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FOREIGN TRADE STRENGTH OF COUNTRIES UNDER THE COVID-19 PANDEMIC

СТІЙКІСТЬ ЗОВНІШНЬОЇ ТОРГІВЛІ КРАЇН В УМОВАХ ПАНДЕМІЇ COVID-19

УСТОЙЧИВОСТЬ ВНЕШНЕЙ ТОРГОВЛИ СТРАН В УСЛОВИЯХ ПАНДЕМИИ COVID-19

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Abstract. *In 2020 the COVID-19 pandemic became the major event affecting the global economy. Both supply- and demand-driven recession and changes in consumption and investment behaviour became a new reality. The purpose of the paper is to estimate foreign trade strength and vulnerability of countries under the shrinking global demand for specific groups of goods and services as a result of the COVID-19 pandemic and the measures to contain it. The proposed foreign trade strength index under pandemic is based on exports of pharmaceutical products, medical equipment, food, IT and audiovisual goods and services etc. (+); tourism and transport services, oil, ores and metals, transport vehicles and most other types of machinery etc. (-); and imports of medical and related products (-) in comparison to a country's GDP. The ranking is provided for the largest 100 economies. 90% of the countries have absolute trade vulnerability under the pandemic. There are 3 types of economies with relatively better trade soundness: exporters of medical products and ICT services (Ireland and Switzerland), food exporters and closed economies. The most vulnerable economies include small island countries which depend on*

tourism services exports, oil exporting countries and exporters of machines and equipment. Ukraine ranks 38th and has a standardized value of the index +0.4 mainly because of its food exports which help offsets the weakness due to the metal exports. Vulnerability of large economies is caused by their merchandise export structure, while vulnerability of small economies is due to their services export structure.

Key words: *foreign trade, economic resilience, demand for goods and services, dependence on global markets, pandemic, quarantine measures.*

Анотація. *У 2020 році пандемія COVID-19 стала основною подією, що впливає на світову економіку. Спад, обумовлений як падінням попиту, так і пропозиції, зміни в поведінці споживачів та інвесторів стали новою реальністю. Метою даного дослідження є оцінка стійкості зовнішньої торгівлі та вразливості країн в умовах скорочення глобального попиту на різні групи товарів і послуг в результаті пандемії COVID-19 і заходів для її стримування. Запропонований індекс стійкості зовнішньої торгівлі в умовах пандемії базується на експорті фармацевтичної продукції, медичного обладнання, продуктів харчування, товарів і послуг в сфері ІТ, аудіовізуальної сфери тощо (+); туристичних і транспортних послуг, нафти, руд і металів, транспортних засобів, більшості інших видів техніки тощо (-); імпорту медичної та супутньої продукції (-) відносно ВВП країн. У статті представлений рейтинг для 100 найбільших економік. 90% країн мають абсолютну вразливість торгівлі в умовах пандемії. Існує 3 типи країн з відносно більшою стійкістю за зовнішньою торгівлею: експортери медичної продукції або послуг в сфері ІТ (Ірландія і Швейцарія), експортери продуктів харчування і країни із закритою економікою. Найбільш вразливі групи країн – це малі острівні держави, які залежать від експорту туристичних послуг; експортери нафти та експортери машин і обладнання. Україна займає 38-е місце у рейтингу і має стандартизоване значення індексу +0,4 переважно завдяки експорту продуктів харчування, який допомагає компенсувати вразливість, пов'язану з експортом продукції металургії. Вразливість великих економік обумовлена структурою їх експорту товарів, а малих – структурою експорту послуг.*

Ключові слова: *зовнішня торгівля, економічна стійкість, попит на товари та послуги, залежність від світових ринків, пандемія, карантинні заходи.*

Аннотация. *В 2020 году пандемия COVID-19 стала основным событием, влияющим на мировую экономику. Спад, обусловленный как падением спроса, так и предложения, изменения в поведении потребителей и инвесторов стали новой реальностью. Целью данного исследования является оценка устойчивости внешней торговли и уязвимости стран в условиях сокращающегося глобального спроса на различные группы товаров и услуг в результате пандемии COVID-19 и мер по ее сдерживанию. Предложенный индекс устойчивости внешней торговли в условиях пандемии основан на экспорте фармацевтической продукции, медицинского оборудования, продуктов питания, товаров и услуг в сфере ИТ, аудиовизуальной сферы и т.д. (+); туристических и транспортных услуг, нефти, руд и металлов, транспортных средств, большинства других видов техники и т. д. (-); импорте медицинской и сопутствующей продукции (-) относительно ВВП стран. В статье представлен рейтинг для 100 крупнейших экономик. 90% стран имеют абсолютную уязвимость торговли в условиях пандемии. Существует 3 типа стран с относительно большей устойчивостью по внешней торговле: экспортеры медицинской продукции или услуг в сфере ИТ (Ирландия и Швейцария), экспортеры продуктов питания и страны с закрытой экономикой. Наиболее уязвимые страны – это малые островные государства, которые зависят от экспорта туристических услуг; экспортеры нефти и экспортеры машин и оборудования. Украина занимает 38-е место в рейтинге и имеет стандартизированное значение индекса +0,4 в основном из-за экспорта продовольствия, который помогает компенсировать уязвимость, связанную с экспортом продукции*

