

Empirical Paper

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Intra-EU vs. extra-EU trade in ICT services

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Abstract: The position of information and communication technology (ICT) services is growing in the European Union (EU) trade, however to different extent in different EU countries. The article aims to identify trade positions of the EU Member States in intra-EU trade and extra-EU trade in ICT services and to assess changes that have taken place in the years 2013–2018. The importance of the EU Member States in trade in ICT services is assessed, followed by the analysis of their trade positions in terms of selected indices. We discovered that countries of the highest importance for the intra-EU and extra-EU trade in ICT services are not holding the best positions in trade in this area, except for Ireland. Additionally, leaders in ICT services trade do better in extra-EU trade rankings than in the EU Internal Market, since the distance does not matter to business operations consequent to the digitalization of economic activities.

Keywords: ICT services, extra-EU trade, intra-EU trade, services trade, RSCA

JEL Classification: F15, F55, O52

1 Introduction

Technological development and the servitization of economies has transformed most of the world's economies into e-economies, with highly technologically advanced services such as information and communication technology (ICT) services playing an important role. The importance of ICT services to economies derives from their being an essential factor in the promotion of growth, innovation, and competitiveness of economic sectors (e.g., transport [Kos-Łabędowicz, 2018]), public administration [Linhartová and Tvrdíková, 2018], or regions [Turečková, 2016], as well as of trade itself [Nath and Liu, 2017]. There is an abundance of literature dealing with the topic of ICT productivity [Spiezia, 2012; Cardona et al., 2013; Goodridge et al., 2019] or its competitiveness [Psychoyios and Dotsi 2018]; however, there is a gap in recent research and literature (with full respect to previous works by Dunnewijk and Meijers, [2008]) on trade aspects, especially on the position of intra-European Union (EU) trade and extra-EU trade in ICT services. In our opinion, ICT services owe their crucial importance in international trade to the fact that they promote the dissemination of information and knowledge by separating the content from physical locations. The most significant effect of this dissemination consists in the elimination of geographical boundaries, which are not obstacles anymore to the provision of some services, especially those which are linked with the flow of information or data, and which therefore facilitate international trade. ICT services make information, knowledge, and some other services (e.g., accounting services) accessible, theoretically speaking, to everyone.


From the global trade perspective, ICT services seem to experience the most dynamic growth among all services. This growth can be explained by a variety of factors which influence trade in ICT services


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such as globalization, servitization, and digitalization of economies, especially of economic entities, economic and technical advancement, or, nowadays, unexpected effects caused by the pandemic. The same developments can be observed in the EU. Although, consequent to the existence of the European Internal Market, trade in services is regulated differently within the EU Internal Market and differently for relations with non-EU Member States, differences in regulatory frameworks between the intra-EU trade and extra-EU trade also seem to matter for the structure and directions of exports and imports of ICT services.

The article aims to identify trade positions of the EU Member States in intra-EU and extra-EU trade in ICT services and to assess changes that have taken place in the years 2013–2018. To this end, first, the methodology and data description are presented. Thereafter, the general statistical evidence on the EU trade in services is analyzed, followed by the assessment of the trade positions of the EU Member States in intra-EU and extra-EU trade in ICT services. Consequent to the absence of any comparable previous research, we see our article as a preliminary introduction to the extended research on the services market, including transborder trade in the EU. The article is finished with conclusions.

2 Methodology and Data

To analyze changes in the intra-EU and extra-EU trade in services, the authors first focused on the value, direction (intra-EU and extra-EU), and importance of the EU Member States to the European trade in ICT services. Thereafter, the analysis of the trade position is undertaken by comparing trade indices, such as the Revealed Symmetrical Comparative Advantage (RSCA), with the trade balance index. Both these indices are relative measures that consider the values for a reference group.

