INDICATORS OF INTERNATIONAL TRADE ORIENTATION OF UKRAINE IN THE CONTEXT OF ASSESSMENT OF THE EFFECTIVENESS OF ITS EXPORT RELATIONS

N. Reznikova[1], O. Osaulenko[2], V. Panchenko[3]

ABSTRACT

The approach to study the significance of trade relations between countries by analysing economic vulnerability, economic sensitivity, symmetry and asymmetry of the established economic links is proposed in the paper. This approach is adapted to an analysis of the trade dependence of Ukraine. The estimated interdependence ratios for Ukraine and its largest trade partners – the EU, the Russian Federation, post-Soviet countries, China, the USA and Brazil and India as emerging economies – are compared with the respective ratios of Ukraine's dependence on these countries' markets. The analysed dynamics of Ukraine's GDP dependence on Ukraine's trade partners shows a growing relative weight of the countries that have not had a substantial role in the foreign trade of Ukraine. The proposed approach for estimating the quality of the established trade relations is supposed to contribute to the radical transformation of Ukraine's foreign trade.

Key words: economic policy, export orientation, trade relations, trade dependence

1. Introduction

A relatively high level of Ukraine's economy integration causes the objective necessity in building up the national economic policy as a response to globalization challenges. It needs to be based on adequate understanding of the mechanism of interaction between the national economy performance and exports as "a channel" linking the country with the global economy. This link between exports and economic growth has two essential dimensions:
1. Direct causality between exports and economic growth, with exports considered as a key factor for the national economy development. This idea was laid by some countries in the strategy of export-led growth.
2. The causality between growth in exports and dynamics and structure of national GDP: GDP is the determinant of exports.

---

[1] Doctor of Economics, Professor of the Chair of World Economy and International Economic Relations of Institute of International Relations Taras Shevchenko National University of Kyiv, Ukraine.

[2] Doctor of Public Administration, Professor, Corresponding Member of National Academy of Sciences of Ukraine, Rector of National Academy of Statistics, Accounting and Audit, Kiev, Ukraine.

[3] Post-PhD at Mariupil State University.

Yet, in practice national economic strategies are set by countries through combining elements of the first and the second approach, with the significance of exports as a factor of economic growth and the correlation between GDP and exports revised in view of various internal and external economic and political factors.

2. Export structure quality and economic growth

2.1. Theoretical Framework

According to IMF experts, foreign trade policy and optimization of the structure of trade partners is a foremost factor behind economic development and convergence in developing countries. North American and European analysts of current economic practices observe positive correlation and strong impact of export-oriented strategies on economic development of countries with transitional economy. Empirical studies of correlation between exports and economic development have become a common matter for experts in international economy since the axiom "exports lead to economic development" was put forward by C. P. Kindleberger [Kindleberger 1962]. A. Krueger puts emphasis on empirical evidence to a strong positive impact of the development of trade, diversification of trade partners and a clear export-oriented strategy for economic growth [Krueger 1988]. According to J. E. Stiglitz, the most part of empirical regressions demonstrates a strong correlation between measures of external openness, i.e. foreign trade, stimulation of exports, tariff, indexes of price distortions, and growth of incomes per capita [Stiglitz 1999]. Due to the data accuracy problems, modern researches tend to use various empirical strategies to study economic openness versus economic growth. These strategies include: (i) the use of openness indicators (D. Dollar [Dollar 1992], J. Sachs and A. Warner [Sachs 1995]); (ii) reliability testing by the use of a wide range of openness criteria, including subjective indicators (S. Edwards [Edwards 1993; Edwards 1998]); (iii) comparisons of convergence practices in groups of liberalized and non-liberalized countries (D. Ben-David [Ben-David 1993]). P. Romer proposes to use the spatial component as a tool to find out the impact of grade on incomes level [Romer 1986]. J. Sachs and A. Warner attempt to measure the index of openness, combining information on several aspects of trade policy, by surveys in 79 countries [Sachs 1995]. It follows from their results that an economy is considered closed once five criteria are met: (i) average tariff rates lower than 40%; (ii) non-tariff barriers applied to more than 40% of the imports; (iii) the economic system is socialist; (iv) government monopoly on a major part of exports; (v) the share of the shadow economy is larger than 20%. The researchers come to the conclusion that the above five criteria have 2.44 percent negative impact on economic growth. Significance t-test is 5.5, and the probability of error is lower than 0.1%. As a significant change would not occur when the first three criteria were not applied, it is the scopes of the shadow economy and the government monopoly which have essential negative effects on economic growth. A. Harrison studies correlation between trade policy and economic development and observes effects from trade liberalization in many countries [Harrison 1991]. He uses seven indicators of trade policy, including the share of the shadow market, the level of