металлургії. Узвимість більших економік обумовлена структурою їх експорту товарів, а малих – структурою експорту послуг.

Ключевые слова: *внешняя торговля, экономическая устойчивость, спрос на товары и услуги, зависимость от мировых рынков, пандемия, карантинные ограничения.*

Introduction. In 2020 the COVID-19 pandemic became the major event affecting the global economy. At the moment of writing this paper, on March 31, 2020 there were more than 801 thousand confirmed cases of the disease worldwide, almost 39 thousand deaths and almost 173 thousand recovered persons [Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU): 2020]. As a country of the first wave, China has successfully contained the epidemic. Western Europe and Iran became the next hotbeds of the disease. Then the sickness rate soared in the US. The next epicenters can emerge anywhere.

Despite currently the COVID-19 is far from being the major cause of death, its danger potential is large enough if the disease gets out of control. Many countries try to use various unprecedented restrictions to contain the infection in order to save time to find efficient means for cure and especially to prevent the disease from spreading so quickly that the health system will not be able to cope with the flow of seriously ill patients. The chances of avoiding getting sick or recovering for vulnerable groups of the population can greatly depend on this. At the same time the quarantine measures also disrupt the regular economic activity. There is a discussion about the length and severity of the measures to be taken. But in any case, the pandemic has already hurt many national economies and the global demand, and will probably continue to do that in the nearest future. Uncertainty about the further development of the pandemic, the restrictive measures and their effects is currently the major factor affecting forecasts, policy and business decisions. This uncertainty may be decreased by assessing the relative strength of countries and in particular their exports under the current challenges.

The purpose of the research is to estimate foreign trade strength and vulnerability of countries under the shrinking global demand for specific groups of goods and services as a result of the COVID-19 pandemic and the quarantine measures to contain it.

Recent literature review. R. J. Barro, J. F. Ursúa and J. Weng analyzed the effects of the 1918-1920 Great Influenza Pandemic and assumed that they may be used as the upper bounds for the expected outcomes of the COVID-19 pandemic. A typical country experienced a decline of the GDP per capita by 6% as a result of the Spanish flu pandemic a century ago. They also stated that the current pandemic already resulted in declines of stock prices and lowering interest rates, and is also likely to decrease GDP, although a lot of uncertainty remains about the future spread of the disease [Barro, Ursúa and Weng: 2020].

G. Verikios et al. modelled two scenarios of a global pandemic of influenza (scenario 1 with a higher infection rate and lower virulence rate, and scenario 2 with a higher virulence rate and lower infection rate in comparison to the Spanish flu pandemic). The virulence rate was calculated as the number of deaths per case. They concluded that under the second scenario the global economy would be hurt more. More globalized regions would also be the most affected ones. They also summarized the various economic effect of illness:

- increased medicals expenditures by patients or governments and increased workloads for a healthcare system;
- decrease in labor supply due to deaths (permanent losses), illness, absenteeism from work to avoid infection, necessity to care for children if schools are closed (temporary losses);
- decrease in public gatherings, closures of educational institutions;
- reduced demand for services that need face-to-face contact (tourism, transport, retail trade etc.) [Verikios et al.: 2011].

M. Casares and H. Khan modelled efficiency of social distancing using the data on Spain (which has quite a similar population size to Ukraine). If the average daily number of face-to-face contacts is 25, the number of deaths may reach 350 thousand and the daily number of people to be

hospitalized may peak at the level of 1.9 million persons. This would overwhelm the capacities of the healthcare sector. If the number of face-to-face contacts is reduced to 3 (social distancing scenario), the number of deaths would be reduced to 54 thousand and the daily peak of the hospitalized people would be only 154 thousand people [Casares and Khan: 2020]. We must note that there is a trade-off between higher death rate because of lack of healthcare capacities on one hand and economic slump and the number of victims due to economic disruption and possibly social unrest on the other hand.

A. Atkeson modelled the progression of COVID-19 in the United States to test when the share of infected people reaches 1% (assuming that it is very challenging for the healthcare system) and 10% (which may cause severe shortages for financial and economic infrastructure) under various mitigation policy scenarios [Atkeson: 2020].