To ascertain the importance of any service in exports of a given country, the Balassa's [1965] revealed comparative advantage (RCA) index is usually used [Deardoff, 1985; Langhammer, 2004; Markusen et al., 2005; Ambroziak, 2018]. It measures a country's exports of a commodity in relation to its total exports and the corresponding export performance of a set of exporters to the same market [Stefaniak-Kopoboru and Kuczevska, 2016]. However, as the RCA is non-symmetric (having values only above 0 with the neutral point at 1), we decided to apply the RSCA index, which was proposed by Laursen [1998] with the following formula:

$$RSCA = \left(RCA_j^i - 1 \right) / \left(RCA_j^i + 1 \right), \quad (1)$$

where

$$RCA_{ex;j}^i = \left(\frac{x_j^i}{\sum x_j^i} \right) / \left(\frac{x_j^{EU}}{\sum x_j^{EU}} \right) \quad (2)$$

and x_j^i represents the value of exports of service j of a country i (to the EU internal market or outside the EU), and x_j^{EU} represents the value of exports of service j within a reference group.

The above index allows us to identify a country to be holding a comparative advantage in exports (for index above 0) or comparative disadvantage (index below 0). Based on that, we can identify countries that specialize in trade in ICT services. As the reference group, we used the total intra-EU trade in ICT services for the assessment of each EU country's trade position in intra-EU trade, and, respectively, the total extra-EU trade, thereby facilitating the determination of their trade positions in extra-EU trade.

The RSCA index focuses on the relative export performance, neglecting net trade flows and intra-industry trade; so as to grasp trade in both directions (exports and imports), we decided to apply the Lafay index (LFI) [1992]. It takes the difference between each item's normalized trade balance and the overall normalized trade balance (the sum of the index across sector j for any of year must by design be equal to zero) and weights each product's contribution according to the respective importance in trade [Platania et al., 2015].

The implicit assumption is that cyclical factors influence aggregate and disaggregate trade flows in the same way. Moreover, it also controls for distortions induced by macroeconomic fluctuations [Caselli and Zaghini, 2005]. The LFI is defined as:

$$LFI_j^i = 100 \left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum (x_j^i - m_j^i)}{\sum (x_j^i + m_j^i)} \right) * \frac{x_j^i + m_j^i}{\sum (x_j^i + m_j^i)}, \quad (3)$$

where x_j^i represents the value of exports of service j by a country i to the EU internal market or outside of the EU, and m_j^i represents the value of imports of service j by a country i from the EU internal market or from outside of the EU, respectively.

The index can be positive or negative. If $LFI > 0$, it indicates reliance on exports, which contributes to a positive trade balance which is higher than in the reference group, while $LFI < 0$ describes a positive net trade balance; however, a value which is lower than that in the reference group or dependence on imports indicates a negative trade balance of a country.

To appraise the trade position of a country, the two aforementioned indices must be observed simultaneously. We decided to distinguish four main groups to find out trade positions of the EU Member States based on the values of these indices. The first group consists of countries that are in the best trade position having both: a comparative advantage (export specialization) and a positive trade balance which is better than in the reference group. The second group consists of countries that hold a comparative advantage, but their net trade performance is worse than that in the reference group. Countries in the third group have a positive net trade balance but no comparative advantage. The last group includes countries with the worst trade position for which the comparative disadvantage is mixed with a negative balance trade index.

The definition of ICT services is well established and covers all activities that are ‘intended to enable and/or fulfil the function of information processing and communication’ [UNCTAD, 2015, p. 3]. As there is no single classification of the ICT services, for the article, we decided to use the classification based on the Manual on Statistics of International Trade in Services 2010 [MSITS, 2010]. The ICT services are classified within this manual as ‘telecommunications, computer, and information services’ (Section SI of MSITS, 2010) that are further divided into three sub-sections¹. However, on account of the limitation of data and massive gaps in data published for ICT sub-sections, we analyze the total value of ICT services without breaking them into sub-sections.

Data on trade in ICT services presented in the article come from the Eurostat database and are presented according to the Eurostat Balance of Payments Services Classification (EBOPS 2010) in accordance with MSITS 2010. The analysis covers years 2013–2018, however, as for those member states where there are some limitations in the data for 2013, we used the earliest available ones to present changes in trade positions for most of the EU countries. The data pertaining to the UK and Malta were excluded from the examination of trade positions since these countries do not report data on ICT services’ exports and imports.

