services trade and IIT in services, as well as Blaskova and Skultety [2015], on the measurement of IIT in air transport. Analyses of Polish trade in services with the European Union in the pre-accession and post-accession periods were conducted by Mongiało [2004; 2013].

<sup>&</sup>lt;sup>1</sup> See, e.g., Sichei [2005], according to whom economic integration increases the potential for IIT in services.

The study performed by Lee and Lloyd [2002] is the most acknowledged in the field. According to the authors, there is no reason to separate trade in goods from trade in services in analysing trade flows and their effects on the allocation of resources and the welfare of national residents. Research concerning IIT should cover both goods and services; however, such simultaneous analyses are abandoned due to the fact that there are no comparable classifications of both trade flows. Additionally, the authors examined country-specific determinants of IIT in services such as per capita income, economies of scale, trade barriers and trade imbalances.

It should also be pointed out that separate analyses of vertical (VIIT) and horizontal (HIIT) IIT are basically abandoned in the case of services due to the impossibility to obtain data necessary to conduct appropriate calculations.

## 2. Methodology

The analysis covers the years 2004–2020, i.e. the seventeen years since the accession to the EU and closer economic cooperation between Poland and other EU member states. The sectoral structure was determined by the BOP classification proposed by the OECD at the 3-digit level (Table 1).

EBOPS 2010	EBOPS 2002	Digit level	Industries
SC1	206	3	sea transport <sup>a</sup>
SC2	210	3	air transport <sup>b</sup>
SC3	214	3	other modes of transport <sup>c</sup>
SC4	246	3	postal and courier services <sup>d</sup>

Table 1. Sub-categories ("industries") of transport services

Notes:

<sup>a</sup> Sea transport services cover all international freight and passenger transport services undertaken by seagoing vessels but do not include transport by underwater pipelines (included in pipeline transport) and cruise fares (included in travel) [UN, 2012, p. 45].

<sup>b</sup> Air transport services cover all international freight and passenger transport services provided by aircraft [UN, 2012, p. 45].

<sup>c</sup> EBOPS 2010 distinguishes eight modes of transport: sea, air, space, rail, road, internal waterway, pipeline and electricity transmission. It also identifies other supporting and auxiliary transport services as well as postal and courier services. The remaining modes of transport, besides air transport and sea transport, are a disaggregation of the single BPM6 mode "other transport". For more, see: [UN, 2012, p. 45–46].

<sup>d</sup> Postal and courier services cover the pickup, transport and delivery of letters, newspapers, periodicals, brochures, other printed matter, parcels and packages, post office counter services (sales of stamps, poste restante services and telegram services and mailbox rental services). Postal services are often supplied by national postal administrations. Courier services include all kinds of courier service, e.g., timed, express and door-to-door delivery. For more, see: [UN, 2012, p. 51].

Source: Own elaboration.

When determining "industries", a similar approach was applied as in the case of IIT in goods [see, e.g., Kawecka-Wyrzykowska, 2016; Kawecka-Wyrzykowska et al., 2017, p. 29]. This results from the fact that in general there is no reason to separate trade in goods from trade in services [see: Lloyd, Lee, 2002]. However, due to the impossibility to obtain data necessary to conduct appropriate calculations, this study does not examine HIIT (exchange of varieties) and VIIT (exchange of qualities) [see: Sichei et al., 2007, p. 17].

Services are supplied across national borders by one of four modes: cross-border supply of services (mode 1, known as "cross-border"), supply to a service consumer who moves to the country of the service supplier (mode 2, known as "consumption abroad"), supply by a service supplier who moves to the country of the consumer (mode 3, known as "commercial presence") and supply through the temporary movement of natural persons (mode 4, known as "presence of natural persons"). This study concentrates on the BOP services transactions at the major services level. The data concerning transport services cover (at major services components) cross-border trade (mode 1).