A. W. A. Boot et al. mentioned both production and consumption shocks for the economy in the current situation. Since supply chains are affected under the epidemic, depletion of inventories may cause slowdown in production and shortages in distribution. Services sector also faces interruptive effects, especially travels, mass events, education etc. Companies experience reduction in cash flows and still have to pay their employees, suppliers and creditors. A. W. A. Boot et al. also suggested that fiscal measures should be taken to provide liquidity to the affected companies in order to prevent a banking crisis because monetary policy measures would not be enough to do that. They also stated that the current crisis has not originated in the financial sector, therefore the risk of moral hazard is low [Boot et al.: 2020].

A. A. Toda modelled two scenarios of COVID-19 epidemic. Under the benchmark scenario without mitigation efforts the share of simultaneously infected persons may reach 28% at the peak, which would overwhelm the healthcare system capacities. The alternative scenario with optimal restrictive measures ensuring social distancing may result in lowering the peak to 6.2%. Under the benchmark scenario stock prices would decrease by 50% temporarily. A lower but longer decrease would take place under the alternative scenario.

C. Albuлесcu provided an empirical analysis of the COVID-19 effect for financial market volatility index. The analysed period was between January 20, 2020 and February 28, 2020. The index grows as a result of new cases reported outside China, if the death ratio increases (especially outside China) and as more countries are affected by the disease [Albuлесcu: 2020a]. In another study C. Albuлесcu proved that there is a marginal negative direct impact of daily reported cases on oil prices. But there may also be an indirect effect on oil prices by amplifying the financial markets volatility [Albuлесcu: 2020b].

W. McKibbin and R. Fernando analysed 7 scenarios for development of the COVID-19 epidemic. If the disease was isolated in China the total losses would be between 283 and 1922 billion dollars. Under the pandemic scenarios the estimated losses may be between 2230 and 9170 billion dollars. This shock will require monetary, fiscal and health policy responses. They also mention disruption of supply chains as one of the effects of the coronavirus epidemic [McKibbin and Fernando: 2020].

C. Michelsen et al. expected the losses for industry and services (especially transport, tourism and financial sector). The imposed restrictions and uncertainty will deter consumption (although there was a temporary increase in retail sales due to a panic). They also expect that after the economic crisis in the 1st half of 2020 the precautionary measures will be relaxed. They provided decreased forecasted GDP growth rates for the world (+2.5% in 2020), euro area (-0.2%), US (+0.8%), Japan (-0.3%), Central and Eastern Europe (+2.8%), Russia (+1.1%), China (+4.6%), India (+5.0%). At the same time they stated that the forecast was becoming increasingly unlikely as downside risks were increasing. Policy responses and possibility of trade conflicts may also influence future trends [Michelsen et. al : 2020a].

In another publication C. Michelsen et al. provided forecasted indicators for Germany: GDP growth -0.2% (or lower) in the second quarter of 2020; growth of value added in manufacturing -1.4%; in construction -0.5%; trade, accommodation and transport -0.4%; business and production services +0.1%; public administration, community and social services +0.2%; investment in

machinery and equipment -0.9%, exports -1.3%, imports -0.3% [Michelsen et. al : 2020b]. Despite all the forecasts are not sufficiently reliable under the current uncertainty, they provide valuable information about the most vulnerable sectors of economy.

Currently the most recent forecast for the global economy was provided by IHS Markit on March 30, 2020 [IHS Markit: 2020]. They expect the new recession to be deeper than in 2008-09. The world GDP is expected to drop in 2020 (-2.8%). Some economies may suffer from double-digit annualized declines in the second quarter. The forecasted economic growth is -5.4% in the US, -3.3% in Canada, -4.5% in euro area and the UK, -6% in Italy, -2.5% in Japan and +2.0% in China. Emerging economies may suffer from the infection itself, the global recession and the related drop in commodity prices. Most economies will reach the pre-crisis level of output only in 2-3 years.

The main problem of the current economic forecasts is a huge uncertainty of the pandemic future trends and directions of further contagion. But regardless the uncertainty about the absolute losses, it is still possible to assess the relative vulnerability of countries considering the dropping global demand and the practiced restrictions for people and business.