trade prices and trade liberalization index of the World Bank. These are indicators having strong correlation with economic development of a country. P. Wacziarg, determining indicators of economic openness that have impact on economic growth, constructed trade policy index as the combination of three indicators: average import rate, share of non-tariff constraints and Sachs-Warner indicator [Wacziarg 2001]. The effectiveness of the established foreign economic relations of a country was measured by R. M. Kunst, D. Marin through analysing the causality between labour productivity and exports [Kunst 1989]. From the analysis of the output in industrial sectors they were able to find out that while exports had no impact on productivity, productivity did have impact on exports. J. A. Hatemi and M. Irandoust found a causal relation between exports and two factors, labour productivity and total factor productivity growth, by the use of data for five developed countries [Hatemi 2001]. A review of scientific publications devoted to the impact of export structure on economic development demonstrates that the problem remains to be important, but insufficiently explored; it, therefore, requires further studies.

2.2. Ukrainian international trade orientation versus global trends

In the years following 1991, when Ukraine gained independence, its exports were comparable with some of the European countries. In the following 20 years or more, each of these countries could increase exports to a significant extent: in Poland exports grew by 14.1 times, in Hungary by 11.1 times, in Turkey by 9.4 times. Yet, in Ukraine it was only 4.7 times.

Given that Ukrainian exports fell by 30.14% in 2015, in absolute figures they amounted to 37.8 billion USD, which is 1.9 billion USD lower than in the crisis year of 2009, when there was an unprecedented decline in exports of 40.7%. From the macroeconomic perspective, in the years of independence Ukraine failed to achieve significant success in economic policy reforms: its results were mostly bad except for years of good market conjuncture for key commodities groups of Ukrainian exports (see Table 1).

Table 1. GDP and foreign trade of Ukraine

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Real GDP, % to the previous year	5.9	2.7	7.3	7.9	2.3	-15.1	4.1	5.2	0.2	-4.6	-7.5	-10.0	2.3
Exports of goods and services, % to the previous year	25.8	4.8	12.1	28.5	35.8	-40.7	-30.7	-11.2	-7.4	-5.2	-27.6	-30.14	-4.1
Imports of goods and services, % to the previous year	17.8	24.6	24.6	34.6	41.1	-46.9	-26.8	-2.2	-0.8	-3.4	-26.5	-27.6	3.7
Trade balance, % of GDP	1.97	1.52	-2.67	-5.05	-7.54	-1.18	-2.22	-4.03	-5.12	-3.53	3.92	1.24	0.36

The argument that all the troubles of Ukraine are caused by the withdrawal of a part of its territory, warfare and destruction of the largest industrial region seems to be rather controversial. The most rapid decline of the national economy was in 90s of the past century: over the earliest five years of independence Ukraine lost nearly 60% of GDP. This rate of collapse is twice higher than the rate of the American economy's decline in the times of Great Depression.

These disappointing results of economic performance in Ukraine, foreign trade in particular, over the long time justify applications of unconventional methods for analysis of interdependence of countries that are trade partners, in order to find the challenges faced by the Ukrainian economy and demonstrate the need to diversify its export structure and destinations. This determines the objective of the study.

The structure of exports of goods and services in a country is conditional on the impact of international demand on them, and the performance and profile of its economy. The structure of Ukrainian exports of goods only partly corresponds with the global one. While the global exports are dominated by mechanical equipment (23.7%), mineral products (18.8%), transport vehicles (9.9%), chemicals (8.8%) and non-precious metals, the share of mechanical equipment in Ukrainian exports (10.5%) is twice lower than the global average. The share of non-precious metals and products made thereof in the total Ukrainian exports (29.8%) is essentially higher than the global average. The share of mineral goods is lower than the global average (12.5% for Ukraine against 18.8% global average), although the difference is rather small compared with other commodity groups. At the same time, the share of plant products in Ukrainian exports (11.9%) is nearly four times higher than the global average. Ukrainian fats and oils account for 3.5% of the global market, plant products – 1.6%. The rates of growth in Ukrainian exports of agricultural and food products outpace the global ones, which confirms that the global demand for these products has been stable and their producers have not been exposed to crisis-specific pressure of the Ukrainian economy.

Basically, Ukrainian exports feature a relatively low share of industrial products with a high value added and larger share of basic metals, agricultural and food products. Ukraine is a global leader in exports of selected commodity groups (see Table 2).