In this work, the simple GL index for bilateral trade flows was adopted. This indicator is the most commonly used measure in studies concerning IIT in goods or services. In addition, the application of bilateral (instead of multilateral) trade eliminates the so-called geographic burden of an IIT measurement. The GL index, which measures the part of balanced trade (overlap between exports and imports) between two countries i and j in total trade of a given industry k, is calculated as follows:

$$GL_{ij}^{k} = \frac{\left[ (X_{ij}^{k} + M_{ij}^{k}) - |X_{ij}^{k} - M_{ij}^{k}| \right]}{X_{ij}^{k} + M_{ij}^{k}} = 1 - \frac{\left| X_{ij}^{k} - M_{ij}^{k} \right|}{X_{ij}^{k} + M_{ij}^{k}}$$

where  $X_{i,j}^k$  anf  $M_{i,j}^k$  denote, respectively, exports of k by a country i to a country j and imports of k by the country i from the country j over one particular year (IIT is interpreted as the balanced part of bilateral trade flows). This index is contained between 0 and 1 (alternatively 0–100%) and the higher the value, the larger the share of balanced trade in total trade of k between said countries. There is no threshold for the GL index beyond which total trade can be categorically described as being dominated by its IIT component. However, according to the practice pioneered by Grubel and Lloyd [1975], in the empirical literature IIT is usually said to be dominant for a GL index larger than two-thirds (GL > 0.66 = 66%). The GL indices can be aggregated across industries (as a trade-weighted average of industry indices) or across partners (as a trade-weighted average of bilateral indices).

## 3. Empirical results

#### 3.1. General remarks

In 2004–2020, the value of Poland's exports of services increased over 4.9 times, while the value of imports of services increased almost 3 times [OECD]. Poland recorded a positive balance of trade in services in that period. In 2004, the surplus was very small, while in 2020 it amounted to almost 26 billion USD (after an almost uninterrupted period of growth, except for 2015).

Despite the above, the share of IIT in total trade decreased (Figure 1). In 2004, IIT constituted 58% of total trade in services. The highest value was recorded in 2008 (60.3%); in the following years, the importance of two-way exchange in trade in services decreased to reach 53.9% in 2019 and 54.9% in 2020. Interestingly, growth was also noted during the 2007–2009 global financial crisis (GFC) and the COVID-19 crisis. The high level of IIT in 2004 resulted probably from its relatively high value and fast growth before the accession to the EU.



Figure 1. Poland's IIT index in total trade in services, 2004–2020 Source: Own calculations based on: [OECD].

The highest IIT indices were recorded in Poland's trade with many EU members and the lowest with non-EU countries (Table 2). IIT proved quite resistant to the GFC and the COVID-19 crisis.

						5	-								
		Service	S	Se	a transp	ort	A	ir transpo	ort	0 °	ther modent transport	les ort	Posté	al and co services	urier
Partner	2004	2020	Change	2004	2020	Change	2004	2020	Change	2004	2020	Change	2004	2020	Change
Argentina	0.13	0.15	0.01	0.00	0.24	0.24	0.00	0.00	0.00	0.25	0.00	-0.25	*	*	*
Australia	0.32	0.54	0.22	1.00	0.33	-0.67	0.92	1.00	0.08	0.67	0.28	-0.39	*	1.00	*
Austria	0.63	0.61	-0.02	0.82	0.72	-0.11	0.89	0.56	-0.33	0.77	0.62	-0.15	1.00	0.85	-0.15
Belgium	0.59	0.55	-0.04	0.88	0.77	-0.10	0.77	0.31	-0.46	0.66	0.50	-0.16	0.50	0.12	-0.38
Bulgaria	0.25	0.42	0.17	0.67	0.45	-0.22	0.61	0.78	0.17	06.0	0.59	-0.31	*	0.34	*
Brazil	0.59	0.47	-0.12	1.00	0.44	-0.56	1.00	0.56	-0.44	0.36	0.47	0.11	*	0.00	*
Canada	0.44	0.59	0.14	0.46	0.78	0.31	0.35	0.80	0.45	0.48	0.40	-0.08	0.67	1.00	0.33
Switzerland	0.41	0.36	-0.06	0.41	0.32	-0.09	0.85	0.86	0.01	0.42	0.29	-0.14	0.20	0.31	0.11
Chile	0.00	0.15	0.15	0.00	0.00	0.00	0.00	0.29	0.29	*	0.35	*	*	*	*
China (People's Republic of)	0.32	0.53	0.21	0.26	0.24	-0.02	1.00	0.51	-0.49	0.24	0.86	0.61	*	0.0	*
Croatia	0.06	0.27	0.21	0.50	0.02	-0.48	0.80	0.78	-0.02	0.67	0.87	0.20	*	0.88	*
Cyprus	0.39	0.47	0.09	0.98	0.10	-0.88	0.75	0.79	0.04	0.38	0.63	0.25	*	0.00	*
Czech Republic	0.69	0.77	0.08	0.64	0.18	-0.46	0.95	0.83	-0.12	0.85	0.68	-0.16	1.00	0.99	-0.01
Germany	0.62	0.58	-0.04	0.87	0.64	-0.23	0.89	0.85	-0.03	0.76	0.36	-0.40	0.74	0.91	0.18
Denmark	0.60	0.51	-0.09	0.62	0.24	-0.38	06.0	0.96	0.06	09.0	0.47	-0.13	0.50	0.64	0.14
Egypt	0.02	0.25	0.23	0.05	0.29	0.24	0.13	0.59	0.46	0.67	0.13	-0.54	*	*	*
Spain	0.58	0.62	0.05	0.94	0.70	-0.23	0.49	0.97	0.47	0.96	0.49	-0.46	0.67	0.52	-0.15
Estonia	0.48	0.62	0.15	0.55	0.63	0.09	0.44	0.54	0.10	0.47	0.91	0.45	*	0.49	*
Finland	0.59	0.44	-0.15	0.97	0.46	-0.51	0.80	0.92	0.12	0.92	0.37	-0.56	*	1.00	*

