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INTERNATIONAL INTEGRATION PROCESSES INFLUENCE ON WELFARE OF COUNTRY

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Abstract. The primary objective of the research is to investigate the influence of international integration processes on national welfare. Peculiarities of trade and economic liberalization of trade through mechanism of regional trade agreements (RTA) forming have been scrutinized. Integration, which develops due to RTAs, is the most important mechanism of the international cooperation in the field of economic policy. This integration is a coordination and protection mechanism, which functions in a broad spectrum of policies. An exceptional role of RTAs in reaching country economic security has been estimated. RTAs being a result of a compromise reached by protectionism and anti-protectionism forces have been grounded. Using tools of the multiple regression model, the influence of integration processes, in which Ukraine and China participate, on national economic growth rates and on GDP per capita (as major parameters reflecting national welfare level) was simulated. This allowed detecting of the positive direct dependence between the trade liberalization and economic growth rates, as well as the inverse dependence between the trade liberalization and GDP per capita, for both countries. Based on these regression models, economic growth rates and GDP per capita were predicted for next years; according to this prediction, graduate increasing of national welfare shall occur in Ukraine and China.

Keywords: integration, regional trade agreements, regionalization, trade liberalization, welfare, economic growth, multiple regression model.

JEL Classification: F15, O19.

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Introduction

Within globalization processes strengthening, transformation changes in countries' interactions and cooperations are observed, particularly, integration processes reach a substantially new development level and are reflected in regionalization processes. Hereby, globalization and regionalization processes strengthen and complement each other, but simultaneously have different dialectical directions.

The process of globalization creates new characteristics and types of regionalization, a number of regional trade agreements is growing rapidly (World Trade Organization, 2020), mega-regional trade agreements are created as a completely new form of integration, and the principle of "neighborhood" recedes into the background, thus aggravating competition between integration associations, which is especially evident in the field of international trade (Bulatova & Panchenko, 2018). In addition, governments seek to increase a number of partners in order to improve trade conditions, which contributes to the intensification of international trade in certain regions and, consequently, increase not only the intensity of global trade, but also national welfare (Yatsenko et al., 2018; Sokiran, 2020). A characteristic feature of the global system of international trade is the integration vector of its development (Tsygankova et al., 2020). Based on this, studying of an integration vector of the global international trade system, which determines the nature, features and strategic directions of international trade relations within world integration groups as integral components of the global international trade system, is especially important today. In addition, deepening of theoretical foundations of the study of certain development aspects related to regional trade agreements and real tools that can be regional trade agreements, in addition to liberalization tools, is of particular interest.

The aim of the article is to study separate aspects of creating and functioning of regional trade agreements and defining their influence on welfare of integrating countries.

The article consists of the following sections: Literature Review, Methods and Data, Empiric Results and Arguments, Conclusions. The first section presents a summary and a synthesis of the findings of the literature review. The model of multiple regression and other methods of scientific research which were used in the article are outlined in the second section. Basic initial results of models and forecast economic growth tempo level and GDP per capita for three following years are discussed in the third section. The concluding remarks are presented in the final section.

1. Literature review

Economic cooperation, acquiring integration forms, transforms into concluding regional trade agreements along with introducing preferential or free trade regimes (Reznikova & Ivashchenko, 2015). For these reasons, intercountry quantity studies of international cooperation issues on economic policy level are often focused on analyzing regional trade agreements whose number is constantly rising (Table 1).

There are several main types of regional trade agreements according to the degree of their economic integration. In accordance with the OECD classification, there are four main types

of regional economic integration, such as free trade areas, customs unions, common markets, and economic unions. The WTO distinguishes three types of regional trade agreements. these are free trade areas, customs unions and economic integration agreements. However, categorization, which includes five types of regional economic integration, is considered to be the most common. These categories are free trade areas, customs unions, common markets, economic unions and political unions.

Table 1. Current regional trade agreements: their types and coverage, 1958–2020 (source: summed up by the authors based on World Trade Organization, n.d.)