Table 2 Positions and shares of Ukrainian exports at selected global commodity markets in 2016

Commodity position	Global position	Market share, %	Main importers
Crops	7	5,5	Egypt, Spain, Saudi Arabia, China
Fats and oils	6	4,0	India, China, Iran, Spain
Ores	10	1,5	China, Czech Republic, Poland, Austria, Slovakia
Ferrous metals	11	3,0	Turkey, Russia, Italy, Egypt, Poland

Ukrainian exports of services are dominated by transport (40.9%) and business (14.0%) services; travel services (19.8%). The three categories of

services, although in slightly different proportion, dominate at the global market: travel services (24.1%), business services (19.8%), and transport services (18.5%). The share of services on processing of material resources in Ukrainian exports (8,5%) is more than thrice higher than the global average (2.5%). Growth in Ukrainian exports of these services outpaced the global average in absolute (growth rates) and relative (export shares) terms.

As shown by the analysis, nearly 19.9% of the output of Ukrainian goods and services is exported. Export orientation is the strongest in manufacturing industry, where the export share is 41.0%: the largest share of exports is in mechanical engineering, textiles and basic metals, whereas the smallest one is in coke and other non-metal products. Mining industry exports nearly 27.8% of the output, with the share of exports being the highest for metal ores. Mining industry is followed by agriculture, where export orientation (the share of exports in the output) is 23.1%. The smallest share of exports is in services, where only 8.1% of the output is exported; the service sector in Ukraine is, therefore, strongly oriented on the domestic market.

3. Methodology for quality assessment of Ukraine's trade with partner countries

To our opinion, interdependence should be interpreted in view of the two critical characteristics: *sensitivity* and *vulnerability*. *Sensitivity* refers to direct and primary costs that can be imposed by one of the partner countries by changing interdependent relations between two partner countries. Sensitivity is associated with the severity of losses resulting from an unpredictable change. Vulnerability, on the other hand, is conditional on the country's capability to recover after losses resulting from the change in the policy of another country. R. Cooper elaborates on conceptual differences between sensitivity and vulnerability, and addresses these concepts as the two parallel definitions to separate forms of interdependence. Interdependence associated with vulnerability refers to the costs that a country has to bear (when the economic relations are disrupted), in order to do without trade transactions with its already former trade partner. These costs are classified in the public costs met by a country to the extent of its capacities, once it could adapt to the new situation.

On the other hand, interdependence associated with sensitivity acts as a tool for short-term corrections of public costs that a government has to impose on foreign policy measures in response to departures from established standards or economic practices. Therefore, while interdependence associated with sensitivity involves the costs related to *maintenance* of economic relations with another country, interdependence associated with vulnerability refers to the costs required for *disruption* of such relations.

Yet, this theoretical modelling cannot solve the problem related to the manifestation of these costs' effects. The concept of interdependence cannot be systematized unless the causal factors behind these benefits or final costs are found out, because it would be too difficult to extract systematically the vulnerability component without understanding the factor causing these costs. An in-depth analysis of the most typical variations in cross-country interactions gives reaffirming arguments of the essential modification in the meaning of the

dependence phenomenon, caused by endogenous and exogenous factors. Manoeuvring between economic vulnerability and sensitivity, between internal and external dependence allows us to interpret the condition of economic interdependence as the intermediate and equidistant case between the two extreme cases of full dependence and full dominance.

The concept of significance refers to the importance of trade relations relative to other trade relations. The significance of trade for one country in bilateral trade relations will not be always similar to its trade partner. For example, in the case of trade relations between Ukraine and the EU, their significance is much higher for Ukraine than for the EU.

The reduction in Ukrainian exports of goods to the EU to as low as 3.98 billion USD, or by 23.5%, in 2015 can be partially explained by the stoppage of industrial activities on occupied territories, because before the warfare in Lugansk and Donetsk regions started these regions' share in the national exports had reached 27%.

Insignificance of exports of Ukrainian goods and services for the EU market is confirmed by their share in the total imports of the EU, ranging from 0.27 to 0.36%: rarely found across the EU, Ukrainian goods and services do have low priority for the EU market.

The deepened and comprehensive free trade zone between Ukraine and the EU was launched in January 2016, which was supposed to push up modernization of the Ukrainian economy due to the increasing scopes of trade and improved regulatory mechanisms in Ukraine in conformity with the European practice.

When measured by ratio of exports of goods and services to GDP, the Ukrainian economy is even more open than the EU economies. The average export share of Ukraine was higher than the EU by 6.4 percentage points in 2005–2015 (except for 2013), which is an indication of a high dependence of the Ukrainian economy on global market conjuncture (see Table 3).

