

BREXIT IN TERMS OF FOREIGN TRADE, VALUE ADDED AND EMPLOYMENT

Gabriela Dovál'ová – Boris Hošoff – Erika Stracová

Abstract

Numerous analytical studies proposing various scenarios and describing the impact of Brexit on further economic development in the EU have already been conducted. However, only some of these studies provide a disaggregated view of the impact of Brexit on individual EU member states. This article aims to contribute to a better understanding of relations between the EU and the UK, particularly in terms of foreign trade, but also in terms of value added and employment using a multi-regional input-output model. A better understanding of the mutual links between individual EU countries and the UK will allow us to learn more about the possible implications of Brexit for individual EU economies but also the potential consequences of Brexit for the UK. Analysing the economic implications of Brexit is particularly important from Slovakia's point of view, as the turnover of foreign trade with the United Kingdom has almost doubled over the past 10 years. The results of our analysis have shown that Slovakia can be classified among countries with a medium impact, with approximately 62,000 jobs (i.e. 2.6% of total employment) generated directly and indirectly by the exports to the UK.

Key words: Brexit, labour market, value added, foreign trade

JEL Code: F140, F150, F160

Introduction

Many impact studies that have been performed so far reached the conclusion that Brexit will incur certain economic losses for the EU and for the UK itself. For instance, the impact study by Emerson et al. (2017) pointed out that losses of EU-27 in case of Brexit would reach 0.11 % to 0.52 % GDP, depending on the optimistic or pessimistic scenario¹. These values represent cumulative losses until 2030. For the UK, these cumulative losses were estimated as high as 1.31 % to 4.21 % GDP. The development of the possible scenarios

¹ The authors assumed these scenarios: Scenario 1: the UK would have a status similar to Norway; Scenario 2: the UK would have no preferential trade relations with the EU.

and their impacts on the UK and the EU, including their relations to the third countries, were dealt with e.g. by Henökl (2018). The regional aspect of Brexit was pointed out e.g. by McCann (2018). So far, only a small number of impact studies offering a disaggregated view of the impact of Brexit on individual member states has been conducted. One example is the study by Aichele and Felbermayr (2015). The authors of this study estimated the UK's expenses connected with Brexit depending on the type of the scenario at 0.6 % to 3 % GDP per capita. The biggest losses (particularly in the case of a hard Brexit) should be incurred especially for chemical industry, mechanical engineering, and automotive industry, i.e. sectors most integrated into the European value chain. As far as EU-27 is concerned, these losses should range from 0.1 % to 0.36 % GDP per capita depending on the scenario. The authors claim that Slovakia should be affected only to a relatively small extent with losses of 0.1 % to 0.3 % GDP per capita. The possible relatively extensive impacts of Brexit on the UK's automotive industry were pointed out e.g. by Bailey and De Propris (2017). Samitas, Polyzos and Siriopoulos (2018) focused on the effects of Brexit through the financial system and showed that the figures for all monitored variables are worse for the EU as well as for the UK. A very interesting approach was used also by the authors Dhingra, Huang et al. (2017), who estimated welfare losses of the UK at the level of 2.66 % due to possible higher tariffs. Moreover, Clarke, Serwicka and Winters (2017) showed in a more detailed way how the decomposition of tariffs on imports from the EU would transform into consumer prices.

The aim of this paper is to show which countries could be most affected by Brexit in terms of foreign trade, value added, and employment. Another aim is to identify to which group of countries Slovakia belongs, and also show how the renewed implementation of tariff measures can influence industries that are most important for Slovakia's foreign trade with the EU.

1 Data and Methodology

For the analyses of employment and value added in later parts of the paper, the data from the World Input-Output Database (WIOD) were used². For the analyses of the relations between the EU countries and the UK from the perspective of employment and value added, we used the multi-regional input-output model (MRIO model). One of its assets is the ability to capture complex linkages among industries and countries, which arise from the use of

² The database is freely available on the wiod.org website. Details about how the database is created are described e.g. in Timmer (2012), Dietzenbacher et al. (2013), or Timmer et al. (2015).

intermediates in individual industries and from the international trade with intermediates. Thus, the model makes it possible to capture not only the direct, but also the indirect effects.