Methodology. First we have to determine the most vulnerable industries. According to [Trading economics: 2020; National Bureau of Statistics of China: 2020] in January – February 2020 the year-on-year growth of industrial output in China was -13.5%. The industry specific output growth rates were:

- -28.2% for transport equipment, -44.6% for metal-cutting machine tools, -30.8% for power generating equipment, -37.4% for household refrigerators, -45.5% for copy and offset printing equipment (most types of machines and equipment);
- -43.2% for passenger turnover in civil aviation (passenger transport and tourism);
- -13.9% for gasoline (fuel for transport);
- -29.5% for cement (construction material);
- -4.6% for crude iron ore, +3.1% for pig iron and crude steel (metallurgy industry);
- -27.2% for textiles;
- -12.3% for chemicals (particular rates vary largely if we consider specific chemical products);
- -17.8% for paper and paperboard, -23.8% for newsprints (printed materials cannot be used distantly, although paperboard may be used for delivery services);
- -30.8% for mobile telephones, -26.6% for color television sets (communication and audiovisual equipment);
- -1.5% refined sugar, -28.5% for soft drinks (food and beverages industry);
- -8.2% for electricity.

But the slump in China took place under the national epidemic and was caused by both the supply shock (undermined labor supply) and the national demand shock. As for the global pandemic, we expect that the demand shock will be more important because it includes drop in both domestic and foreign demand. The industry specific effects may be different especially taking into account that the expected negative effect of the pandemic may last for a longer period than under a local epidemic scenario.

Therefore we should account for radical and more prolonged changes in consumption behavior in the majority of countries, which may transmit into drop of investment in the vulnerable industries causing lower demand for investment goods. As a result, we account for both the post-hoc review of the current trends in specific industries in China and our assumptions about future global trends in order to determine the most and the least vulnerable industries. E.g. the negative effect for metal industry may be underestimated as it produces mostly durable and investment goods (e.g. under the global crisis in 2009 the exports of metals decreased by 34% [UNCTAD: 2020]). Sales of TV sets and mobile phones may restore under quarantine restriction when people have to rely on means of distant communication and entertainment at home.

Thus, we included 5 components (measured as % GDP) into our index of foreign trade strength under pandemic (IFTSP):

1. Strong merchandise exports SME (+) – total exports of food (including animal fats and vegetable oils); computer and audiovisual equipment; medical equipment, pharmaceutical products, cosmetics and toilet preparations. The last subcomponent is multiplied by 3. We assume that these types of products are relatively more consumed under pandemic and the related quarantine restrictions as they may be used inside one's house or in hospitals.

2. Strong services exports SSE (+) – total exports of telecommunications, computer and information services; audiovisual and related services. We assume that people have to communicate more and to consume video content at home instead of going outside for entertainment.

3. Weak merchandise exports WME (-) – total exports of oil and related products; ores, metals and related products; works of arts, jewelry and related goods; machinery (transport vehicles and most other machinery); cement and related construction materials; printed matter, office and stationery supplies; furniture; travel goods; footwear. We assume that these products may be the most vulnerable when demand for investment goods, durable goods etc. shrinks. Textile industry is also vulnerable, but it may switch to producing e.g. face masks, protective apparel etc. Gas and coal industries are vulnerable too due to decreasing fuel prices. But unlike oil gas and coal are mostly consumed for heating or producing electricity, while oil products are relatively more used by transport.

4. Weak services exports WSE (-) – total exports of passenger transport, travel and construction services. Quarantine measures significantly hamper travels, while shrinking demand negatively affects investments in residential, commercial and industrial buildings.

5. Imports of medical equipment, pharmaceutical products, cosmetics and toilet preparations IMPCT (-) multiplied by 3.

Thus, we compare strong and vulnerable exporting industries in comparison to countries' GDP and make a correction for import dependence on products for medical purposes and cleaning. We pay special attention to competitiveness and self-sufficiency of medical and pharmaceutical sector of a country. We use the data of [UNCTAD: 2020] for about 200 countries in 2018. But the index is calculated for the largest 100 economies considering the data availability and their role in the global or regional economies. GDP by exchange rate was used as an indicator of economy size.

After calculating the Index we consider the structure of exports of small and large economies, the leading countries and outsiders in the ranking, main global and regional powers, and Ukraine. Finally we define the leading countries by contribution of particular resilient and vulnerable industries in the IFTSP (in % GDP).

Our methodology also has some drawbacks:

- classification of industries into strong and weak may be imperfect considering different demand elasticities and vulnerability to quarantine restrictions;
- there are cases of missing data for some services exports especially for smaller countries, therefore positive or negative effect of services trade for some countries may be underestimated.

But we are making this research in a situation of high uncertainty of future scenarios of the pandemic trends and unprecedented challenges when past economic research results and models are not fully applicable. Only real developments in future will show actual resilience of countries.