Table 3   Indicators of exports of goods and services from Ukraine to the EU
in 2005–2015

Indicator	2005	2008	2009	2010	2011	2012	2013	2014	2015
Exports of goods to the EU, billion USD	10233	18130	9499	13052	17970	17081	16759	17003	13015
% to the previous year	92.9	130.3	52.4	137.4	137.7	95.1	97.8	102.6	76.5
Exports of services to the EU, billion USD	1766	4066	3021	3117	3525	3745	4196	3992	2928
% to the previous year	113.4	136.5	74.3	105.6	113.2	106.4	111.9	95.1	73.4
The share of Ukrainian exports of goods and services in the total imports of the EU, %	0.29	0.36	0.27	0.30	0.34	0.36	0.35	0.35	0.31

The key aspect that we are going to emphasize when interpreting the concept of interdependence is *symmetry* in cross-country relations. It is argued that the significance of economic relations can vary in the dyad of countries, whereas the symmetry indicates the relative equality of their economic interdependence. A potential case of the ideal symmetry is when both countries are equally dependent on each other. The ideal asymmetry occurs when one country is fully dependent on its trade partner, but this partner is almost independent from the former country. Yet, considering that each country's dependency is a function of the total exports and imports between them, and this total does not equal zero for one country in the dyad, the total will not be zero for the other country as well. Therefore, the case when one country is absolutely independent from the other country can only occur when the other country is also fully independent.

The interdependence establishes the relative importance of bilateral trade relations for each of the countries compared with the amounts of their total trade (in both cases imports and exports are accounted for). For two countries (Country i and Country j), $TradeShare_{ij}$ measures the ratio of economic exchange between countries i and j, and the exchange of County i with all the partners.

$$TradeShare_{ij} = \frac{DyadicTrade_{ij}}{TotalTrade_i} \qquad (1)$$

Where $DyadicTrade_{ij}$ is the total imports and exports between Country i and Country j, $TotalTrade_{ij}$ is the total imports and exports of Country i with all the partners.

This ratio can range between 0 and 1, with 0 indicating absence of imports or exports between Country i and Country j, and 1 showing that Country i has international trade relations only with Country j. Using the basic share of trade derived by (1), the significance of interdependence between two countries can be estimated by multiplying the share of $TradeShare_{ij}$ for both countries and taking square root from the product by the formula:

$$Salience_{ij} = \sqrt{TradeShare_{ij} \cdot TradeShare_{ji}} \qquad (2)$$

The low level of dependence for one country decreases the overall significance of the relations in a dyad of countries. The overall significance for each of the two countries can be estimated by the use of $TradeShare_{ij}$ for each country.

Estimating the dependence of Country i on Country j on Gross Domestic Product (GDP) of Country is calculated according to the formula:

$$Depend_{ij,t} = \frac{X_{ij,t} + M_{ij,t}}{GDP_{i,t}} \tag{3}$$

where $Depend_{ij,t}$ is the estimate of dependence of Country i on Country j, $X_{ij,t}$ is the exports from Country i to Country j at the moment of time t, and $M_{ij,t}$ is the imports to Country i from Country j in the moment of time t.

3.1. Estimating the ratio of economic exchange between Ukraine and its selected trade partners

Estimation of $TradeShare_{ij}$ for Ukraine and its selected trade partners – the EU, the Russian Federation, post-Soviet countries, China, the USA, and the group of countries consisting of Brazil and India – allows for the following conclusions (see Table 4, Table 5):

Table 4. Ratios of interdependence between Ukraine and its largest trade partners

			TradeShareij			
Date	**Russian Fed.**	**Post-Soviet countries**	**EU**	**USA**	**China**	**BRIC (not incl. Russian Fed.)**
01.01.1996	0.318	0.088	0.173	0.021	0.030	0.007
01.01.1997	0.277	0.092	0.209	0.023	0.042	0.010
01.01.1998	0.236	0.049	0.206	0.026	0.031	0.008
01.01.1999	0.222	0.054	0.198	0.023	0.031	0.011
01.01.2000	0.287	0.097	0.265	0.033	0.030	0.013
01.01.2001	0.254	0.106	0.275	0.027	0.027	0.010
01.01.2002	0.229	0.091	0.286	0.024	0.028	0.011
01.01.2003	0.289	0.099	0.369	0.027	0.033	0.021
01.01.2004	0.318	0.098	0.364	0.037	0.025	0.021
01.01.2005	0.262	0.093	0.290	0.021	0.018	0.020
01.01.2006	0.255	0.114	0.323	0.024	0.016	0.019
01.01.2007	0.285	0.136	0.351	0.024	0.018	0.020
01.01.2008	0.258	0.157	0.347	0.035	0.025	0.022
01.01.2009	0.205	0.062	0.235	0.008	0.015	0.012
01.01.2010	0.322	0.089	0.291	0.023	0.028	0.028
01.01.2011	0.344	0.101	0.308	0.026	0.034	0.030

Table 4. Ratios of interdependence between Ukraine and its largest trade partners (cont.)