The MRIO model is an extended version of an open static input-output model for one economy. A description of the model can be found e.g. in Miller–Blair (2009). In this paper, we use the version of international input-output tables composed using the so-called model D for industry x industry. The international input-output tables are composed of three basic sections – the intermediate consumption matrix (\mathbf{Z}), the value added vector (\mathbf{p}) and the matrix of final use (\mathbf{Y}). Moreover, we will also work with the vector of total production \mathbf{x} and the employment vector \mathbf{e} . Matrix \mathbf{Z} captures the flows of intermediates among individual industries i and countries k . It can be expressed as $\mathbf{Z} = \{z_{ij}^{pu}\}$. The individual elements in matrix \mathbf{Z} indicate the production of industry i from the country of origin p intended for intermediate consumption in industry j in the target country u . Similarly, matrix \mathbf{Y} includes information about where the final products produced by industries in individual countries are used. This matrix also includes e.g. the exports of cars from Malta for the final use in the UK. The total production vector $\mathbf{x} = \{x_i^k\}$ includes information about the production of industry i in country k . When deducing the MRIO model, we start from the input coefficients matrix \mathbf{A} which is calculated as $\mathbf{A} = \mathbf{Z}\hat{\mathbf{x}}^{-1}$. The elements of this matrix indicate the production of industry i in country p necessary for the production of one unit of production in industry j in country u . Using vectors \mathbf{x} and \mathbf{y} and matrix \mathbf{A} , it is possible to construct a system of balance equations and deduce the Leontief model, in this case for several regions,

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{y} = \mathbf{L}\mathbf{y} \quad (1)$$

where matrix \mathbf{L} is the basis of the model and includes complex linkages among industries and countries. The extension of the model by value added and employment vectors allows us to analyse the effects of final demand and its changes on these variables. The row employment vector \mathbf{e}' includes data about employment in industry i in country k . By dividing the individual elements of vector \mathbf{e}' by the respective production of an industry, we get the so-called direct employment coefficients $\mathbf{e}_c = \mathbf{e}'\hat{\mathbf{x}}^{-1}$. The main thing needed to link final use with the generated employment is the Leontief inverse matrix constructed for several countries. Then we get the cumulative employment coefficients matrix, formally written as:

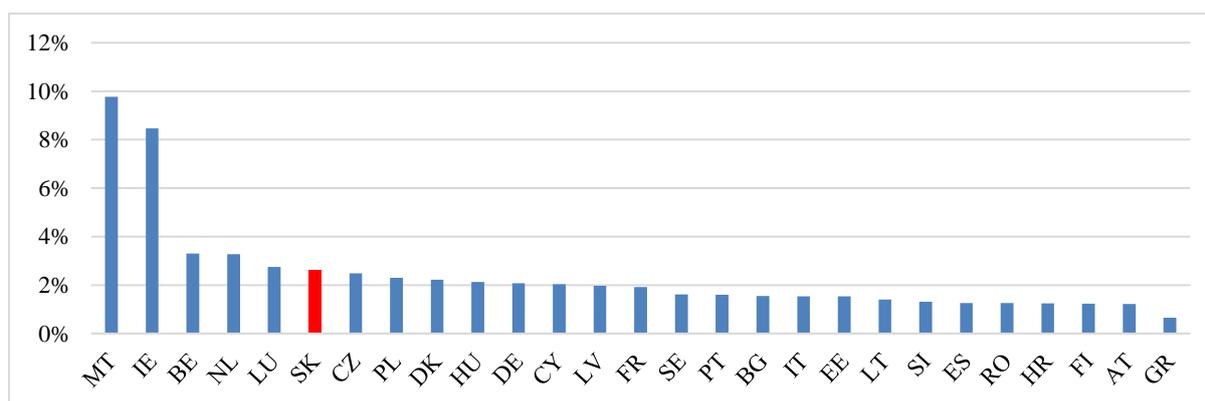
$$\mathbf{E} = \hat{\mathbf{e}}_c \mathbf{L} \quad (2)$$

By multiplying matrix \mathbf{E} by the final demand vector, we calculate its effects on employment generated in individual countries and in corresponding industries.