3 Empirical Results

Regarding the trade position, the findings which were obtained from calculations based on the indices are presented in two parts. First, the general overview of the situation in the ICT services trade is described based on statistical evidence; then, trade positions of the EU Member States in intra-EU and extra-EU trade are discussed in detail. The results of the calculations are shown in Appendix 1.

¹ Those sub-sections are: 1) telecommunications services (broadcast or transmission of sound, images, data, or other information), 2) computer services (hardware- and software-related services and data processing services), and 3) information services (news agency services and other information services).

3.1 General statistical evidence on the EU trade in ICT services

The European trade in ICT services increased significantly over the past 5 years (by 49.6%); however, its share in the total EU trade in services is not significant (11.5% in 2013 vs. 12.8% in 2018) [Eurostat, 2019]. Over the whole of the analyzed period, the volume of the intra-EU trade exceeded the extra-EU trade (57.4% vs. 42.9%) (Table 1). However, with regard to the trade directions, the volume of ICT services traded in the EU Internal Market increased dynamically (by 42.9%), and the growth of the extra-EU trade was more significant (57.4%). Consequently, the share of the intra-EU trade in the total trade in ICT services has decreased from 53.6% in 2013 to 51.1% in 2018 with regard to the increased share of the extra-EU trade (46.4% in 2013 up to 48.9% in 2018).²

As for the importance of the EU Member States regarding the volume of trade in ICT services and their share in the total EU trade, we noted that the same countries were leaders in intra- and extra-EU trade. Ireland was the unquestionable leader in the ICT services trade, both for the intra-EU and extra-EU trade (Table 2). In 2013, the share of Irish trade in intra-EU total trade in ICT services accounted for 20.7% and increased up to 26.9% in 2018. As for the extra-EU share, the leading position of Ireland is even more

Table 1. Trade in ICT services: intra-EU and extra-EU trades (2013–2018)

	2013	2014	2015	2016	2017	2018
Intra-EU trade						
Volume (million €)	97,588.7	103,068.2	113,199.7	120,675.9	129,039.3	139,409.2
Dynamics (2013 = 100)	100.0	105.6	116.0	123.7	132.2	142.9
Share in the EU total trade in ICT services (%)	53.6	53.8	50.4	52.0	51.0	51.1
Extra-EU trade						
Volume (million €)	84,622.9	88,602.0	111,243.5	111,299.8	123,910.4	133,189.9
Dynamics (2013 = 100)	100.0	104.7	131.5	131.5	146.4	157.4
Share in the EU total trade in ICT services (%)	46.4	46.2	49.6	48.0	49.0	48.9

EU, European Union; ICT, information and communication technology.

Source: Own calculations based on Eurostat [2019].

Table 2. Top five countries in trade in ICT services: intra-EU and extra-EU trades

	Share in the EU trade (%)			
	Intra-EU		Extra-EU	
	2013	2018	2013	2018
Ireland	20.7	26.9	19.0	36.6
Germany	10.4	12.5	12.3	14.0
France	8.0	7.2	5.9	5.7
The Netherlands*	9.8	6.5	10.3	4.8
Belgium	5.5	6.0	3.1	2.6

EU, European Union

Source: Own calculations, Eurostat [2019].

² In the context of the importance of the types of ICT services in the EU trade, computer services are dominant in intra-EU and extra-EU trade in ICT services (in 2018 they accounted for 77% and 80%, respectively), followed by telecommunications (2018: 17% and 13%), and information services (2018: 6% and 7%).

visible as its share increased from 19.0% in 2013 up to 36.6% in 2018. Another leader in intra- and extra-EU trade was Germany with 12.5% and 14.0%, respectively, in 2018. In the years 2013–2018, more than half Member States were minor players in international trade in services for both intra-EU and extra-EU trade while their share in the EU trade was mostly around or below 1% (for detailed data, see Table A1 in the Appendix).

3.2 Trade positions of the EU Member States in ICT services in intra-EU and extra-EU trades

As for the trade positions of the EU Member States in intra-EU trade in ICT services, we can observe that the number of countries holding an RCA and better net trade results in ICT services than in the country's total service trade (LFI) increased over the analyzed time (Figure 1). While in 2013, this group consisted of only five countries, in 2018, it comprised nine countries. On the other hand, the group of countries with weaker trade positions grew and most EU Member States deteriorated or lost their comparative advantage and positive net trade position in ICT services (for detailed data, see Table A1 in the Appendix).