Research results. Overall ranking. In Table 1 we ranked 100 largest economies by our index of foreign trade strength under pandemic (IFTSP). As we see, 90% of countries export more vulnerable products than rely on strong types of exports. Very different countries are in the top of the list. The top 3 countries with stronger foreign trade are Ireland, Paraguay and Switzerland. India ranks 19th, Brazil 20th, US 26th, China 28th, France 35th, Ukraine 38th, UK 41st, Japan 48th, Spain 50th, Italy 56th, Germany 60th, Russia 70th, Libya 100th.

Table 1

Ranking countries by the index of foreign trade strength under pandemic

Rank	Country	IFTSP	Rank	Country	IFTSP	Rank	Country	IFTSP
1	Ireland	57.2	35	France	-7.7	68	Serbia	-18.1
2	Paraguay	12.3	36	Uzbekistan	-7.8	69	Greece	-19.1
3	Switzerland, Liechtenstein	7.2	37	Latvia	-8.0	70	Russian Federation	-20.0
4	Côte d'Ivoire	6.6	38	Ukraine	-8.2	71	Austria	-20.7
5	Costa Rica	5.5	39	Colombia	-8.7	72	Lithuania	-20.8
6	New Zealand	3.0	40	Australia	-8.8	73	Qatar	-21.8
7	Argentina	2.3	41	United Kingdom	-9.2	74	Romania	-21.9
8	Uruguay	2.0	42	Lebanon	-9.4	75	Belgium	-22.3
9	Denmark	1.8	43	Bolivia	-9.4	76	Tunisia	-23.0
10	Guatemala	0.3	44	Egypt	-10.0	77	Dem. Rep. of the Congo	-23.0
11	Pakistan	-0.1	45	Viet Nam	-10.5	78	Belarus	-23.4
12	Kenya	-1.1	46	Sweden	-10.9	79	Republic of Korea	-24.8
13	Zimbabwe	-1.2	47	Peru	-11.3	80	Thailand	-25.4
14	Bangladesh	-1.3	48	Japan	-11.9	81	Bulgaria	-26.5
15	Cuba	-2.8	49	Chile	-12.6	82	Portugal	-27.9
16	Turkmenistan	-2.9	50	Spain	-13.0	83	Croatia	-29.9
17	Indonesia	-2.9	51	Philippines	-13.1	84	Saudi Arabia	-31.3
18	Israel	-3.0	52	Panama	-13.4	85	Malaysia	-32.2
19	India	-3.1	53	Nigeria	-13.4	86	Estonia	-32.2
20	Brazil	-3.5	54	Norway	-13.5	87	Hungary	-32.7
21	Yemen	-4.0	55	Finland	-13.9	88	Slovenia	-33.2
22	Cameroon	-4.0	56	Italy	-13.9	89	Kazakhstan	-33.7
23	Sudan	-4.2	57	Canada	-14.1	90	Kuwait	-37.0
24	Ghana	-4.5	58	Jordan	-14.4	91	Angola	-37.2
25	Tanzania	-4.6	59	Morocco	-14.4	92	Oman	-37.6
26	United States of America	-4.6	60	Iran	-15.2	93	Czechia	-38.1
27	Ethiopia	-4.8	61	Germany	-15.7	94	Bahrain	-40.6
28	China	-5.2	62	Turkey	-15.9	95	Iraq	-44.6
29	Myanmar	-5.5	63	Venezuela	-16.4	96	United Arab Emirates	-46.0
30	Ecuador	-5.6	64	South Africa	-16.5	97	Azerbaijan	-46.0
31	Sri Lanka	-5.6	65	Mexico	-16.7	98	Slovakia	-48.6
32	Dominican Republic	-6.1	66	Poland	-17.0	99	Singapore	-50.5
33	Netherlands	-6.2	67	Algeria	-17.0	100	Libya	-68.0
34	Luxembourg	-6.9						

Source: Authors' calculations based on the [UNCTADStat: 2020].

IFTSP structure. Table 2 shows components of the Index for several selected economies and the standardized values of the Index (the difference in standard deviations from the average value of the IFTSP).

Table 2

Standardized values and components of the index of foreign trade strength under pandemic – for selected countries