2. Impact of Brexit on employment and value added

If we compare employment in the EU member states directly and indirectly linked to the exports to the UK, we find the strongest relations to this country in Malta (9.8 %) and Ireland (8.5 %), cf. Fig. 1. Thus, we can consider them for countries with the highest risk. The group of countries with a medium risk includes Belgium (3.3 %), the Netherlands (3.3 %), Luxembourg (2.8 %), but also Slovakia (2.6 %) and other countries with more than 2 % of employment linked in some way to the exports to the UK. The other end of the ranking is taken by countries with the lowest risk, i.e. Greece (0.6 %), Austria (1.2 %), Finland (1.2 %), or Croatia (1.3 %).

Fig. 1: EU countries ranked by the share of employment directly and indirectly generated by the exports to the UK (2014)



Source: Authors' calculations using WIOT data (wiod.org).

There are the strongest relations between the UK and Malta in the sector of other service activities (as much as 28 % of the total employment generated by the exports to the UK is a part of this sector). Exports to the UK generate many jobs also in the sector of financial service activities (12 %) and administrative and support service activities (7 %). Ireland is the country with the second highest risk connected to Brexit, especially in the sector of agriculture (26 % of the generated employment) and the food industry (11 %). There are relatively strong ties in the field of mechanical engineering and financial service activities as well.

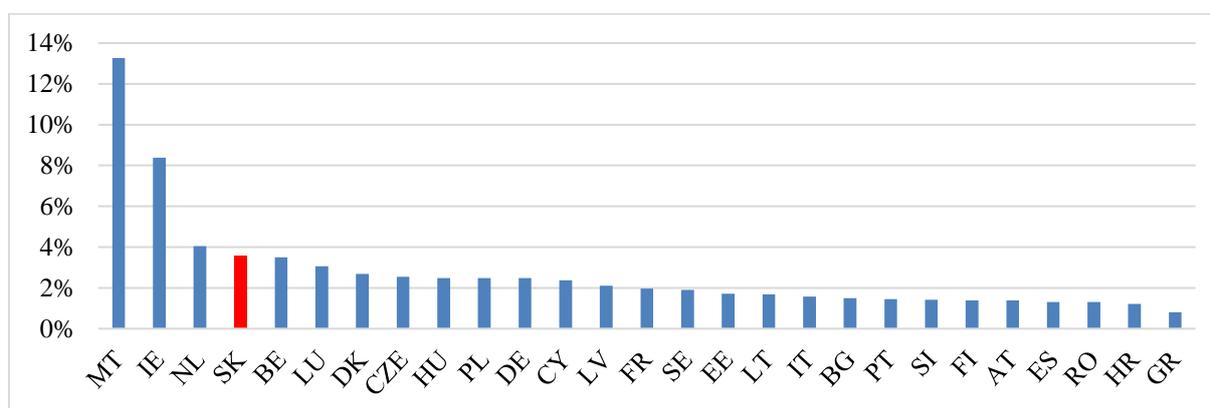
In Slovakia, the exports to the UK generate 2.6 % of employment, which represents more than 60,000 jobs. While the exports of intermediates to the UK generate employment especially in the services sector, the exports of final products generate employment

particularly in manufacturing, where the dominating sectors are mechanical engineering, automotive industry and electrical engineering. Overall, the biggest number of jobs in Slovakia was generated by the exports to the UK in services (61 %), with real estate activities, administrative and support service activities and trade as the dominating sectors.

In Belgium and the Netherlands, the sector with the biggest share on employment directly and indirectly generated by the exports to the UK was the administrative and support service activities (16 %) and legal and accounting activities. This interconnection between countries can be explained by the activities of shared services centres. In the case of the Netherlands, wholesale is also very important (12 %) and mechanical engineering, construction or agriculture are not negligible either (5 %). In Belgium, 8 % of the generated employment is directly and indirectly linked to mechanical engineering, dominated especially by the automotive industry.