			TradeShareij			
Date	Russian Fed.	Post-Soviet countries	EU	USA	China	BRIC (not incl. Russian Fed.)
01.01.2012	0.240	0.078	0.231	0.021	0.025	0.024
01.01.2013	0.214	0.065	0.245	0.020	0.059	0.021
01.01.2014	0.166	0.071	0.281	0.019	0.060	0.023
01.01.2015	0.127	0.061	0.291	0.020	0.063	0.024

Table 5. Ratios of interdependence between Ukraine and its largest trade partners

			TradeShareij			
Date	Russian Fed.	Post-Soviet countries	EU	USA	China	BRIC (not incl. Russian Fed.)
01.01.1996	0.318	0.088	0.173	0.021	0.030	0.007
01.01.1997	0.277	0.092	0.209	0.023	0.042	0.010
01.01.1998	0.236	0.049	0.206	0.026	0.031	0.008
01.01.1999	0.222	0.054	0.198	0.023	0.031	0.011
01.01.2000	0.287	0.097	0.265	0.033	0.030	0.013
01.01.2001	0.254	0.106	0.275	0.027	0.027	0.010
01.01.2002	0.229	0.091	0.286	0.024	0.028	0.011
01.01.2003	0.289	0.099	0.369	0.027	0.033	0.021
01.01.2004	0.318	0.098	0.364	0.037	0.025	0.021
01.01.2005	0.262	0.093	0.290	0.021	0.018	0.020
01.01.2006	0.255	0.114	0.323	0.024	0.016	0.019
01.01.2007	0.285	0.136	0.351	0.024	0.018	0.020
01.01.2008	0.258	0.157	0.347	0.035	0.025	0.022
01.01.2009	0.205	0.062	0.235	0.008	0.015	0.012
01.01.2010	0.322	0.089	0.291	0.023	0.028	0.028
01.01.2011	0.344	0.101	0.308	0.026	0.034	0.030
01.01.2012	0.240	0.078	0.231	0.021	0.025	0.024
01.01.2013	0.214	0.065	0.245	0.020	0.059	0.021
01.01.2014	0.166	0.071	0.281	0.019	0.060	0.023
01.01.2015	0.127	0.061	0.291	0.020	0.063	0.024

1) Trade relations of Ukraine with the EU and the Russian Federation can be referred to as significant and indicative of the vulnerability of the Ukrainian economy to their dynamics.

2) The relative vulnerability of trade relations between Ukraine and the Russian Federation have been gradually decreasing.

3) The trade interdependence of Ukraine and post-Soviet countries features high volatility and the decreasing vulnerability.

4) Regarding the interrelations of Ukraine and the EU, the period from 2000 to 2008 stands out as one demonstrating most clearly the growing share of the EU in the total exports and imports of Ukraine.

5) Ukrainian-American trade relations do not feature dynamics.

An nnalysis of data for 2015 shows the continuingly decreasing trade dependence of Ukraine on the Russian Federation due to the sanctions (0.127 in 2015; 0.214 in 2013, against 0.318 in 1996); in parallel, estimates of trade dependence for Ukraine in the posts-crisis year of 2009 marking the shrinking global demand show that markets in post-Soviet countries could adapt to the consumption of Ukrainian products.

Beginning with 2012, the dependence of Ukraine on the Russian Federation and post-Soviet countries was notably decreasing, contrary to the markets of the EU and China, which, given the high volatility (turning points of growths and recessions), could retain stability. In parallel, the decreasing dependence of Ukraine on the main trade partners in 2012–2015 is an indication of the growing relative weight of the third countries, which did not have a substantial role in Ukraine's foreign trade. It is true that Egypt or Turkey, whose figures of trade with Ukraine are beyond the scope of our analysis, could increase their shares in the foreign trade with Ukraine beginning with 2014.

A remarkable long-term tendency in Ukrainian exports is the falling share of the Commonwealth of Independent States (CIS) beginning with 2011 (from 38.27% in 2012 to 16.62% in 2016) in parallel with the increasing share of EU-28, Asian and African countries. This reorientation is caused by the aggravation of trade and political contradictions between Ukraine and Russia, and the need to seek for new export markets (see Table 6).