In 2013, the group of leaders in trade position in intra-EU trade in ICT services consisted of Ireland, Finland, Sweden, the Czech Republic, and Romania. Over 5 years, four more countries joined this group

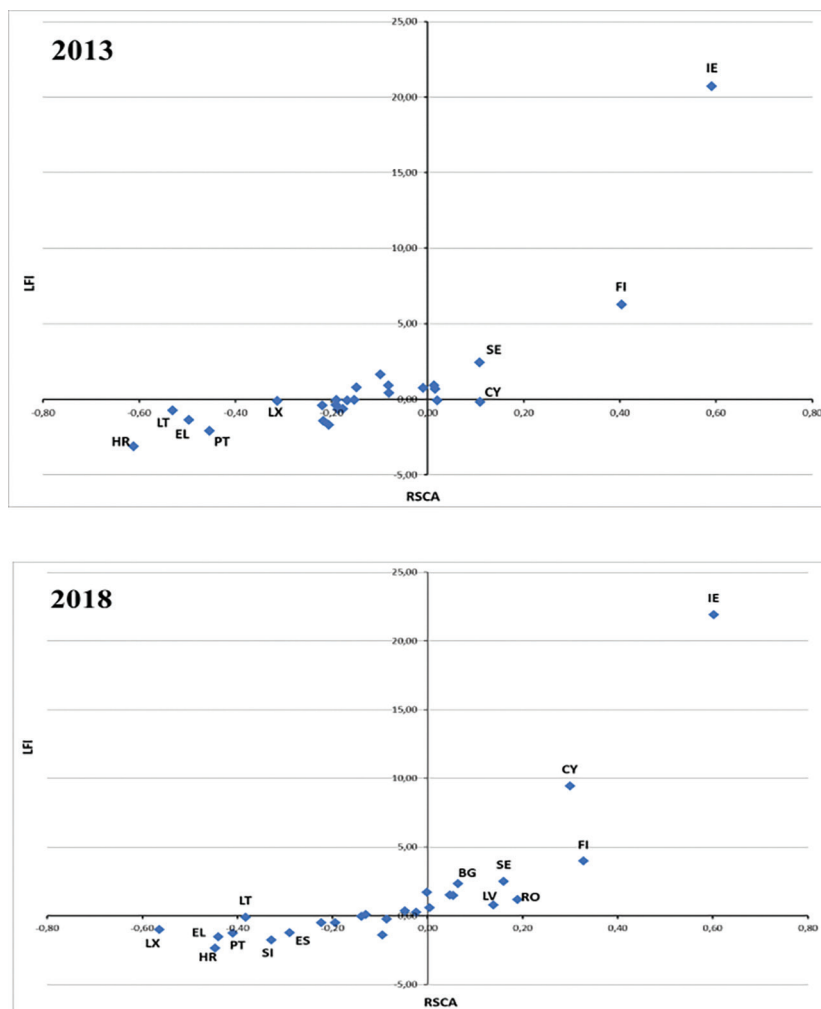


Figure 1. Trade position in intra-EU trade in ICT services.

Source: Own calculations.

of countries with positive RSCA and LFI values (Cyprus, Bulgaria, Latvia, and Slovakia). On the other hand, in 2013, 14 of the EU countries reported weak trade positions (both indices, RSCA and LFI, were negative), of which ICT services, in 4 countries, played a minor role in their economies and trade (Croatia, Portugal, Greece, and Lithuania). Over the years 2013–2018, the group of countries holding weak trade positions accounted for 12, with the Netherlands worsening their trade position and Poland, Hungary, and Estonia improving their net trade indices. In 2018, Luxembourg had the weakest comparative advantage in ICT services of all the EU countries as its intra-EU exports of ICT services decreased by 18.8% over the analyzed time.