The division of countries in terms of the risk incurred by Brexit based on the generated value added is similar as in the case of employment (Fig. 2). In 2014, exports to the UK generated the largest share of value added in Malta (13.3 %) and Ireland (8.4 %). The case of value added confirms that the relation of the UK and Malta is based primarily on services. Other service activities, financial service activities and administrative activities account for as much as 43 % of the created value added. In terms of value added, the UK and Ireland are most linked through the food industry, financial service activities, pharmaceutical industry and agriculture.

Fig. 2: EU countries ranked by the share of value added directly and indirectly generated by the exports to the UK (2014)



Source: Authors' calculations using WIOT data (wiod.org).

This indicator placed Slovakia together with the Netherlands into the group of countries with medium-high risk as well. In 2014, the exports to the UK generated directly

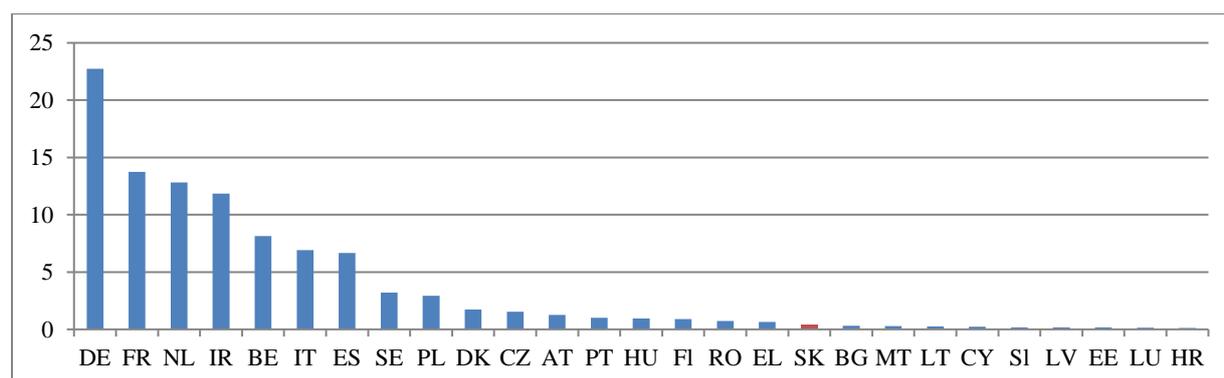
and indirectly almost EUR 3 billion of value added in Slovakia (3.6 %), which shows the increasing importance of the UK as Slovakia's trade partner. This is caused especially by the increasing volume of exports to the UK, but also by a shift in its structure towards higher value-added industries (real estate activities, trade, etc.). Roughly the same contribution to the creation of value added is made by mechanical engineering, especially the sub-sectors of manufacture of fabricated metal products and manufacture of motor vehicles.

Based on the analysis of value-added, countries with the lowest risk incurred by Brexit are again Greece, Croatia or Romania, while the value added generated directly and indirectly by exports to the UK accounts for less than 2 % in almost half of the countries.

2 Foreign trade of the UK and the EU with a focus on Slovakia

The most important trade partner of the UK among the EU countries is Germany, which was the destination for as much as 22.7 % of the UK's total exports to EU-27. Other important export partners of the UK are France (13.8 %), the Netherlands (12.8 %), Ireland (11.8 %), Belgium (8.1 %), Italy (6.9 %) and Spain (6.7 %). These top seven export partners of the UK together accounted for 83 % of the UK's total exports to the EU. In 2016, Slovakia with its 0.4 % share ranked 18th³ in terms of the importance of the UK's export partners within the Union. Thus, Slovakia does not count as one of the UK's important export territories within the EU.⁴

Fig. 3: The importance of Slovakia in terms of the UK's exports of goods to EU-27 (in %)



Source: Composed using the data from ONS, Pink Book 2017.

Note: Expressed as a share on the UK's total exports to EU-27.

