What links Russia to EU, USA, China and ASEAN in intermediate trade?

April 12, 2023

XXIV Yasin (April) International Academic
Conference on Economic and Social Development

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1. **Motivation**

2. **Data & methodology**

3. **Empirical results**

4. **Conslusion**

1. Motivation

- ## 2010s Global trade slowdown

  – Hoekman B. (2015). *The global trade slowdown: A new normal?* London, UK: CEPR Press, 2015. [link]

  – Constantinescu C., Mattoo A., Ruta M. (2016). Does the global trade slowdown matter? *Journal of Policy Modeling*, 38(4), 711-722. [link]

- ## 2020 Pandemic

  – Enderwick P., Buckley P.J. (2020). Rising regionalization: Will the post-COVID-19 world see a retreat from globalization? *Transnational Corporations Journal*, 27(2), 99-112. [link]

- ## 2022 Sanctions and Taiwan problem

  – Arslanalp S., Eichengreen B.J., Simpson-Bell C. (2022). The stealth erosion of dollar dominance: Active diversifiers and the rise of nontraditional reserve currencies. IMF, Working Paper No. WP/22/58, March 2022. [link]

  – Abidde, S.O. (2022). The US-China-Taiwan relations: Military invasion, annexation, and verbal brinkmanship. In: Abidde, S.O. (eds), *China and Taiwan in Africa*. Springer, Cham, 2022. [link]

1. Motivation

- Recent strong trend on regionalization of the world economy
  - It is particular relevant to study the position of Russia in global economic system relative to the two largest countries – USA and China – as well as to the two most important integration unions – EU and ASEAN

- The report is devoted to studying the links of Russian economy with the indicated countries and blocs of countries in intermediate trade (that is, in regional value added chains)
  - Such trade is especially vulnerable in the current conditions, as the interruption or a noticeable reduction in the supply of intermediate products can lead to a shutdown or forced restructuring of many industries

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2. Data & methodology

- Data

  - OECD Trade in Value Added Database: a set of inter-country input-output (ICIO) tables for 2018

  - The data allow tracking inter-country trade flows for 67 countries and 45 industries by the direction of use

  - *Guilhoto J.M., Webb C., Yamano N. (2022). Guide to OECD TiVA indicators, 2021 edition. OECD Science, Technology and Industry Working Papers, No. 2022/02, OECD Publishing, Paris. [link]*