In relation to the extra-EU trade, it is our observation that there is a higher dispersion of the EU countries with regard to their trade positions in ICT services (Figure 2). The number of countries having an RSCA was lower than those holding a comparative disadvantage (9 vs. 17 in 2013 and 8 vs. 18 in 2018). However, it is over the analyzed timeframe that most of the countries reported better net ICT trade performance than total extra-EU services trade (LFI > 0).

The group of the main leaders in extra-EU trade in ICT services is similar to that for intra-EU trade (Ireland, Finland, Romania, and Sweden). However, in 2013, the group was composed of the Netherlands, Spain, and Austria, which, in 2018, were replaced by Slovakia, Cyprus, Bulgaria, and the Czech Republic. It is noteworthy to mention that in the period 2013–2018, two of the previous leaders, namely, Ireland and

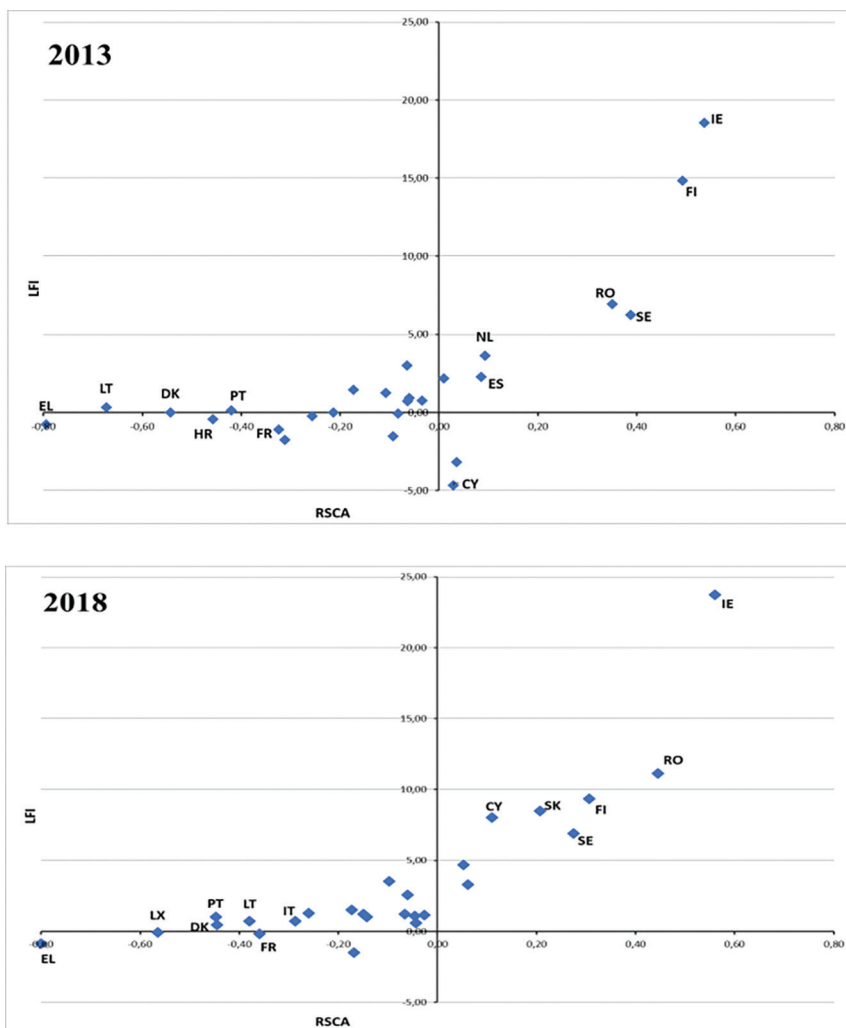


Figure 2. Trade position in extra-EU trade in ICT services.
Source: Own calculations.

Romania, improved their trade positions, while other countries' positions deteriorated. Interestingly, the situation of Cyprus and Slovenia changed. Both countries had negative net trade index (LFI), and in 2013 were holding a comparative advantage at the same time, while in 2018, Cyprus's trade in ICT services increased by 65.9% compared to the 43.9% increase in total services, and Slovenia recorded a 25.4% increase in ICT services, achieving at the same time a 50.8% increase in total trade in services. In the analyzed period, most of the EU Member States improved their trade positions, both in the RSCA and LFI indices, except for Greece.