Country	Standardized IFTSP	SME	SSE	WME	WSE	IMPCT
Ireland	4.4	55.1	27.2	-6.6	-3.9	-14.6
Paraguay	1.7	20.5	0.0	-1.6	-1.3	-5.4
Switzerland + Liechtenstein	1.3	37.0	1.8	-14.3	-2.6	-14.7
Argentina	1.0	6.9	0.4	-1.7	-1.2	-2.2
Pakistan	0.9	2.4	0.4	-0.7	-0.3	-1.9
Indonesia	0.7	4.6	0.1	-5.3	-1.4	-1.0
India	0.7	3.3	2.1	-6.5	-1.2	-0.9
Brazil	0.7	4.7	0.1	-6.3	-0.3	-1.7
United States of America	0.6	2.6	0.2	-3.8	-1.2	-2.4
China	0.6	4.8	0.3	-8.8	-0.5	-1.1
Netherlands	0.5	39.7	3.1	-30.9	-3.2	-14.9
France	0.4	9.3	0.8	-10.7	-2.8	-4.3
Ukraine	0.4	16.2	2.8	-17.3	-1.9	-7.9
Australia	0.4	3.4	0.2	-6.2	-3.2	-3.1
United Kingdom	0.3	6.1	1.0	-9.6	-2.0	-4.7
Sweden	0.2	9.5	2.7	-16.4	-2.8	-3.9
Japan	0.2	1.8	0.1	-10.5	-1.1	-2.3
Spain	0.1	8.1	1.0	-12.1	-5.2	-4.9
Nigeria	0.1	0.4	0.1	-12.4	-0.5	-1.0
Italy	0.0	8.5	0.5	-15.0	-2.5	-5.4
Canada	0.0	5.5	0.7	-14.7	-1.5	-4.0
Iran	0.0	1.5	-	-14.9	-	-1.8
Germany	-0.1	13.5	1.1	-22.8	-1.6	-6.0
Turkey	-0.1	3.6	0.0	-11.8	-4.9	-2.8
South Africa	-0.1	4.2	0.2	-15.1	-2.4	-3.4
Mexico	-0.1	11.4	0.0	-23.5	-1.9	-2.6
Poland	-0.1	14.0	1.4	-22.8	-3.0	-6.5
Russian Federation	-0.3	2.0	0.3	-17.8	-1.5	-3.1
Republic of Korea	-0.6	5.7	0.3	-26.6	-1.9	-2.3
Thailand	-0.7	14.7	0.1	-24.2	-12.5	-3.4
Saudi Arabia	-1.0	1.2	0.1	-27.5	-1.5	-3.5
Slovakia	-2.1	18.7	1.6	-57.2	-3.2	-8.5
Singapore	-2.2	33.9	3.9	-71.2	-7.8	-9.2
Libya	-3.3	0.3	-	-63.5	-	-4.9

Source: Authors' calculations based on the [UNCTADStat: 2020].

Size of economy. We also calculated that the Index does not significantly correlate with the logarithm of GDP. But there is a significant positive correlation between the logarithm of GDP and

strong goods exports (0.23), weak goods exports (0.36) and a negative correlation with weak services exports (-0.51). Therefore under pandemic there is also no optimal size of economies if protectionism does not rise globally. But the export vulnerabilities of large and small economies are structurally different: small economies are vulnerable because of their services exports structure, while large economies – because of their goods exports structure.

The top 15 countries by the IFTSP index. Ireland (ranks 1st) is the most promising country. It is definitely a positive outlier as its IFTSP standardized value is 4.4. The reasons of its leadership in the ranking are its large exports of telecommunications, computer, and information services (27% GDP), medicinal and pharmaceutical products (15%). It also imports a lot of medicinal and pharmaceutical products (4%), but this may evidence in favor of involvement of the industry in the global value chains.

Paraguay (2nd) relies mainly on food exports (20%) and has minor foreign trade weaknesses. Switzerland (3rd) has large exports of medicinal and pharmaceutical products (12%), although it exports also a lot of machinery (10%). Its substantial imports of medicinal and pharmaceutical products (4%) may also be a result of involvement in the global value chains.

Côte d'Ivoire (4th) relies mainly on food exports (20%). Costa Rica (5th) and New Zealand (6^h) export mostly food too (8% and 12%), although they also have certain dependence on travel services exports (6% and 5%). Argentina (7th) and Uruguay (8th) have relatively large food exports (6% and 7%). Denmark (9th) exports both food (6%) and medicinal and pharmaceutical products (4%), although it exports a lot of machinery too (7%). Guatemala (10th) relies mainly on food exports (6%).

The next group of countries (Pakistan, Kenya, Zimbabwe, Bangladesh and Cuba (11th-15th)) are relatively closed economies in terms of strong and weak exports.

If we consider smaller economies too, the leaders could also include such economies as Guinea-Bissau (IFTSP = 18.0), Greenland (16.6), Micronesia (12.9), Kiribati (1.9) thanks to their food exports. But their IFTSP values are not robust because of the missing data for their services exports structure (except for Guinea-Bissau).

The bottom 15 countries. Libya (ranks 100th) depends a lot on its oil exports (62% GDP). Since its IFTSP standardized value is -3.3, we can obviously define it as a negative outlier in our sample of countries.