~	
-	
<u>≍</u>	
č	
ų	
<u>_</u>	
τj.	
F	
8	
· Ħ	
_	
5	
1	
60	
- 57	
<u> </u>	
$\mathcal{O}$	
e	
- 60	
_	
(Ú	
- I	
<u> </u>	
0	
2	
0	
$\sim$	
4	
Ó	
ō	
$\overline{\sim}$	
ഹ്	
័រ	
õ	
>	
ч	
e	
ŝ	
~	
. 1	
H	
Ĥ	
Ţ	
ŝ	
<u>~</u>	
୍ର	
Ц	
5	
0	
<u> </u>	
<u> </u>	
7	
0	
L	
5	
.ĭ	
<u> </u>	
7	
0	
>	
[1]	
_	
i	
1.1	
e	
-	
-9	
μ_	
L	

urier	-0.34	-0.05	*	*	*	-0.56	*	*	*	*	*	*	-0.13	0.42	*	*	0.37	*	*	*	*	*
al and co services	0.41	0.70	1.00	*	0.85	0.44	*	1.00	1.00	*	0.00	*	0.62	0.42	0.85	0.00	0.37	0.89	0.32	0.00	*	*
Post	0.75	0.75	*	*	*	1.00	*	*	*	*	*	0.00	0.75	0.00	*	*	0.00	*	*	*	*	*
les ort	-0.46	0.01	* *	*	0.41	-0.22	0.37	0.09	-0.36	*	0.47	*	-0.53	0.54	0.16	-0.14	-0.03	-0.75	0.49	-0.79	-0.46	-0.77
ther moc f transpc	0.32	0.44	*	*	0.70	0.65	0.77	0.76	0.27	*	0.69	*	0.36	0.97	0.66	0.10	0.93	0.08	0.95	0.21	0.54	0.23
0 0	0.78	0.43	0.62	*	0.29	0.86	0.40	0.67	0.63	*	0.22	0.50	0.89	0.43	0.50	0.24	0.96	0.83	0.46	1.00	1.00	1.00
ort	0.12	-0.07	-0.01	*	0.35	-0.32	0.53	0.02	-0.73	*	0.00	*	-0.25	0.27	-0.33	*	0.28	-0.04	0.07	0.73	0.94	0.89
ir transpo	0.94	0.92	0.72	*	0.85	0.49	0.53	0.69	0.27	*	1.00	*	0.66	0.83	0.58	0.00	0.65	0.62	0.82	0.73	0.94	0.89
A	0.82	96.0	0.73	*	0.50	0.81	0.00	0.67	1.00	0.00	1.00	0.51	0.91	0.56	0.91	*	0.37	0.67	0.75	0.00	0.00	0.00
ort	-0.61	-0.57	-0.72	*	-0.13	-0.20	0.00	-0.01	-0.31	*	0.48	*	-0.35	0.16	0.43	*	-0.25	0.14	-0.07	-0.02	0.52	-0.31
ea transp	0.24	0.34	0.04	*	0.49	0.49	1.00	0.79	0.44	*	0.77	*	0.64	0.45	0.85	*	0.56	0.47	0.25	0.42	0.52	0.28
Se	0.85	0.91	0.76	*	0.62	0.69	1.00	0.80	0.75	*	0.29	0.00	0.99	0.28	0.42	1.00	0.81	0.33	0.31	0.44	0.00	0.59
	0.00	0.04	-0.08	*	0.02	-0.06	-0.09	0.34	0.12	*	0.34	*	0.02	0.12	-0.02	-0.04	0.13	-0.08	0.11	0.01	0.37	-0.25
Services	0.55	0.60	0.21	*	0.32	0.65	0.25	0.66	0.59	*	0.55	*	0.56	0.51	0.27	0.14	0.72	0.29	0.56	0.17	0.45	0.15
	0.55	0.55	0.30	* *	0.31	0.71	0.33	0.31	0.47	0.44	0.21	0.35	0.54	0.39	0.28	0.18	0.59	0.37	0.45	0.17	0.08	0.40
	France	United Kingdom	Greece	Greenland	Hong Kong (China)	Hungary	Indonesia	India	Ireland	Iran	Iceland	Israel	Italy	Japan	Korea	Liechtenstein	Lithuania	Luxembourg	Latvia	Morocco	Mexico	Malta