- Analytical instruments

  - Input-output analysis, matrix algebra

2. Data & methodology
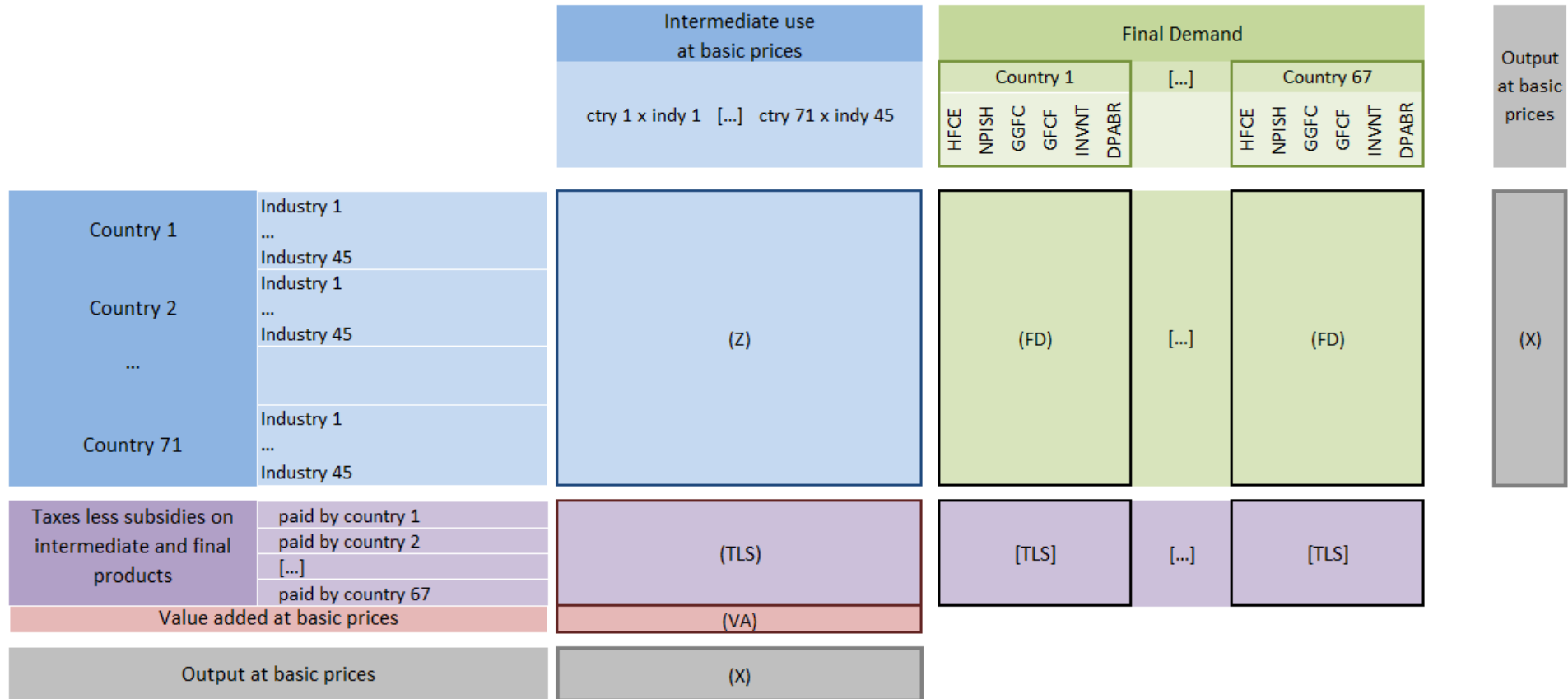
71 economies x 45 industries = 3195 sectors

OECD (2021). OECD Inter-Country Input-Output Database,
http://oe.cd/icio

2. Data & methodology

- First, I aim at calculating a number of input-output multipliers developed in the literature with the focus on:

  - Detalization by the regional blocs of countries

  - The role of Russia as a consumer and supplier of intermediate products

- Leontief (1944) multiplier with adaptation to ICIO

  - Reflects the dependence of a country and an industry on the production of intermediate products in other countries

- Ghosh (1958) multiplier with adaptation to ICIO

  - Reflects the importance of a country and an industry as a supplier of intermediate products to other economies

2. Data & methodology

- [Leontief](#) (1944) multiplier with adaptation to ICIO

  - Reflects the dependence of a country and an industry on the production of intermediate products in other countries

$$q + m = Aq + y + x \qquad \rightarrow \qquad q = Aq + y$$

(standard version)

$$a_{ic,jp} = x_{ic,jp}/q_{jp}$$

$$\downarrow$$

$$\sum_{ic} b_{ic,jp} \qquad \leftarrow \qquad \begin{aligned} q &= By \\ B &= (I - A)^{-1} \end{aligned}$$

  - The growth of output in all sector-country pairs ic that is needed to meet the additional demand for the products of sector j in country p by 1 dollar

2. Data & methodology

- Ghosh (1958) multiplier with adaptation to ICIO
  - Reflects the importance of a country and an industry as a supplier of intermediate products to other economies

$$q = qG + v$$

$$g_{ic,jp} = x_{ic,jp}/q_{ic}$$

$$\downarrow$$

$$\sum_{jp} g_{ic,jp} \qquad \leftarrow \qquad \begin{aligned} q &= vH \\ H &= (I - G)^{-1} \end{aligned}$$

  - The drop in output in all sector-country pairs jp after a hypothetic decline in the value added of sector i in country c by 1 dollar

2. Data & methodology

- Second, following [Stehrer](#) (2021), I calculate the three matrices:

$P = VY$ **The "source-sink" matrix** (shows the industry-level value added generated in "source" countries to satisfy "sink" countries' demand for final products; non-diagonal elements are trade in value added)

$Q = V\hat{Y}$ **The "source-assembly" matrix** (shows the industry-level value added from "source" countries embodied in final products in "assembly" countries)

$Q = V\hat{E}$ **The matrix of domestic and foreign contents of final good exports** (shows the industry-level value added from "source" countries embodied in final goods exports in "assembly" countries)