Singapore (99th) exports mainly machinery (49%), oil and related products (18%), and travel services (6%). These weaknesses under pandemic are not offset by exports of medical equipment, pharmaceutical products, cosmetics and toilet preparations (7%), computer and audiovisual equipment (8%). Slovakia (98th) exports mostly machinery (43%), metals and related products (9%). They are not compensated by its exports computer and audiovisual equipment (12%).

Azerbaijan (97th) largely depends on its oil exports (37%) as well as exports of travel services (6%). United Arab Emirates (96th) exports oil and related products (24%), machinery (9%), jewelry and related products (8%). Iraq (95th) depends a lot on its oil exports (40% GDP). Bahrain (94th) exports mainly oil (23%), metals and related products (13%).

Czechia (93th) exports mostly machinery (38%), metals and related products (7%). These exports are not offset by exports computer and audiovisual equipment (12%). Oman, Angola and Kuwait (92th-90th) depend a lot on their oil exports (30%, 35% and 31%). Kazakhstan (89th) relies largely on oil exports (23% GDP), metals and related products (7%).

Slovenia (88th) exports mostly machinery (27%), metals and related products (8%), and travel services (6%). They are not balanced by exports of medicaments (6%). Hungary (87th) exports mainly machinery (38%), which is not offset by exports of computer and audiovisual equipment (8%), and other strong exports. Estonia (86th) exports machinery (16%), oil products (8%) and travel services (6%). These weaker exports are not balanced by stronger exports computer and audiovisual equipment (12%).

If we consider small economies too, the outsiders would also include such economies as Aruba (IFTSP = -80.2), Antigua and Barbuda (-61.9), Maldives (-58.2), Saint Lucia (-54.8), Grenada (-51.5), Saint Kitts and Nevis (-43.9), Anguilla (-42.8) because of their large dependence

on travel services exports (34-71% GDP).

Global and regional economic powers. As for the largest economies, the USA has few strong and weak exports relatively its GDP as it is a relatively self-sufficient economy. China's minor weakness is the exports of machines (6% of GDP), but it is largely compensated by exports of computer and audiovisual equipment (4%).

The largest EU economies have exports of machines as a minor or moderate weakness: 18% in Germany, although it is partially offset by exports of products for medical purposes (3%), 9% in Italy, 8% in France, 6% in the UK. The same is relevant for Japan (9%) and especially South Korea (20%).

Spain's weaknesses are the exports of machines (8%) and travel services (5%). The Netherlands export a lot of machines (15%) and oil products (9%), but they are offset by exports of food (12%), products for medical purposes (6%), computer and audiovisual equipment (7%). Poland's weaknesses are the exports of machines (15%) and metals (5%), which are slightly offset by exports of food (6%).

Canada's weaknesses are the exports of machines (7%) and oil (5%). Australia has exports of ores and metals (5%) as a minor weakness. The weak exports of Russia and Saudi Arabia are the exports of oil (13% and 25%). India, Brazil and Indonesia are quite closed economies with few strong and weak exports. Mexico exports mainly machines (18%), it is slightly compensated by exports of computer and audiovisual equipment (5%). Turkey has two minor weaknesses: the exports of machines (7%) and travel services (3%).

Ukraine has a better than average rank (38th) with the standardized IFTSP value of +0.4. It is supported by its food exports (15% GDP) as well as exports of telecommunications, computer, and information services (3%). But its total exports of medical equipment, pharmaceutical products, cosmetics and toilet preparations; computer and audiovisual equipment; audiovisual and related services are less than 1% of its GDP. Ukrainian weak exports under the pandemic include mainly exports of metals and related products (12%) as well as machinery (4%). Other weak exports are minor ones: travel services (1%), passenger transport services (0.7%) and construction services (0.1%) etc.

Product specific export dependence. Next we define the leading countries by contribution of particular industries in IFTSP (in % GDP).

Countries which are the most dependent on exports of food include Guinea-Bissau, Seychelles (22%), Micronesia (21%), Greenland, Paraguay (20%), Nicaragua (17%), Côte d'Ivoire, Honduras (16%) and Ukraine (15%). The main countries which specialize in exports of computer and audiovisual equipment are Vietnam (24%), Czechia, Slovakia (12%), Singapore, Hungary (8%), Malaysia, the Netherlands (7%), United Arab Emirates and Thailand (6%).

The most intensive exporters of medical equipment, pharmaceutical products, cosmetics and toilet preparations are Ireland (16%), Belgium, Switzerland (12%), Slovenia (8%), Singapore (7%), the Netherlands (7%), Hungary (5%) and Denmark (5%). But they are also present in the list of the most intensive importers of these products: Belgium (10%), Slovenia, the Netherlands, Switzerland, Ireland, Malawi (5%), Hungary, Kyrgyzstan and Nicaragua (4%). If we calculate the most intensive net exporters of such goods, the leaders would be Ireland (12%), Switzerland (7%), Singapore (4%), Slovenia and Denmark (3%).