ourier	*	*	-0.04	0.63	*	*	*	*	-0.46	*	*	*	-0.77	*	*	*	*	0.37	*	*
al and cc services	0.00	*	0.96	0.63	*	0.00	1.00	0.35	0.54	0.00	0.93	0.25	0.23	0.00	0.00	0.00	*	0.97	*	*
Post	*	*	1.00	0.00	*	*	*	*	1.00	*	*	*	1.00	*	*	*	*	0.60	*	*
les ort	0.71	*	-0.34	-0.65	*	*	* *	0.24	0.04	-0.28	-0.16	-0.36	-0.46	0.50	-0.05	-0.01	0.00	0.08	*	-0.18
ther mod f transpo	0.71	0.00	0.34	0.12	0.42	1.00	* *	0.79	0.35	0.72	0.67	0.54	0.20	1.00	0.67	0.56	0.00	0.84	*	0.32
0 0	0.00	*	0.67	0.76	*	*	0.83	0.55	0.31	1.00	0.84	0.90	0.66	0.50	0.72	0.57	0.00	0.76	1.00	0.50
ort	0.88	*	-0.15	-0.29	0.40	*	0.12	-0.16	0.09	0.47	-0.19	0.38	0.00	0.21	0.02	0.89	*	0.07	*	-0.34
ir transp	0.88	0.00	0.83	0.71	0.40	0.34	0.78	0.57	0.86	0.97	0.52	0.88	0.59	0.61	0.88	0.89	0.00	0.85	*	0.06
A	0.00	*	0.98	1.00	0.00	*	0.67	0.74	0.77	0.50	0.71	0.50	0.59	0.40	0.86	0.00	*	0.78	*	0.40
ort	-0.32	*	-0.54	-0.57	-1.00	*	0.22	-0.03	* *	-0.08	-0.56	-0.63	-0.17	0.00	-0.49	-0.11	*	-0.12	*	-0.67
ea transp	0.35	**	0.38	0.18	0.00	0.76	0.72	0.47	* *	0.25	0.14	0.37	0.63	1.00	0.51	0.44	*	0.83	*	0.33
Se	0.67	*	0.92	0.75	1.00	*	0.50	0.50	0.79	0.33	0.70	1.00	0.80	1.00	1.00	0.55	*	0.95	*	1.00
	0.51	* *	0.03	-0.24	-0.34	0.46	00.0	0.16	-0.12	-0.11	0.19	-0.12	-0.19	0.23	0.18	0.04	00.0	-0.08	*	0.05
Services	0.55	* *	0.59	0.41	0.32	0.46	0.52	0.71	0.40	6£.0	0.81	0.62	0.51	0.42	0.48	0.42	00.0	0.53	*	0.28
	0.05	0.00	0.56	0.65	0.67	00.00	0.53	0.54	0.52	0.50	0.63	0.74	0.70	0.19	0.30	0.38	0.00	0.61	1.00	0.23
	Malaysia	Nigeria	Netherlands	Norway	New Zealand	Philippines	Portugal	Romania	Russia	Singapore	Slovak Republic	Slovenia	Sweden	Thailand	Turkey	Chinese Taipei	Uruguay	United States	Venezuela	South Africa