4 Discussion

Based on the aforementioned results, we arrive at the following conclusions:

First, Ireland is an unquestionable leader in the intra-EU trade in ICT services. Over the whole timeframe, Ireland maintained the best trade position. This is the result of the Irish policy, launched in 2012, which focused on harnessing new technology skills; the implementation-phase of this plan extends until 2022³ [ICS, 2019]. This strategy enabled Ireland to concentrate on the development of the ICT services sector and, as a result, Ireland has become the most significant player in the European trade in ICT services, both in the EU internal market as well as outside of the EU; it is further noteworthy to mention that Ireland is continuously strengthening its trade position.

Second, most of the EU Member States moved towards a higher specialization in intra-EU trade in ICT services, noting, at the same time, an improvement in their trade balance, since most of them have become stronger net exporters. This fact indicates that the EU, as a whole, grasped a digital opportunity and moved its potentials ahead to meet modern requirements [Ambroziak, 2020a, 2020b]. Only a few countries are still lagging behind, with indices close to neutral. An interesting situation was observed in the case of Finland, which maintained its strong position in 2018, however it's position has worsened comparing to 2013, especially in the net trade position. The latter can suggest that Finland follows the innovation path and, therefore, the increasing demand for ICT services in a Finnish innovative economy is creating a need for higher imports of these services.

Third, we observed certain trends in trade in ICT services: countries which started to specialize in it are becoming stronger exporters, whereas countries for which the ICT services are not substantial components of their trade flows noted weaker trade positions. This observation is supported by the general opinion that the market of ICT services is getting highly concentrated [Talar, 2016]. When it comes to trade in the EU internal market, this trend was very clear as there is a limited number of players—only the EU Member States. In the extra-EU trade, the trend was not so clear, however, since the group of countries for whom trade in ICT services is gaining in importance is more visible. Additionally, because of changes in the intra-EU and extra-EU trades in ICT services, we realized that, in 2018, there were no EU Member States with a positive RSCA and a negative LFI.

Fourth, generally speaking, the assessment of trade positions of the EU Member States in the extra-EU trade shows that the majority of the EU Member States possess the capability to successfully compete worldwide and they export more than import into the EU.

Fifth, it is worth noting that in the case of ICT services, there were countries having less technology-oriented economies (e.g., Bulgaria and Romania), which achieved better trade positions than more advanced economies (such as Germany and France), which, in turn, reported much higher shares in the total EU trade. The reason for this phenomenon is the bigger demand of the latter for more innovative services, such as ICT services, leading to a greater dependence on imports.

³ Since the ICT sector is of vital strategic importance to Ireland, its government has decided to develop ICT Skills Action Plan to steer its economy towards new technologies after the previous crisis of 2008–2010. Years 2019–2022 witnessing the third edition of this program. The programme aims to establish co-operation links between the education and training sector and industry to fully utilize the range of learning opportunities which are available across the education and training system to meet the demand for high-level ICT skill [ICS, 2019].

5 Conclusions

The trade in ICT services develops as the servitization and digitalization of economies are progressing. Trade in ICT services in the EU increased significantly, both in the EU internal market and with non-EU Member States. Among the EU Member States, Ireland is the country which is the most focused on ICT services. Its approach is reflected in its role in the total EU trade in ICT services, as well as in the individual trade position of this country. However, we discovered that this is not a rule since countries that are of the highest importance for the intra-EU and extra-EU trade in ICT services are not having the best trade positions in this regard.

We also learnt that during the period 2013–2018, countries that specialized in ICT trade expanded their activities not only within the EU internal market but also outside of the EU. Further, the trade positions of countries specializing in ICT trade were better in the external trade than in trade within the EU Internal Market. Given the fact that on account of the digitalization of economic activities, the distance does not matter anymore to business operations, we can assume that the EU trade-leaders in ICT services will develop their activities globally irrespective of geographical boundaries.

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Appendix

Table A1. Share in the EU trade and trade position indices of the EU Member States in ICT services trade (ranked by the share in intra-EU trade for 2018).