Table 6. Geographic structure of Ukrainian exports of goods in 2005–2016, %

Year	CIS	Europe	EU-28	Asia	Africa	America	Australia and Oceania
2005	30.77	31.79	30.07	25.06	6.99	5.35	0.04
2006	32.19	32.91	31.71	22.01	6.19	6.65	0.05
2007	36.69	29.97	28.44	22.07	5.66	5.45	0.03
2008	34.59	29.47	27.28	23.72	5.83	6.19	0.10
2009	33.94	25.86	23.97	30.56	6.62	2.83	0.05
2010	36.46	26.90	25.46	26.68	5.87	3.89	0.06
2011	38.27	26.96	26.35	25.93	4.89	3.73	0.04
2012	36.78	25.31	24.88	25.69	8.19	3.79	0.07

Table 6. Geographic structure of Ukrainian exports of goods in 2005–2016, % (cont.)

Year	CIS	Europe	EU-28	Asia	Africa	America	Australia and Oceania
2013	34.87	26.95	26.47	26.55	8.05	3.42	0.06
2014	27.61	31.77	31.54	28.48	9.46	2.55	0.04
2015	20.47	34.75	34.14	32.47	9.98	2.06	0.04
2016	16.62	37.55	37.11	33.34	10.21	2.24	0.04

3.2. Estimating trade dependence for Ukraine and its selected trade partners

Estimation of $Depend_{ij,t}$ for Ukraine and its selected trade partners – the EU, the Russian Federation, post-Soviet countries, China, the USA, and the group of countries consisting of Brazil, China and India – allows for the following conclusions (see Table 7):

- the dependence of Ukraine's GDP growth on trade relations of the Russian Federation decreased; interrelations between Ukraine and the Russian Federation have five explicit phases of economic activity, correlating closely with the political climate in Ukraine.

- the contribution of post-Soviet countries in Ukraine's GDP growth rapidly decreased (dependence ratio 0.114 as of 1 January 2008, against 0.062 as of 1 January 2016).

- although the impact of trade relations between Ukraine and EU countries on growth of Ukraine's GDP features relative stability (dependence ratio 0.319 for 2003; 0.254 for 2006; 0.259 for 2011), in 2015 EU countries (with dependence ratio of 0.295 recorded for the second time after 2000, the year when the significance of trade relations with this group of countries was dominant for Ukraine's GDP dynamics) became the trade partner for Ukraine with the most essential impact on the dynamics of Ukraine's GDP. However, given that the indicators of dependence of Ukrainian trade on EU countries are analysed considering the waves of EU enlargement (enlarging significantly the number of EU members), the change in Ukraine-EU relations is not explicit.

- given that China joined the top three trade partners of Ukraine by the results of 2016, its impact on the dynamics of Ukraine's GDP gives evidence of gradual transformations in China-Ukraine relations: its nearly zero impact on Ukraine's GDP at early phases of Ukraine's state building (0.019 dependence ratio as of 1 January 1996) was gradually increasing to catch up with the dependence estimates for the group of post-Soviet countries, for which the significance of trade was rapidly falling (dependence ratio 0.064 for China and 0.062 for the group of post-Soviet countries as of 1 January 2016, against 0.026 for China and 0.090 for the group of post-Soviet countries as of 1 January 2006).

Table 7. Ratios of dependence of Ukrainian GDP growth on trade relations with Ukraine's partners

	$Depend_{ij,t}$					
	Russian Fed.	**Post-Soviet countries**	**EU**	**USA**	**China**	**Brazil, China, India**
01.01.1996	0.312	0.087	0.170	0.021	0.019	0.007
01.01.1997	0.223	0.074	0.169	0.018	0.024	0.008
01.01.1998	0.230	0.048	0.201	0.025	0.020	0.008
01.01.1999	0.244	0.060	0.218	0.026	0.026	0.012
01.01.2000	0.289	0.097	0.266	0.034	0.042	0.013
01.01.2001	0.241	0.101	0.262	0.026	0.019	0.010
01.01.2002	0.216	0.086	0.271	0.023	0.022	0.011
01.01.2003	0.249	0.086	0.319	0.023	0.029	0.018
01.01.2004	0.268	0.083	0.307	0.031	0.023	0.018
01.01.2005	0.228	0.081	0.252	0.019	0.028	0.017
01.01.2006	0.201	0.090	0.254	0.019	0.026	0.015
01.01.2007	0.198	0.094	0.244	0.017	0.025	0.014
01.01.2008	0.187	0.114	0.251	0.025	0.033	0.016
01.01.2009	0.179	0.094	0.205	0.013	0.034	0.018
01.01.2010	0.252	0.069	0.228	0.018	0.043	0.022
01.01.2011	0.289	0.085	0.259	0.022	0.050	0.025
01.01.2012	0.247	0.081	0.237	0.021	0.053	0.025
01.01.2013	0.201	0.061	0.230	0.019	0.056	0.019
01.01.2014	0.171	0.073	0.289	0.020	0.061	0.023
01.01.2015	0.128	0.062	0.295	0.020	0.064	0.024

Given the strong impact from the USA on shaping the geopolitical vector of Ukraine's development, the existing trade relations between the two countries indicate unchanged positions (dependence ratio 0.021 as of 1996 and 0.020 as of 2015).