Table 2. cont.

Notes: \* invalid index (divided by zero error), \*\* invalid index.

Source: Own calculations based on: [OECD].

# 3.2. Changes in the geographical structure

From the geographical perspective (GL indices aggregated across industries as a trade-weighted average of industry indices and across partners as a traded-weighted average of bilateral indices), the analysis revealed four basic cases of Poland's bilateral IIT in each of the transport "industries" (Table 2):

- 1. IIT index in 2004 above 0.58, constituting the average overall IIT level as presented in Figure 1, and even higher in 2020:
  - air transport with EU-members (Cyprus, Denmark, Finland, France, Latvia, Portugal, Bulgaria) and non-EU-members (Australia, Switzerland, India, Russia, Turkey, the US),
  - other modes of transport with Croatia, India and the US,
  - postal and courier services with Canada, Germany, Italy, the US however, in this case data for most of the partners are not comparable due to an invalid IIT index resulting from the "divided by zero error";
- 2. IIT index in 2004 above 0.58 but decreased in 2020:
  - sea transport with EU-members (Austria, Belgium, Cyprus, the Czech Republic, Germany, Denmark, Spain, Finland, France, the UK, Greece, Hungary, Ireland, Italy, Lithuania, Malta, the Netherlands, the Slovak Republic, Slovenia, Sweden, Bulgaria) and non-EU-members (Australia, Brazil, Hong Kong, India, Malaysia, New Zealand, Norway, Russia, the US, Turkey),
  - air transport with EU-members (Austria, Belgium, the Czech Republic, Germany, the UK, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, the Slovak Republic, Croatia, Romania) and non-EU-members (Brazil, China, Korea, Norway),
  - other modes of transport with EU-members (Austria, Belgium, the Czech Republic, Germany, Denmark, Spain, Finland, France, Greece, Hungary, Ireland, Italy, Lithuania, Malta, the Netherlands, Portugal, the Slovak Republic, Slovenia, Sweden, Bulgaria) and non-EU-members (Australia, Egypt, Morocco, Mexico, Norway, Singapore, Turkey),
  - postal and courier services with the Czech Republic, Spain, France, the UK, Hungary, Italy, the Netherlands, Sweden and Russia;
- 3. IIT index in 2004 below 0.58 but increased in 2020:
  - sea transport with EU-members (Estonia, Luxembourg, Portugal) and non-EU-members (Argentina, Canada, Egypt, Iceland, Japan, Korea, Mexico),
  - air transport with EU-members (Spain, Estonia, Lithuania, Malta, Slovenia) and non-EU-members (Canada, Chile, Egypt, Hong Kong, Indonesia, Japan, Morocco, Mexico, Malaysia, New Zeeland, Singapore, Thailand),
  - other modes of transport with EU-members (Cyprus, Estonia, Latvia, the UK, Romania) and non-EU-members (Brazil, China, Hong Kong, Indonesia, Iceland, Japan, Korea, Malaysia, Russia, Thailand),

- postal and courier services with EU-members (Denmark, Lithuania) and non-EU-members (Switzerland, Japan, Norway, the US);
- 4. IIT index in 2004 below 0.58 and even lower in 2020:
  - sea transport with EU-members (Latvia, Croatia, Romania) and non-EU--members (Switzerland, China, Morocco, Singapore),
  - air transport with South Africa,
  - other modes of transport with Canada, Switzerland and South Africa,
  - postal and courier services with Belgium.
- 3.3. Changes in the sectoral structure

From the sectoral perspective (GL indices aggregated across industries as a trade-weighted average of industry indices), the analysis revealed only two cases of Poland's IIT in each of the transport "industries" (Figure 2):

- 1. IIT index in 2004 above 0.58, constituting the average overall IIT level as presented in Figure 1, and even higher in 2020 (this applied to postal and courier services),
- 2. IIT index in 2004 above 0.58 but decreased in 2020 (this applied to sea transport, air transport and other modes of transport).