Period of time:	before 1990	1991–2000	2001–2010	2011–2020*	**Total:**	% from total number
Type:						
CU	2	6	4	0	12	4.0%
CU & EIA	2	2	–	1	5	1.7%
EIA	–	1	–	1	2	0.7%
FTA	7	42	41	21	111	36.6%
FTA & EIA	1	5	79	62	147	48.5%
PSA	8	4	9	4	25	8.3%
PSA & EIA	1	–	–	–	1	0.3%
Total:	21	60	133	89	303	100.0%
Coverage:						
Goods	17	52	54	25	148	48.8%
Services	–	1	–	1	2	0.7%
Goods & Services	4	7	79	63	153	50.5%
Total:	21	60	133	89	303	100.0%

Note: * – data as of April 2020. CU – A Customs Union, EIA – An Economic Integration Agreement, FTA – A Free Trade Agreement, PSA – A "Partial Scope" Agreement.

In fact, RTAs functioning as a coordinating and protecting mechanism in a wide range of policies is probably the most important mechanism of international cooperation in the economic policy sphere. As of April 2020, the total number of current RTAs accounted for 303 agreements and in 1990, they were only 21, which is a 15-fold less number. Regional trade agreements cover more than half of international trade today and their number has tripled in the last 20 years. Averagely, each WTO member country has currently 11 partners with regional trade agreements. Top positions are held by small export-oriented countries, such as Singapore and Chile; each of them, has concluded more than 30 agreements with more than 60 countries (World Trade Organization, 2021). As researchers K. Fro and E. Ornelas state, RTAs have been a major tool of mutual liberalization over the last years and there are promising evidences confirming that trade development and foreign trade facilitation to were caused by RTAs (Bhala, 2008; Crawford & Fiorentino, 2005). On average, over the past 30 years the

number of RTAs has increased by 100 agreements every decade and peaked in 2001–2010. At the same time, free trade zone and economic integration agreements have constantly been a dominant form of countries' trade integration (Tsygankova et al., 2020). As for trade types, which are covered by RTAs, in the 20th century the major part of agreements consisted of goods trading agreements, and only at the beginning of the 21st century, a number of goods and services trading agreements started to prevail over the above ones (Kucher et al., 2019a).

Since many WTO members are involved in new negotiations on the forming of RTAs, the trend to increase a number of regional trade agreements persists. Like most existing agreements, most new ones are bilateral. Current trends of regionalism are no longer associated with bilateral agreements only, but also with the formation of comprehensive "new generation" interregional agreements, such as the Trans-Pacific Partnership (TPP), also called the Trans-Pacific Partnership Agreement between Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, Vietnam, and the United States; the Transatlantic Trade and Investment Partnership (TTIP) between the European Union and the United States; the Regional Comprehensive Economic Partnership (RCEP) between ten member states of the Association of Southeast Asian Nations (ASEAN), namely Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam, and five of ASEAN's FTA partners – Australia, China, Japan, New Zealand, and South Korea.

RTAs concluded over the last decade normally exceed significantly negotiating trade conditions; they include a number of regulations concerning matters such as investment, competition, and domestic regulations which justifies their use as a representation of economic cooperation depth between countries which signed an agreement. Thus, RTAs, where decrease of tariff protection is only one of many aspects requiring coordination, are not limited down to liberalization as it is (Grossman, 2016), but consider a number of issues ranging from changes in business models of companies operating in those sectors which are covered by an agreement, to conditions of giving preferential access to markets of partnering countries and challenges of political coordination (DiCaprio et al., 2017) in order to level or strengthen within-RTA and outside-RTA effects (Goldberg & Pavcnik, 2016; MacPhee & Sattayanuwat, 2014).

Hereby, RTAs cannot completely reflect a condition and level of international cooperation of countries in the area of their economic policies as well as in any other area framed in an agreement. More often, governmental institutions cooperate directly with representatives of similar establishments in other countries rather than use the RTA mechanism. M. Schiff (Schiff, 2000) highlights that multi-sided trade liberalization by itself will inevitably lead to more or less politically integrated RTAs. In his theoretical modeling, the scientist used the hypothesis of political disintegration of Alesina-Spolaore-Wacziarg (Alesina et al., 2000) which states that a balanced weight of a country in a union falls and a number of countries increases as international economic integration spreads, and the hypotheses of V. Ethier stating that multi-sided trade liberalization leads to a larger number of RTAs (Ethier, 1998). J. Crawford and R. Fiorentino make a similar supposition claiming that prevailing of free trade area over Customs Unions is likely connected to the fact that the more rapidly they are formed, the lower level of political coordination they require (Crawford & Fiorentino, 2005).