$(V = \hat{S}B)$

- In contrast to *Stehrer* (2021), who uses the 2016 release of WIOD database for 44 countries and 56 industries, our estimates are provided for a later period (2018) and for a wider range of countries (71 economies)
- All indicators are estimated for Russia and grouped by countries and blocs

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3.1. Empirical results (multipliers)

Leontief multipliers for Russia by country blocs, % (top)

NACE rev 2	SECTOR	TOTAL	ASEAN	CHINA	EU	USA	OTHER
29	Motor vehicles, trailers and semi-trailers	88.6	2.3	13.9	34.3	5.2	32.9
26	Computer, electronic and optical products	69.9	3.9	30.2	15.6	3.4	16.7
22	Rubber and plastic products	65.3	1.8	12.1	27.4	4.1	20.0
27	Electrical equipment	62.4	1.9	18.3	21.3	3.0	17.9
30	Other transport equipment	61.8	2.4	15.1	21.0	6.7	16.6
28	Machinery and equipment n.e.c.	60.5	1.4	15.0	23.4	3.2	17.5
13-15	Textiles, wearing apparel, leather and related products	57.5	2.1	23.8	13.0	1.9	16.7
31-33	Furniture and other products, repair and installation of machinery	49.4	1.6	13.3	17.5	3.1	13.9
21	Basic pharmaceutical products and pharmaceutical preparation	43.4	0.9	5.8	19.9	3.7	13.1
25	Fabricated metal products, except machinery and equipment	41.4	1.0	9.7	14.6	2.2	13.9

3.1. Empirical results (multipliers)

Leontief multipliers for Russia by country blocs, % (bottom)

NACE rev 2	SECTOR	TOTAL	ASEAN	CHINA	EU	USA	OTHER
85	Education	7.2	0.2	1.5	2.6	0.5	2.3
68	Real estate activities	8.3	0.2	1.7	3.2	0.6	2.5
05-06	Coal, lignite, crude petrolium and natural gas	8.8	0.2	1.5	3.4	0.7	2.9
35	Electricity, gas, steam	12.6	0.3	2.6	4.6	0.9	4.2
64-66	Financial and insurance activities	12.8	0.4	1.3	4.7	2.2	4.4
19	Coke and refined petroleum products	12.9	0.3	1.9	5.1	1.1	4.5
77-82	Administrative and support service activities	14.8	0.5	2.4	5.8	1.5	4.7
45-47	Wholesale and retail trade	14.9	0.4	2.3	6.0	1.3	4.8
84	Public administration and defence; compulsory social security	15.5	0.5	2.9	5.7	1.3	5.1
90-93	Arts, entertainment and recreation	16.1	0.5	3.2	5.8	1.4	5.3

3.1. Empirical results (multipliers)

Ghosh multipliers for Russia by country blocs, % (top)

NACE rev 2	SECTOR	MEAN	ASEAN	CHINA	EU	USA	OTHER
05-06	Coal, lignite, crude petrolium and natural gas	40.2	4.9	65.1	73.1	6.3	51.5
07-08	Metal ores and other mining	28.5	5.5	25.7	31.2	8.1	72.1
24	Basic metals	25.3	5.6	19.1	37.1	14.4	50.1
19	Coke and refined petroleum products	22.5	4.0	21.8	37.3	7.2	42.3
20	Chemicals and chemical products	21.4	4.7	16.9	29.8	8.2	47.4
09	Mining support service activities	20.9	3.1	24.8	37.9	4.9	33.9
16	Wood and of products of wood and cork	20.8	1.1	45.5	20.1	4.2	32.9
50	Water transport	20.4	5.4	26.9	27.5	3.4	39.0
52	Warehousing and support activities for transportation	17.4	3.4	18.9	30.3	4.3	29.8
49	Land transport and transport via pipelines	15.4	2.4	19.2	25.8	3.6	25.8

3.1. Empirical results (multipliers)

Ghosh multipliers for Russia by country blocs, % (bottom)