In 2004, IIT indices in all subsectors were above the average overall IIT level (Figures 1 and 2), i.e. 82.3% for sea transport, 82.4% for air transport, 67.8% for other modes of transport and 69.7% for postal and courier services. In the case of sea transport and air transport, big changes were noted after the GFC. In 2020, IIT indices in air transport as well as postal and courier services were above the average (70.6% and 78.4%, respectively) and for sea transport and other modes of transport – below the average (38.3% and 41.3%, respectively).



→ 206\_SC1 - sea transport → 210\_SC2 - air transport → 214\_SC3 - other modes of transport → 246\_SC4 - postal and courier services Figure 2. Poland's IIT in transport "industries", 2004–2020 Source: Own calculations based on: [OECD].

## 4. Discussion

In the transport sector, the greatest shares in Poland's total services exports were noted in other modes of transport (20% in 2004, 22% in 2019, 24.7% in 2020; Figure 3). The biggest decrease was recorded in sea transport and air transport. Postal and courier services oscillated between 0.2% in 2004 and 0.6% in 2020. The greatest shares in Poland's services imports were noted in other modes of transport (11.5% in 2004, 12.6% in 2020; Figure 4).



Figure 3. Shares of transport "industries" in Poland's total services exports, 2004–2020 Source: Own calculations based on: [OECD].



Figure 4. Shares of transport "industries" in Poland's total services imports, 2004–2020 Source: Own calculations based on: [OECD].

Poland's net trade in air transport and sea transport decreased not only as a result of the COVID-19 crisis; the general tendency in sea transport was unfavourable from 2007, and in air transport – in 2007–2009 and again from 2014. Lower net trade values in 2020 in comparison to 2019 are related with the far-reaching solutions implemented to reduce the spread of COVID-19 (e.g. border sanitary control, mandatory self-quarantine for travellers) and the differences in the size of lockdown areas. Interestingly, export shares are higher in 2020 in comparison to 2019 for sea transport (0.8% in 2019 and 1% in 2020), which may also result from changing transport channels from air to sea.

In the case of remaining transport services (other modes of transport, such as space, rail, road, internal waterway, pipeline and electricity transmission, as well as postal and courier services), some positive signals (including increase in exports) were observed despite the COVID-19 crisis. These resulted from Poland's social distancing and stay-at-home policy, which in many parts of the world led to a mass transition to other modes of transport [Monterde-i-Bort et al., 2022] and postal and courier services as a way to connect with people and provide them with vital goods [Chołodecki, 2021].

In 2004, other modes of transport had the best position among transport services and this was still the case in 2020, not only because of competitive costs (especially delivery costs to the EU market), but also the expansion of available products, creation of new direct supply chains, as well as the development of outsourcing, fright, logistics and warehouse services. Poland is improving its position in road transport due to the expansion of the road and highway network, European rail and logistics systems [Ambroziak, Stefaniak, 2022].

The analysis performed from the geographical perspective revealed that Poland noted the highest IIT indices with developed economies (especially members of the EU, due to the lowest trade barriers). This seems to confirm that trade barriers between trading partners are one of the most important factors influencing international trade. Some variables affect such an exchange positively (e.g. lower average level of barriers between partners, membership in the same preferential trade agreements, similar size of economies, geographical proximity, common border) and some negatively (e.g. different size of economies, different per capita income levels) [see: Ambroziak, 2013; Czarny, 2002].

The analysis performed from the sectoral perspective revealed a clear difference in the intensity of IIT in selected transport "industries". The results seem to suggest that factors influencing those values are related with EU membership.

# Conclusions

Not all of the results of the study are consistent with the research hypothesis. A positive answer to the research question was obtained in the case of postal and courier services and negative answers were obtained in the case of sea transport, air transport and other modes of transport (largely confirming the preliminary findings of Mongiało [2013]).