In the 21st century, R. Bhala (Bhala, 2008) has already asked the provocative question whether RTAs are a tool used by large economies in a race against each other when fighting for economic and political influence. He made an attempt of an unbiased analysis of the USA's and the EU's attempts to use the RTA mechanism as a tool for strengthening their trade power. Despite the fact that the scientist did not manage to avoid a slightly too optimistic view on opportunities for developing countries caused by globalization, in our opinion, his conclusions seem to be informative and deserve scrutinizing. Thus, original flexibility of RTA lets countries set better trade relations which they wish to establish mutually or on a regional level, relatively easily and rapidly. When compared to slow processes of multi-sided trade system of the WTO, RTAs reflect an appealing tool for reaching various aspirations of their participants (Baier & Bergstrand, 2007) with the major one being reaching higher growth indices (Hur & Park, 2012; Chang et al., 2009) at the expense of activating flows of goods and services between member countries.

Theoretically, RTAs are seen not only as tools for trade liberalization (Estevadeordal et al., 2006; Thirlwall, 2000; Vicard, 2009; Barari & Kim, 2020) but also as tools for implementing protectionism policy as well. Bulatova and Panchenko (Bulatova & Panchenko, 2018) prove that RTAs are a protectionism tool which seeks to reproduce best trade relations between their sides which risk to be left as a cornerstone in multi-sided relations and trade liberalization principles on a global level due to the implementation of complex Origin Rules criteria and other disguised protectionism barriers in trade. Moreover, admitting that trade aspirations of every country – either big or small – are similar, in authors' opinion, understanding implications of any trade agreement, which shall be concluded, is an obligatory condition for holding own positions.

The issue of establishing correlation dependence between growing competitiveness and the rapidity of liberalization processes aggravates theoretical argument among trade advantages on multi-sided, regional or two-sided base. Thus, according to Limao (Limao, 2006), peculiar competition between multi-sidedness and regionality/two-sidedness has been aggravating lately. There is an adduced argument that analyzing RTAs signed between the USA and the EU may indirectly indicate their aspiration to hold spread of influence of other countries on their economic interests' zone. Moreover, controlling the issues of state purchases and regulating intellectual property rights, which are top priority interests for the USA and the EU, are easier to for regulation on a two-sided and regional level than on multi-sided one (Ma & Soroka, 2020; Kucher et al., 2019b). Furthermore, taking into consideration that RTAs with their legal nature are exceptional preferential trade agreements between countries signing them, an aspiration to be first in signing agreements on new markets, which guarantees keeping primacy of own interests over others, becomes obvious. Such an interpretation of RTAs enables us to assume their exceptional role in reaching economic security of a country.

In their researches J. Bhagwati and F. Panagariya (Bhagwati & Panagariya, 1996), when identifying potentially conflict aims and effects of regionalism as compared to the principle of multi-sided relations, focused on analyzing process of formation and spread of trade blocks and their influence on protectionism and liberalization level. Meanwhile, S. Bilal (Bilal, 1998) tries to find an answer to the question *whether RTAs increase or decrease attempts to implement protectionism.* We agree with the position of the authors concerning importance

of acknowledging objective need for protectionism within RTAs and studying its realization peculiarities without resorting to widespread approach based on balancing between two polar variants according to which RTAs *either increase or decrease a protectionism level.* A. Krueger (Krueger, 1997), having suggested alternative arguments, has arrived at analogous conclusions. The scientist provides considerable arguments that free trade area have stronger potential of trade diversion than Customs Union (CU), mainly due to connected rules of goods origin. Trade deepening normally provokes counteractions of national enterprises that compete on domestic market. At the same time, companies of collaborating countries, which benefit from trade diversion within a free trade zone, will also counteract to further global liberalization of trade. Therefore, trade diversion demonstrates a tendency to growing counteraction of further trade liberalization within economic unity, and thus, protectionism interests will be satisfied by free trade area rather than CU. Virtually, RTA is a result of protectionism and anti-protectionism powers compromise. Free trade support originates from consumers, branches that depend on produce import, and export economy industries. At the same time, enterprises, which compete on domestic market, normally actively support limiting measures. No doubt, such antagonistic interests influence the process of regional integration and foreign trade policy which was scrutinized by J. Grossman and A. Helpman (Grossman & Helpman, 1995). They have drawn a conclusion that free trade area is most likely to take place under the following circumstances: when trade diversion is on a high level; when industries, which mostly counteract to regional integration are excluded from an agreement, or when a more durable period of their adjustment to new economic conditions is guaranteed.