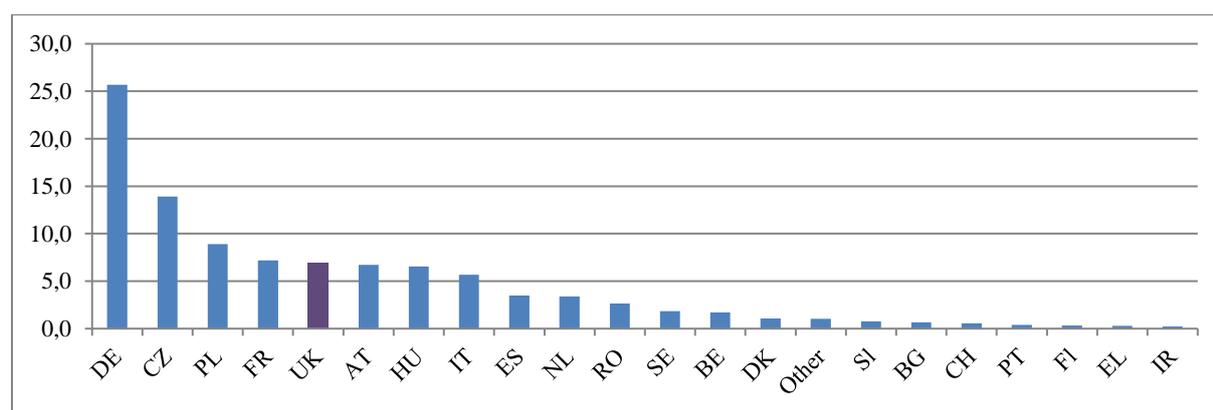
³ From the global point of view, it ranked 50th in terms of the importance of the UK's export territories.

⁴ Slovakia is not an important partner for the UK even in terms of exports of services. In 2016, the value of the UK's exports of services to Slovakia reached roughly half of the value of the exports of goods. The value of the UK's imports of services from Slovakia only accounted for roughly 7 % of the value of the imports of goods.

In terms of exports from EU-27, the most important trade partners of the UK are the same seven countries as in the case of exports. In the examined period, these countries accounted for 81.3 % of the UK's total imports from EU-27. Slovakia's share on the UK's total imports from EU-27 is relatively low, as it only amounted to 1.1 %. Having a relatively low share on the UK's imports from EU-27, Slovakia ranked 14th in terms of the UK's import partners⁵ within this group of countries.

The main long-term trade partners of Slovakia are European countries. In 2016, as much as 85.2 % of Slovakia's total exports was directed to EU-28, while imports from EU-28 reached 67.3 %. The export activities of Slovakia are oriented on the so called third markets only minimally. Within the EU-28 countries, our most important export partners are Germany, V3 countries and France; in 2016, their share on the total exports reached 21.9 %, 25 % and 6.1 % respectively. In 2016, the UK was the target of roughly 7 % of Slovakia's total exports to the EU (Fig. 4), and so represents a relatively important trade partner for Slovakia. In 2016, the total value of Slovakia's exports to the EU reached EUR 4.1 billion, which means that the UK's share on Slovakia's total exports was as much as 5.9 %. In the field of exports to the UK, the dominant industries are automotive industry, electrical engineering and mechanical engineering. In the examined period, the share of automotive industry on the total exports of Slovakia to this country was as much as 46.1 %, followed by electrical engineering (25.3 %) and mechanical engineering (6.7 %).

Fig. 4: The importance of the UK in terms of Slovakia's exports of goods to the EU (in %)



Source: Composed using the data from the Statistical Office of the Slovak Republic.

Note: Expressed as a share on Slovakia's total exports to EU-28.

From the viewpoint of imports from the UK to Slovakia in the examined period, the mining industry was the dominant one and its share on the total imports from the UK was

⁵ In the global ranking of the importance of the UK's import partners, Slovakia ranked 30th.