The results suggest that factors influencing IIT in transport services are related with EU membership, which did not contribute to the intensification of IIT in transport "industries" in the analysed period (it is more profitable to offer inter-industry than intra-industry transport services). This finding contributes to the discussion on possible actions to be taken at the macro-, meso- and microeconomic levels in order to change economic policies and develop strategies for the development of transport "industries".

Due to the above, there is a need for further geographical and sectoral research on IIT in transport "industries" of other EU member states, as well as on determinants of IIT in transport "industries".

#### References

- Ambroziak A.A., Stefaniak J., 2022, *The position of China in trade in services within the European Union*, Oeconomia Copernicana, no. 2.
- Ambroziak Ł., 2013, Wpływ bezpośrednich inwestycji zagranicznych na handel wewnątrzgałęziowy państw Grupy Wyszehradzkiej, Instytut Badań Rynku, Konsumpcji i Koniunktur, Warszawa.
- Blaskova M., Skultety F., 2015, U.S. intra-industry trade in air transport services: Measurement and results, Transport Problems, no. 2.
- Chołodecki M., 2021, The impact of the COVID-19 pandemic on the postal market: Challenges and opportunities for the postal regulatory framework, paper presented at the 29th Conference on Postal and Delivery Economics, Italy, Florence, fsr.eui.eu/wp-content/uploads/2021/02/3A-03R.pdf [access: 11.11.2024].
- Czarny E., 2002, *Teoria i praktyka handlu wewnątrzgałęziowego*, Monografie i Opracowania / Szkoła Główna Handlowa, no. 496.
- Grubel H.G., Lloyd P.J., 1975, Intra-industry trade: The theory and measurement of international trade in differentiated products, Wiley, New York.
- Kawecka-Wyrzykowska E., 2016, Changes in types of Poland's intra-industry trade in the period 1995–2014 in comparison with the other Central and Eastern European countries – EU members: Conclusions for changes in the competitiveness of Polish foreign trade, International Business and Global Economy, no. 35.
- Kawecka-Wyrzykowska E., Ambroziak Ł., Molendowski E., Polan W., 2017, Intra-industry trade of the new EU member states: Theory and empirical evidence, PWN, Warszawa.
- Kierzkowski H., 1989, Intra-industry trade in transportation services [in:] Intra-industry trade: Theory, evidence and extensions, eds. P.K.M. Tharakan, J. Kol, Macmillan, London.

- Lee H., Lloyd P., 2002, Intra-industry trade in services [in:] Frontiers of research in intra-industry trade, eds. P.J. Lloyd, H. Lee, Palgrave, New York.
- Mongiało D., 2004, Handel usługami Polski z Unią Europejską w okresie przedakcesyjnym, Ekonomia, no. 15.
- Mongiało D., 2013, Wpływ akcesji Polski do Unii Europejskiej na handel usługami, Wiadomości Statystyczne, no. 2.
- Monterde-i-Bort H., Sucha M., Risser R., Honzickova K., 2022, A European-wide study on the effects of the COVID-19 threat on active transport modes, Sustainability, no. 6.
- OECD, n.d., Data explorer, stats.oecd.org [access: 1.01.2022].
- Shelburne R.C., Gonzalez J.G., 2004, *The role of intra-industry trade in the service sector* [in:] *Empirical methods in international trade*, ed. M.G. Plummer, Edward Elgar Publishing, Cheltenham.
- Sichei M.M., 2005, South Africa-US intra-industry trade in services, PhD thesis, University of Pretoria, repository.up.ac.za/bitstream/handle/2263/28201/00front.pdf?sequence=1&isAllowed=y [access: 11.11.2024].
- Sichei M.M., Harmse C., Kanfr F., 2007, *Determinants of South Africa-US intra-industry trade in services: A wild bootstrap dynamic panel data analysis*, South African Journal of Economics, no. 3.
- Tang Y., Zhang Y., Findlay C., 2013, What explains China's rising trade in services?, Chinese Economy, no. 6.
- UN, 2012, *Manual on statistics of international trade in services 2010*, rev. ed., United Nations, Geneva, Luxemburg, Madrid, New York, Washington D.C.

B. Majerczyk-Graczykowska (🖂) b\_majerczyk@yahoo.com