2. Methods and data

The methodological tools of the study of trade and economic integration are a structural element of the general concept of international trade. There is no single universal method of assessing the potential economic effects of free trade zones in modern economic theory and practice due to differences in major factors influencing the development of cooperation between countries. To some extent, it causes some evaluation problems; in particular, it is impossible to apply a single methodology for quantitative and qualitative research of the potential effects of bilateral cooperation due to the relative and comparative nature of the studied process, inconsistency of domestic statistical reporting with the world, influence of exogenous and endogenous, and socio-political and natural resource factors on bilateral trade.

The main methodological tasks to solve the problem of assessing effects of trade and economic cooperation are:

1. Identification of determinants and factors that influence trade and economic cooperation of countries;

2. Analysis of explicit and latent trade and economic potential of countries with the identification of basic problems and trends;

3. Research of features and methods of trade policy implementation;

4. Development of a multiple regression model in order to quantify effects of signing a regional trade agreement;

5. Jusification of strategic and tactical directions of trade policy harmonization with foreign economic interests and goals.

Analysis of economic effects of free trade areas is carried out in 3 stages (Yatsenko et al., 2018): ex-ante analysis (preliminary stage), operational analysis (current stage) and ex-post analysis. The first two stages imply assessment of prerequisites, problems and an actual state of trade and economic cooperation. The third stage implies modeling and forecasting scenarios of bilateral cooperation development along with identifying strategic and tactical objectives.

According to the set aim and in order to solve the major issue, the following methods of scientific research were used: method of analysis and synthesis for defining peculiarities of trade economic liberalization; method of comparative analysis to estimate the use of protectionism through regional trade agreements; method of correlation regression analysis to identify influence of integration processes on the rates of economic growth and GDP per capita; method of extrapolation – to calculate and explain forecast indices of economic growth rates and GDP per capita for future periods; and method of theoretical generalization to form conclusions.

Calculations of various types of indices (revealed comparative advantage, complementarity of partnering countries' trade, intensity of foreign trade, intra-brunch trade, trade specialization, etc.) (Dekhtyar, 2017; Avramchenko et al., 2013; Trofymchuk, 2017) and numerous variations of a gravity model (Tinbergen, 1962; Anderson, 1979; Raišienė et al., 2019) depending on the modeling aim are probably the most frequently used mathematic methods of estimating efficiency of regional trade agreement development. But these methods are increasing frequently criticized by scientists and do not provide answers for question, if a national welfare level changes after entering an integration group.

One of methods used to assess the influence of economic integration on its GDP dynamics is the multiple regression set of tools (Naveh et al., 2012). Let us study two models (1, 2):

$$GROW_{it} = b_0 + b_1\, LN\,(GDP_{it}) + b_2\,(GDI_{it} / GDP_{it}) + b_3\,(DEBT_{it} / GDP_{it}) + b_4\,(FDI_{it} / GDP_{it}) + b_5\,(TRADE_{it} / GDP_{it}) + \varepsilon_{it}; \quad (1)$$

$$GDP\ per\ capita_{it} = c_0 + c_1\, LN\,(GDP_{it}) + c_2\,(GDI_{it} / GDP_{it}) + c_3\,(DEBT_{it} / GDP_{it}) + c_4\,(TRADE_{it} / GDP_{it}) + c_5\,(TOT_{it}) + \varepsilon_{it}, \quad (2)$$

where, $GROW_{it}$ is rate of "i" country growth in "t" time which is calculated by formula $(GDP_t - GDP_{t-1}) / GDP_{t-1}$; GDP_{it} is "i" country's gross domestic product (GDP) in "t" time; $GDP\ per\ capita_{it}$ is "i" country's GDP per capita in "t" time; GDI_{it} / GDP_{it} is correlation between gross investment and "i" country's GDP in "t" time; $DEBT_{it} / GDP_{it}$ is correlation between national debt and "i" country's GDP in "t" time; FDI_{it} / GDP_{it} is correlation between direct foreign investment and "i" country's GDP in "t" time; $TRADE_{it} / GDP_{it}$ is correlation between trade and "i" country's GDP in "t" time (trade liberalization degree); TOT_{it} is "trade condition" index of "i" country in "t" time; b_n, c_n are constants (model parameters); ε_{it} is all other factors which influence rates of economic growth and GDP per capita but are not included to the formula (Naveh et al., 2012).