Yet, the estimates of $TradeShare_{ij}$ and $Depend_{ij,t}$ demonstrate the quality of economic exchange between Ukraine and its partners in a more representative way, which allows for the following statements:

- while the impact of Ukraine's foreign trade with the EU on Ukraine's GDP changed from negative (-0.132 in 2012) to positive (0.204), in the case of foreign trade with the Russian Federation (-0.359) and the USA (-0.447) the situation is too bad.
- the impact of Ukraine's foreign economic relations with developing countries (Brazil, India, China) on Ukraine's GDP growth is positive (0.534);
- high estimates of dependence show insufficient structural diversification of the Ukrainian economy, disregard to the need for the import substitution policy implementation, which would change commodity positions of Ukrainian exports and imports.

In the case of Ukraine (given its economic dependence on the EU (0.295 as of the end of 2015) and the Russian Federation (0.128 as of the end of 2015, against 0.217 as of the end of 2013)), the estimates give evidence of the skewed trade structure and orientation towards the group of selected partners.

4. Analysis and discussion of results

We have built the equation of regression for the total exports and imports by country, which looks representative.

$$Y_1 = -2.758X_6 + 4{,}922X_9 + 2{,}042X_{12} + 16{,}524X_{15} - 35{,}289X_{18} + 23{,}273X_{21} + 54687205$$

(4)

coefficient of determination $R^2 = 0.940$;

where X_6 – total imports and exports with the Russian Federation;

X_9 – total imports and exports with post-Soviet countries

(not including the Russian Federation);

X_{12} – total imports and exports with EU countries;

X_{15} – total imports and exports with China;

X_{18} – total imports and exports with the USA;

X_{21} – total imports and exports with Brazil, China and India.

The results lead to the following conclusions:
- Ukraine's dependence on foreign economic relations with the Russian Federation has a negative impact on the growth rates of Ukraine's GDP (growth in the trade relations by 1000 UAH reduces the GDP by 2758 UAH);
- Ukraine's dependence on foreign economic relations with the USA has an extremely negative impact on the growth rates of Ukraine's GDP (growth in the trade relations by 1000 UAH reduces the GDP by 35289 UAH);
- Ukraine's dependence on foreign economic relations with China has a positive impact on the growth rates of Ukraine's GDP (growth in the trade relations by 1000 UAH increases the GDP by 16524 UAH);
- Ukraine's dependence on foreign economic relations with post-Soviet countries has positive impact on the growth rates of Ukraine's GDP (growth in the trade relations by 1000 UAH increases the GDP by 4922 UAH);
- Ukraine's dependence on foreign economic relations with EU countries has a positive impact on the growth rates of Ukraine's GDP (growth in the trade relations by 1000 UAH increases the GDP by 2042 UAH);

- Trade leaders with a positive impact on the growth rates of Ukraine's GDP (growth worth of 23273 UAH per each 1000 UAH) are Brazil China, and India.

5. Summary and conclusion

The proposed methodology for computing indexes of dependence and interdependence, measures of symmetry, sensitivity and vulnerability of relations between partner countries can be useful for the analysis of established relations, to reveal the comparative dynamics of change in partner countries with different economic capacities, and in countries with similar economic structures. It should be borne in mind, however, that once a partner country pursues imports substitution policy or, say, reshoring, which changes its economic structure and, consequently, the structure of its demand for goods at the global market, this can have a tangible effect on the quality of established relations that will undergo gradual transformations: when imports substitution policy is adopted by a country that is an outsider in relations, the asymmetries will be decreasing; when reshoring policy is adopted by countries that are leaders of relations, the explicit asymmetries will be aggravating.

The dynamics of countries' interdependence is conditional not only on endogenous factors (structure of economy, structure of demand, macroeconomic stability in a country), but also exogenous ones (rate of the global economy growth, conjuncture at global commodity markets, conditions for access to capital markets and intellectual property markets, etc.). Thus, if GDP of a partner country grows significantly, the unchanged figures of its trade relations with selected countries cannot be evidence of these relations' decline.