NACE rev 2	SECTOR	MEAN	ASEAN	CHINA	EU	USA	OTHER
86-88	Human health and social work activities	0.1	0	0.1	0.2	0	0.2
85	Education	0.2	0	0.2	0.4	0.1	0.4
84	Public administration and defence; compulsory social security	0.2	0	0.3	0.4	0.1	0.4
90-93	Arts, entertainment and recreation	0.2	0	0.2	0.4	0.1	0.5
94-96	Other service activities	0.5	0.1	0.5	0.8	0.2	0.8
55-56	Accommodation and food service activities	1.0	0.2	1.1	1.7	0.3	1.7
10-12	Food products, beverages and tobacco products	1.8	0.3	3.0	1.5	0.4	3.7
41-43	Construction	1.8	0.3	2.2	3.0	0.5	2.9
21	Basic pharmaceutical products and pharmaceutical preparation	2.1	0.5	1.4	2.3	0.3	5.8
61	Telecommunications	2.3	0.3	1.6	5.1	0.6	3.9

3.2. *Empirical results (matrices)*

"Source-sink matrix" for Russia and country blocs

PRODUCERS	CONSUMERS							
	TOTAL	RUSSIA	ASEAN	CHINA	EU	USA	OTHER	*Share of exports, %*
TOTAL	82 962	1 429	2 820	13 395	17 364	20 831	27 123	
RUSSIA	1 592	1 128	13	68	165	38	180	*29.2*
ASEAN	2 910	12	2 041	178	130	151	398	*29.9*
CHINA	13 487	48	164	11 531	343	456	946	*14.5*
EU	17 735	114	123	338	15 097	618	1 444	*14.9*
USA	20 179	25	96	230	455	18 283	1 091	*9.4*
OTHER	27 059	103	383	1 049	1 175	1 285	23 064	*14.8*
Share of imports, %		*21.1*	*27.6*	*13.9*	*13.1*	*12.2*	*15.0*	

3.2. Empirical results (matrices)

"Source-assembly matrix" for Russia and country blocs

SOURCES OF VALUE ADDED	PRODUCERS							Own VA in foreign output, %
	TOTAL	RUSSIA	ASEAN	CHINA	EU	USA	OTHER	
TOTAL	82 962	1 364	3 042	13 898	15 117	20 320	29 220	
RUSSIA	1 592	1 222	12	67	128	24	139	*23.2*
ASEAN	2 910	4	2 429	133	61	63	220	*16.5*
CHINA	13 487	21	134	12 486	157	194	494	*7.4*
EU	15 043	52	74	203	13 709	223	783	*8.9*
USA	20 179	13	70	144	242	19 077	634	*5.5*
OTHER	29 750	52	324	865	819	740	26 950	*9.4*
Foreign VA, %		*10.4*	*20.2*	*10.2*	*9.3*	*6.1*	*7.8*	

3.2. Empirical results (matrices)

"Domestic and foreign contents of final good exports" for Russia and country blocs

SOURCES OF VALUE ADDED	EXPORTERS							Own VA in foreign exports, %
	TOTAL	RUSSIA	ASEAN	CHINA	EU	USA	OTHER	
TOTAL	8 922	108	682	1 165	2 970	959	3 037	
RUSSIA	166	96	4	7	38	2	19	*42.3*
ASEAN	545	0	463	19	20	4	37	*15.0*
CHINA	1 185	2	49	976	52	14	92	*17.6*
EU	2 728	5	27	25	2 522	16	134	*7.6*
USA	1 115	1	26	19	83	868	118	*22.2*
OTHER	3 182	5	114	118	255	55	2 635	*17.2*
Foreign VA, %		*11.4*	*32.2*	*16.2*	*15.1*	*9.5*	*13.2*	

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4. Conclusion

- Russian output is vulnerable to intermediate imports such as
  - Motor vehicles, computers and electronics, rubber and plastics, machinery, textiles
  - China is most important partner in computers, electronics and textiles, motor vehicles heavily rely on parts from EU and other countries (Japan, Rep. of Korea)

- Russia is an important supplier of intermediates such as
  - Fuels, ores, metals, chemicals, wood, transport services
  - China is most dependent on Russian fuels and wood, EU is vulnerable to fuels from Russia and moderately dependent on other materials, US and ASEAN are dependent on basic metals from Russia

- Russia in value added trade
  - 29% of Russia's VA (as well as ASEAN's) is exported, half of it is directed to EU and China
  - Import VA share is 21% (rather high), it also comes primarily from EU and China
  - A record of 23% (42%) of Russia's VA is embodied in goods produced (exported) abroad
  - Foreign VA share in output (export) is about 10% (11%) that is a low level (US is lower)