Taking into consideration the above mentioned, we suggest using the model of multiple regression for estimating efficiency of economic integration influence on welfare of China and Ukraine expressed with rates of economic growth and GDPs per capita. Chinese and Ukrainian statistic data 2000–2018 were used as input data for the models (Appendix Tables A1, A2).

3. Empiric results and arguments

Currently, RTAs are one of the most efficient models of cooperation of countries in order to provide profitability of international economic relations subjects, their economic growth, and social welfare (Yatsenko et al., 2018; Sokiran, 2020). Furthermore, these days there is no country that is a member of the world trade and is not a signee of at least one regional trade agreement. The major drivers of world integration processes are developed countries, however, a number of RTAs signed between developing countries has increased over the last years. For instance, China as one of the biggest developing countries participates in 16 regional trade agreements, this number rises every year and their content changes (Svyrydenko & Stovpets, 2020). Holding an indisputably special position in trade sphere, China is an initiator of the New Silk Road project (Kyianytsia, 2019) aimed at not only economic but geopolitical motives as well (Bilan et al., 2019). Over the years of independence, Ukraine has concluded 18 free trade agreements covering 45 countries (Melnyk, 2018), particularly, over the last decade, free trade areas with CIS and EFTA countries, Montenegro, the European Union, and Canada have become effective, and RTAs with Israel and the Republic of Turkey are being planned to be signed (Ministry for Development of Economy, Trade and Agriculture of Ukraine, 2020; Możgin, 2018).

However, despite additional applications of RTAs, their major goal is economic growth of a country. Expectations related to the integration are always positive and include increasing of the international goods exchange, economic growth of an integrated country, enhanced in-country specialization and goods production performance, as well as provision of new employment opportunities (Romanova & Davydenko, 2021). In order to estimate influence of integration, particularly, of valid RTAs on the welfare level of China and Ukraine, let us use models 1 and 2. To do so, statistic data of China and Ukraine during 2000–2018 is used, and modeling of influence of all integration processes of China (models (3) and (4)) and Ukraine (models (5) and (6)) on rates of their economic growth and GDPs per capita is received.

Models (3) and (4) for China:

$$GROW_{it} = -3.994 + 0.159\ LN\ (GDP_{it}) - 0.017\ (GDI_{it} / GDP_{it}) - 0.004\ (DEBT_{it} / GDP_{it}) + 0.06\ (FDI_{it} / GDP_{it}) + 0.004\ (TRADE_{it} / GDP_{it}); \quad (3)$$

$$GDP\ per\ capita_{it} = -60.726 + 2.214\ \text{LN}\ (GDP_{it}) - 0.011\ (GDI_{it} / GDP_{it}) + 0.126\ (DEBT_{it} / GDP_{it}) - 0.038\ (TRADE_{it} / GDP_{it}) - 0.013\ (TOT_{it}). \quad (4)$$

Models (5) and (6) for Ukraine:

$$GROW_{it} = -2.836 + 0.06\ \text{LN}\ (GDP_{it}) + 0.019\ (GDI_{it} / GDP_{it}) - 0.007\ (DEBT_{it} / GDP_{it}) + 0.031\ (FDI_{it} / GDP_{it}) + 0.011\ (TRADE_{it} / GDP_{it}); \quad (5)$$

$$GDP\ per\ capita_{it} = -49.704 + 2.068\ LN\ (GDP_{it}) - 0.01\ (GDI_{it} / GDP_{it}) - 0.006\ (DEBT_{it} / GDP_{it}) + 0.017\ (TRADE_{it} / GDP_{it}) - 0.015\ (TOT_{it}). \quad (6)$$

In order to check the significance of the connection between dependent and explanatory variables, the F-criterion with its table value of 0.3 is used. In every regression model (Table 2) actual F > table F with 95% credibility, thus it may be stated that models are statistically significant and the hypothesis about considerable dependence between dependent and explanatory variables in models is confirmed.