The reorientation of Ukraine's trade flows from CIS to the EU and Asia, confirmed by the assessment, is a long-term trend that has been strengthened as a consequence of recent events and Ukraine and beyond. Ukraine has leading positions at the markets of agricultural goods, ores and metal, i.e. the so called "stock exchange" goods with prices very sensitive to global conjuncture fluctuations. Once the share of goods with high value added is increased, export earnings will be more stable. Ukrainian exports are concentrated; because this also increases their sensitivity to shocks, their scope and price can be to a significant extend volatile. The indexes of dependence, derived for Ukraine, show that Ukraine has sensitivity-based interdependence relations with its trade partners, except for Russia, with which Ukraine has interdependence associated with vulnerability, because it refers to deliberate *disruption* of the existing relations and minimization of Russia's role as exporter and importer.

Considering the already existing economic capacities and sectoral structure of Ukraine, it needs to be noted that Ukraine faces objective challenges on the way to integration in the global market that has undergone powerful globalization processes involved in coordination of interests by entities participating in international value added chains. We believe that Ukraine needs to act in a multi-vector way, in the five mainstream directions (technological, financial, infrastructural, structural and diplomatic), to optimize its foreign economic relations. The export pattern of Ukraine, based on a significant share of primary commodities, confirms its low productivity and non-competitiveness at the global

market. A comprehensive analysis of trade relations of Ukraine by computing RVA index and dependence index confirms that the less diversified the economic structure of a country is and the more similar the economic structures of partner countries are, the more stable their relations are. Accordingly, if even the trade between such partner countries diminishes, the quality of their relations will remain unchanged, with the implicit asymmetric or symmetric dependence. Moreover, the change will be mutual if even asymmetric relations are preserved.

The interdependence of the partner countries' economies can be caused by the symmetrically growing demand for goods that they offer if even technological gaps between them are preserved. Thus, the increasing imports of technologies by one of the partner countries can be symmetrically accompanied by the increasing exports of its primary commodities to the partner country's market. Therefore, it would be too difficult to substantiate the quality of such trade relations without a detailed study of the structure of commodity exports and imports.

It can be concluded that the decreasing interdependence of partner countries, in parallel with establishing more diversified trade relations and/or reorientation to production of alternative goods/services with the respective growth in exports is a sign of economic development of a country.

REFERENCES

BEN-DAVID, D., (1993). Equalizing exchange: trade liberalization and income convergence, Quarterly Journal of Economics, Vol. 108, No. 3, pp. 653–679.

COOPER, R., KENEN, P. B., JONES, R. W., (1985). Economic Interdependence and Coordination of Economic Policies,
http://econpapers.repec.org/bookchap/eeeintchp/2-23.htm.

DOLLAR, D., (1992). Outward-oriented developing economies really do grow more rapidly: evidence from 95 LDCs, 1976-85, Economic Development and Cultural Change, pp. 523–544.

EDWARDS, S., (1993). Openness, trade liberalization, and growth in developing countries, Journal of Economic Literature, Vol. 31, No 3, pp. 1358–1393.

EDWARDS, S., (1998). Openness, productivity and growth: what do we really know? Economic Journal, Vol. 108, pp. 383–398.

HARRISON, A., (1991). Openness and growth: a time-series, cross-country analysis for developing countries, NBER Working Paper, No. WPS 809, pp. 6–45.

HATEMI, J. A., IRANDOUST, M., (2001). Productivity performance and export performance: a time series perspective, Eastern Economic Journal, Vol. 27, No. 2, pp. 149–164

INTERNATIONAL MONETARY FUND, (1997). Annual report of the Executive Board for the financial year,
http://www.imf.org/external/pubs/ft/ar/97/pdf/file06.pdf.

KINDLEBERGER, C. P., (1962). Foreign trade and the national economy, New Heaven; Yale University Press.

KRUEGER, A. O., (1988). Why trade liberalization is good for growth, The Economic Journal, Vol. 88, pp.1513–1522.

KUNST, R.M., MARIN, D., (1989). On exports and productivity: a causal analysis, Review of Economics and Statistics, Vol. 71, No. 4, pp. 699–703.

ROMER, P., (1986). Increasing returns and long–run growth, Journal of Political Economy, Vol. 94, pp. 1002–1038.

SACHS, J., WARNER, A., (1995). Economic reform and the process of global integration, Brookings Papers on Economic Activity, Vol. 1, pp. 1–118.

STIGLITZ, J. E., (1998). Towards a new paradigm for development: strategies, policies, and processes,
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.199.9708&rep=rep1&type=pdf.

WACZIARG, R., (2001). Measuring the dynamic gains from trade, World Bank Economic Review, Vol. 15, No. 3, pp. 393–429.