22.7 %. The renewed implementation of tariff and non-tariff barriers for Slovak importers from the UK could thus increase the costs of enterprises for inputs needed for the production of final products. In the examined period, the chemical industry had a relatively high share on Slovakia's total imports from the UK as well (14.7 %). In the given period, the share of imports of automotive industry, electrical engineering and mechanical engineering reached 29 % of the total imports from the UK. The UK is one of the countries from which Slovakia imports to a relatively small extent. UK's share on Slovakia's total imports in 2016 amounted to roughly 1.9 %.

4 Potential tariff measures from the point of view of Slovak imports and exports

In terms of the future structure and arrangement of the tariff barriers between Slovakia and the UK, it is still premature to talk about their specific level, which can change substantially during the negotiations. Today, the trade between Slovakia and the UK is conducted within the common market of the EU, and so is not burdened with any tariff barriers. However, we can form a picture about what the tariff burden would look like in case of a minimum agreement between the UK and the EU, which would mean a reciprocal implementation of the same duty rates on both sides. We have taken into consideration the level of duty rates the EU (and Slovakia) has towards third countries.

In the following section, we have analysed the structure of duties under the scenario of their reciprocal implementation on the side of both Slovakia and the UK. Specifically, we have focused on the three most important industries in terms of our exports to the UK, and the same industries were then examined also in terms of our imports from the UK.

Tab. 1: Duty rate burden of the TOP exports of goods from Slovakia to the UK, 2015

TOP 12 articles according to the HS	Automotive industry	Electrical engineering	Mechanical engineering
TOP 12 total (value in EUR million)	1 737, 818	863,942	176,789
No duty (% of goods)	0	33	42
No duty (% of the TOP 12 value)	0	8	21
The lowest rate (in %)	4,5	1,1	1,7
The lowest rate (% of the TOP 12 value)	5	1	3
The highest rate (in %)	10	14	5,7
The highest rate (% of the TOP 12 value)	95	77	6

Source: Authors' calculations using data from the Statistical Office of the Slovak Republic, 2017.

As can be seen in Table 1, the most exported goods from Slovakia to the UK can be theoretically burdened with relatively high duty rates from the point of view of their value. As much as 95 % of the value of the 12 most exported goods to the UK in the automotive

industry can be burdened with a rate of 10 %. This also applies to the potential increase in the price for our exports to the UK in the case of goods of electrical engineering. As much as 77 % of the value of the 12 most exported goods of electrical engineering from Slovakia to the UK could be burdened with a 14 % duty rate. The potential reciprocal imposition of duties should have the smallest impact on mechanical engineering. However, the total share of the above-mentioned sectors exempt from duties or burdened with minimum duty rates on the total value of our exports to the UK is relatively low. On the contrary, a relatively high percentage of the value of the most exported goods may have duty rates imposed in the future, which is true especially for automotive industry and electrical engineering.

Tab. 2: Duty rate burden of the imports of goods to Slovakia from the UK, 2015

TOP 12 articles according to HS	Automotive industry	Electrical engineering	Mechanical engineering
TOP 12 total (value in EUR million)	90,766	66,651	42,348
No duty (% of goods)	0	25	50
No duty (% of the TOP 12 value)	0	55	58
The lowest rate (in %)	4,5	1,1	1,7
The lowest rate (% of the TOP 12 value)	20	8	11
The highest rate (in %)	10	14	8
The highest rate (% of the TOP 12 value)	78	4	9

Source: Authors' calculations using data from the Statistical Office of the Slovak Republic, 2017.

When comparing the potential tariff burden of exports, several differences come to light. The smallest difference between the two sides can be found in the burden on the goods of the automotive industry, but potential lower duties for a greater percentage of the value of the UK's exports to Slovakia than vice versa can be observed in this case as well. A continuation of the most significant differences between Slovakia and the UK can be expected within the tariff burden of exports in electrical and mechanical engineering. In these two sectors, as much as 55 % of the value of exports of electrical engineering and 58 % of the value of the exports of mechanical engineering from the UK to Slovakia could be exempt from duty. In the case of Slovak exports to the UK, this can only be expected for 8 % of the value of exports of electrical engineering and 21 % of the value of exports of mechanical engineering. In the case of the UK's exports in the automotive industry to Slovakia, 78 % of their value could be burdened with the highest duty rates (compared to 95 % on the side of Slovakia). Differences would be even more dramatically intensified by the implementation of reciprocal duty rates in the case of exports of electrical engineering; in the case of the UK's exports to Slovakia, the highest duty rate should only be imposed on around 4 % of the total exports of this sector, compared to 77 % of exports on the side of Slovakia.