Table 2. Basic initial results of models (3), (4), (5), (6) (source: own calculations)

Index		Value	Standard deviation	$\lvert t_{stand.} \rvert$	Determination coefficient R^2	Correlation coefficient R	Factual F	Factual X2
Model 3	LN (GDP_{it})	0.159	0.057	2.782	0.799	0.894	10.364	18.536
	GDI_{it} / GDP_{it}	–0.017	0.007	2.592				
	$DEBT_{it}$ / GDP_{it}	–0.004	0.004	0.928				
	FDI_{it} / GDP_{it}	0.06	0.027	2.208				
	$TRADE_{it}$ / GDP_{it}	0.004	0.002	2.059				
	b_0	–3.994	1.336	2.99				
Model 4	LN (GDP_{it})	2.214	0.658	3.367	0.984	0.992	165.008	18.999
	GDI_{it} / GDP_{it}	–0.011	0.077	0.148				
	$DEBT_{it}$ / GDP_{it}	0.126	0.046	2.738				
	$TRADE_{it}$ / GDP_{it}	–0.038	0.017	2.186				
	TOT_{it}	–0.013	0.034	0.378				
	c_0	–60.726	17.018	3.568				
Model 5	LN (GDP_{it})	0.06	0.093	0.641	0.577	0.76	3.553	17.477
	GDI_{it} / GDP_{it}	0.019	0.009	2.256				
	$DEBT_{it}$ / GDP_{it}	–0.007	0.002	2.939				
	FDI_{it} / GDP_{it}	0.031	0.025	1.271				
	$TRADE_{it}$ / GDP_{it}	0.011	0.007	1.643				
	b_0	–2.836	2.797	1.014				

End of Table 2

Index		Value	Standard deviation	$\lvert t_{stand.} \rvert$	Determination coefficient R^2	Correlation coefficient R	Factual F	Factual X2
Model 6	LN (GDP_{it})	2.068	0.142	14.611	0.963	0.981	67.268	18.998
	GDI_{it} / GDP_{it}	–0.01	0.014	0.734				
	$DEBT_{it}$ / GDP_{it}	–0.006	0.008	0.739				
	$TRADE_{it}$ / GDP_{it}	0.017	0.012	1.466				
	TOT_{it}	–0.015	0.018	0.807				
	c_0	–49.704	4.477	11.103				

In order to check statistical significance of model parameters, Student's t-distribution is used, its table value is 1.3304 with 80% credibility. Considering particular parameters of model (3), every factor is substantially significant, except national debt of GDP whose value does not reflect the actual state of index influence on Chinese GDP growth. This is because the public debt of China, as well as of other Asian countries with emerging markets, is quite significant if compared to GDP and it indicates that the country has not yet undergone structural changes and up to 2016, the debt growth rate had been higher than the GDP growth rate. One of the factors of China's economic growth is foreign direct investments, that increase every year. Now China is considered to be one of the world's most attractive countries for investing. Such investment attractiveness has a direct impact on the country's economic growth. An economic interpretation allows stating that an increase of FDI_{it} / GDP_{it} by 1 unit causes the rate of economic growth increase by 0.06 units. In model (4) the correlation between gross investments and GDP per capita as well as "trade condition" index is not significant for GDP, however, the level of Chinese GDP, correlation between the national debt and GDP, and trade liberalization degree are significant. Thus, the hypothesis of a significant impact of the degree of trade liberalization on the rate of economic growth and GDP per capita is confirmed. Considering parameters for model (5), the correlation between gross investments and GDP, the national debt and GDP, and a trade liberalization degree are substantially significant. The indicator of foreign direct investments, which plays an important role in China's economic growth, is not significant for Ukraine at all. This is due to the fact that the investment attractiveness of Ukraine is quite low, and the condition of fixed assets is critical. Therefore, gross investments contribute to Ukraine's economic growth, as they are aimed at upgrading major production facilities. Direct investments in Ukraine are not so significant and therefore they do not play a significant role in economic growth. However, in addition to gross investments, a public debt reduction is also important for economic growth. Ukraine has repeatedly experienced difficulties in repaying its debt, so the reduction of an external debt has a positive impact on the economic situation in the country and its growth, respectively. For model (6) only the GDP level and a trade liberalization degree

are substantially significant. Thus, the hypothesis of a significant impact of trade liberalization on the rate of economic growth and GDP per capita, which was confirmed for China, is confirmed for Ukraine, too.