	Share in the EU trade				Trade position indices							
	Intra-EU		Extra-EU		Intra-EU				Extra-EU			
					2013		2018		2013		2018	
	2013	2018	2013	2018	RSCA	LFI	RSCA	LFI	RSCA	LFI	RSCA	LFI
Ireland	20.7	26.9	19.0	36.6	0.59	20.73	0.60	21.92	0.54	18.56	0.56	23.74
Germany	10.4	12.5	12.3	14.0	-0.08	0.41	0.00	0.58	-0.06	0.93	-0.04	0.59
France	8.0	7.2	5.9	5.7	-0.22	-0.39	-0.22	-0.51	-0.32	-1.09	-0.36	-0.18
The Netherlands*	9.8	6.5	10.3	4.8	0.02	-0.06	-0.14	-0.03	0.09	3.63	-0.10	3.55
Belgium	5.5	6.0	3.1	2.6	-0.10	1.64	0.00	1.71	-0.09	-1.51	-0.14	1.03
Sweden	4.1	3.8	8.5	5.7	0.11	2.46	0.16	2.50	0.39	6.25	0.27	6.92
Spain	4.3	3.7	5.8	4.5	-0.22	-1.43	-0.25	-1.44	0.08	2.28	-0.06	2.59
Austria	3.1	3.4	1.6	1.2	-0.17	-0.06	-0.09	-0.24	0.01	2.19	-0.15	1.23
Italy	3.8	3.3	3.3	2.7	-0.15	-0.03	-0.19	-0.49	-0.26	-0.24	-0.29	0.71
Poland	1.8	3.1	0.9	1.8	-0.19	-0.36	-0.05	0.35	-0.21	0.00	-0.05	1.09
Finland	2.5	2.4	4.0	2.7	0.40	6.27	0.33	3.99	0.49	14.84	0.31	9.37
Romania	1.3	2.2	0.8	1.2	0.01	0.70	0.19	1.19	0.35	6.95	0.45	11.15
Denmark	1.9	1.9	1.2	1.3	-0.19	-0.03	-0.10	-1.40	-0.54	0.01	-0.45	0.47
Luxembourg	2.9	1.7	1.9	0.8	-0.31	-0.11	-0.56	-1.00	-0.17	1.45	-0.56	-0.06
Czech Rep.	1.5	1.6	0.6	1.1	0.01	0.92	0.05	1.49	-0.08	-0.07	0.06	3.30
Hungary	1.0	1.1	0.6	0.6	-0.19	-0.66	-0.13	0.09	-0.11	1.25	-0.17	1.51
Cyprus	0.6	0.8	0.6	0.6	0.11	-0.17	0.30	9.45	0.03	-4.67	0.11	8.03
Portugal	0.6	0.8	0.4	0.4	-0.45	-2.07	-0.41	-1.26	-0.42	0.14	-0.45	1.04
Slovakia	0.6	0.7	0.2	0.4	-0.01	0.75	0.05	1.50	-0.03	0.76	0.21	8.50
Greece	0.6	0.6	0.2	0.2	-0.50	-1.37	-0.44	-1.51	-0.79	-0.25	-0.84	-0.03
Bulgaria	0.4	0.5	0.3	0.4	-0.08	0.93	0.06	2.35	-0.06	3.01	0.05	4.70
Estonia	0.3	0.4	0.2	0.2	-0.18	-0.63	-0.02	0.26	-0.06	0.73	-0.07	1.22
Latvia	0.2	0.4	0.1	0.2	-0.15	0.78	0.14	0.80	-0.31	-1.75	-0.03	1.15
Slovenia	0.3	0.3	0.2	0.1	-0.21	-1.68	-0.33	-1.77	0.04	-3.16	-0.17	-1.49
Croatia	0.2	0.3	0.1	0.2	-0.61	-3.10	-0.45	-2.34	-0.46	-0.43	-0.26	1.27
Lithuania	0.1	0.2	0.1	0.2	-0.53	-0.74	-0.38	-0.10	-0.67	0.34	-0.38	0.72

EU, European Union; LFI, Lafay index; ICT, information and communication technology; RSCA, revealed symmetrical comparative advantage.

*Data for 2014 (2013—data missing).

Source: Authors' calculations.