Conclusion

The analysis performed using the input-output model shows that Malta and Ireland should be most affected in terms of employment and value added generated directly and indirectly by the exports to the UK. From this point of view, Slovakia can be classified among countries with a medium impact, while the exports to the UK generate directly and indirectly almost EUR 3 billion of value added and create roughly 60,000 jobs (i.e. 2.6 % of total employment). From the perspective of exports and imports, Slovakia is not an important trade partner for the UK. In contrast, in 2016, the UK accounted for 5.9 % of Slovakia's total exports. Thus, from the perspective of Slovakia, the UK is a relatively important trade partner especially in the field of automotive industry, mechanical engineering and electrical engineering. The calculation of the potential tariff measures especially on the side of exports indicated that the burden on goods would differ least in automotive industry. In mechanical and electrical engineering, bigger advantages would be on the side of the UK.

Acknowledgment

This work was supported by the VEGA Grant Agency within the Framework of VEGA project no. 2/0109/16 and APVV-15-0765.

References

- Aichele, R., Felbermayr G. (2015). Costs and benefits of a United Kingdom exit from the European Union. Guetersloh: Bertelsmann Stiftung. Retrieved from <https://ged-project.de/wp-content/uploads/2015/04/Costs-and-benefits-of-a-United-Kingdom-exit-from-the-European-Union.pdf>
- Bailey, D., De Propris, L. (2017). Brexit and the UK Automotive Industry. *National Institute economic review*, 242(1), R51-R59.
- Clarke, S., Serwicka, I., Winters, L.A. (2017). Will Brexit raise the cost of living? *National Institute Economic Review*, 242(1), 37-50.
- Dhingra, S., Huang, H. at al. (2017). The costs and benefits of leaving the EU: trade effects. *Economic policy*, 32(92), 651-705.
- Dietzenbacher, E. et al. (2013). The Construction of World Input-Output Tables in the WIOD Project. *Economic Systems Research*, 25(1), 71-98.
- Emerson, M., Busse, M., Di Salvio, M., Gros, D., Pelkmans, J. (2017). An Assessment of the Economic Impact of Brexit on the EU27. Retrieved from [http://www.europarl.europa.eu/RegData/etudes/STUD/2017/595374/IPOL_STU\(2017\)595374_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/595374/IPOL_STU(2017)595374_EN.pdf)

Henökl, T. (2018). How Brexit affects EU external action: The UK's legacy in European international cooperation. *Futures*, 97(SI), 63-72.

McCann, P. (2018). The trade, geography and regional implications of Brexit. *Papers in regional science*, 97(SI), 3-8.

Miller, R. E., Blair, P. D. (2009). *Input-Output Analysis: Foundations and Extensions*. 2nd Edition. New York: Cambridge University Press.

Samitas, A., Polyzos, S., Siriopoulos, C. (2018). Brexit and fiscal stability: An agent-based simulation. *Economic Modelling*, Elsevier, 69(C), 181-192.

Timmer, M. P. (2012). The World Input-Output Database (WIOD): Contents, Sources and Methods. *WIOD WORKING PAPER no. 10*. Liberec: Technical University of Liberec.

Timmer, M. P. et. al. (2015). An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production. *Review of International Economics*, 23(3), 575–605.

Contact

Ing. Gabriela Dovál'ová, PhD.

Institute of Economic Research SAS

Šancová 56, 811 05 Bratislava

gabriela.dovalova@savba.sk

Ing. Boris Hošoff, PhD.

Institute of Economic Research SAS

Šancová 56, 811 05 Bratislava

boris.hosoff@savba.sk

Ing. Erika Stracová

University of Economics in Bratislava

Dolnozemska cesta 1/b, 852 35 Bratislava

erika.stracova@euba.sk