Countries with the largest contribution of telecommunications, computer and information services exports to their GDP are Ireland (27%), Cyprus (10%), Luxembourg (6%), Montserrat (5%), Israel and Singapore (4%). Luxembourg (5%) ranks 1st by intensity of audiovisual and related services exports, but there are too many countries with missing data by this indicator to provide a genuine ranking in this case.

As for weak exports, the most intensive exporters of oil and related products are Libya (62%), Republic of Congo (46%), Iraq (40%), Azerbaijan (37%), Angola (35%), Kuwait (31%), Oman, Equatorial Guinea (30%), Saudi Arabia (25%), Gabon (24%), United Arab Emirates (24%), Kazakhstan, Bahrain (23%) and Brunei Darussalam (20%). Exports of ores and metals are the most important for Zambia (25%), Mongolia (21%), Democratic Republic of the Congo (18%), New

Caledonia (17%), Guinea (16%), Chile (14%), Bahrain (13%), Namibia, Ukraine and Bhutan (12%). The most dependent countries on exports of precious and semi-precious stones, jewelry, works of art or related products are Botswana (31%), Lesotho (10%), United Arab Emirates (9%) and Namibia (7%).

The most intensive exporters of transport vehicles and most other vulnerable types of machinery and equipment are Singapore (49%), Slovakia (43%), Czechia, Hungary (38%), Slovenia, Malaysia (27%), Republic of Korea (20%), Germany, Mexico, Belgium, Vietnam, Thailand (18%) and North Macedonia (17%). The same for footwear – Vietnam (7%), Cambodia (5%) and Albania (4%); for furniture – Lithuania (4%) and Vietnam (3%); for travel goods, handbags and similar containers – Cambodia (2%) and Vietnam (1.4%). Exports of cement and similar construction materials, printed matter, some types of office and stationery supplies provide only a minor contribution to national economies in all countries.

Aruba (71%), Maldives (57%), Saint Lucia (50%), Antigua and Barbuda (50%), Grenada (47%), Saint Kitts and Nevis (38%), Seychelles (36%), Anguilla (34%), Saint Vincent and the Grenadines (28%), Dominica (26%), Belize (25%), Bahamas, Cabo Verde (24%), Barbados (23%), Montenegro (22%), Jamaica (20%), Georgia (20%), Montserrat, Croatia, Fiji (19%), Cambodia, and Sao Tome and Principe (18%) are economies that are the most dependent on travel services exports. The same for passenger transport services – Fiji, Antigua and Barbuda (7%), Panama and Malta (4%), although about half of countries have missing data for this indicator. There is also some minor dependence on construction services exports in Estonia (2%), Armenia and Belarus (about 1.5%).

Conclusions. The COVID-19 pandemic is currently the main factor of the global and domestic demand, although it is not easy to forecast what country may become the next epicenter of the pandemic. E.g. Italy was far from being the main country of origin or destination for tourism links with China. But recession and changes in consumption and investment behavior are already taking place simultaneously in many countries.

We used trade structure analysis to elaborate and calculate our index of foreign trade strength under pandemic. We can conclude that there are three groups of the most resilient countries:

- which specialize in exports of medical and pharmaceutical products (Ireland and Switzerland) or telecommunications, computer and information services (Ireland);
- food exporting countries (mainly some developing economies);
- several closed developing economies.

The most severely affected countries through the trade channel are likely to include:

- countries which largely rely on exports of machines and equipment (Singapore and several Central European countries);
- oil exporting countries (mainly in the Middle East);
- heavily dependent countries on exports of travel services (especially small island countries) as the most vulnerable group.

As for the main powers, India, Brazil, USA and China outperform Japan and the EU, while the latter outperform Russia. Inside the EU Western European countries (they usually have an average performance globally) have better positions than the Central European countries. But the EU still may improve its resilience under cohesion scenario. Controlling for the fact that most of the EU trade is within the union itself can also provide it with more optimistic ranks. Thanks to its food exports, Ukraine has a better than average situation considering foreign trade strength under the current COVID-19 pandemic. Small economies are vulnerable mainly because of their services exports structure, while large economies – because of their goods exports structure.

However, our research results should be treated with caution because of uncertainty related to the future trends in the pandemic and the mitigation measures. But our research is an early attempt to decrease the uncertainty in forecasting international trade developments when a full-scale post-hoc analysis is not possible yet.

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