Another prerequisite for the statistical significance of the model is fulfillment of the condition about the constancy of the variance or homoscedasticity for all observations. In order to check the hypothesis of heteroscedasticity, White's test is used. Table value of X^2 is 22.362 and it is higher than factual X^2 in every regression model (Tables 1, 2 and in Appendix Table A1, A2). Therefore, the hypothesis of heteroscedasticity is rejected and the model may be considered homoscedastic.

The weighed determination coefficients are 0.799 in model (3), 0.984 in model (4), 0.577 in model (5), and 0.963 in model (6) and show that economic growth rate variations of China and Ukraine are determined by GDP variations, correlations between gross investments and country GDPs, between national debts and country GDPs, between direct foreign investments and country GDPs, and trade liberalization degrees of 79.9% for China and 57.7% for Ukraine relatively; country GDP per capita variations are determined by GDP variations, correlations between gross investments and country GDPs, national debts and country GDPs, and trade liberalization degrees of 98.4% for China and 96.3% for Ukraine. The correlation coefficient is close to 1, thus there is a strong connection between all explanatory variables and dependent variables.

Regression models combined with expert and authors' predictions let us forecast economic growth rates (Figures 1 and 3) and GDPs per capita (Figures 2 and 4) for next three years.

Thus, modeling the degree of integration processes influence on welfare of China and Ukraine, let us define positive direct dependence of trade liberalization on economic growth rates according to models (3) and (5), and also direct dependence of trade liberalization on GDP per capita according to models (4) and (6). In all cases statistical significance of trade liberalization index has been established which enables us to state high integration significance for country welfare growth. Models adequacy was proved using basic criteria, therefore it can be used as a base for more extended research for forecasting development of economic growth rates and GDPs per capita.

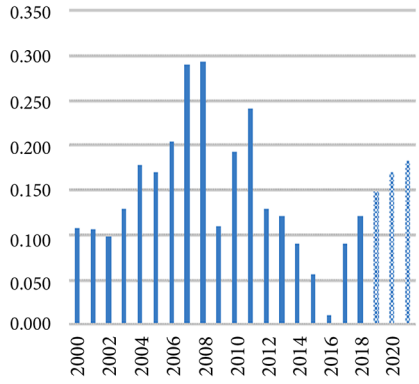

Figure 1. Economic growth tempo of China, 2000–2021, % (source: authors' researches)

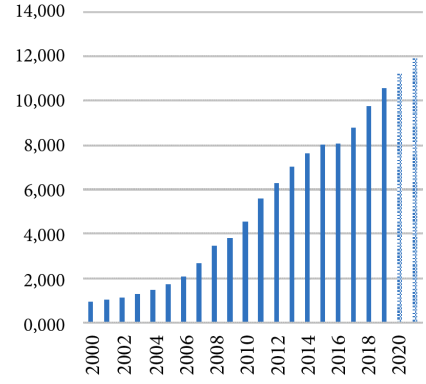

Figure 2. GDP per capita in China, 2000–2021, $ thousands (source: authors' researches)

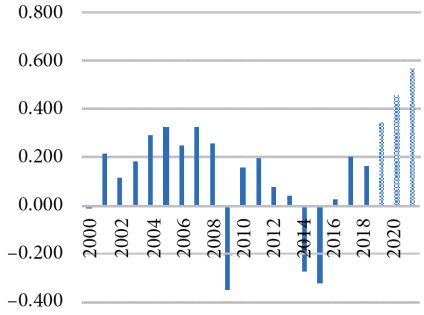

Figure 3. Economic growth tempo of Ukraine, 2000–2021, % (source: authors' researches)

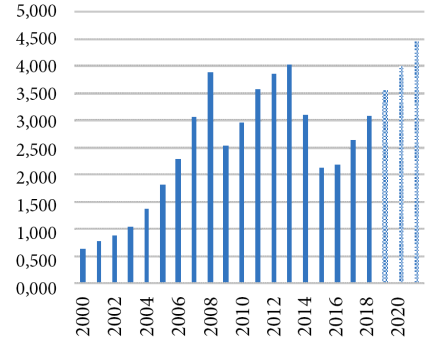

Figure 4. GDP per capita in Ukraine, 2000–2021, $ thousands (source: authors' researches)

The increase of an RTA number has a positive effect on country welfare and causes both increased economic development rates and higher GDP per capita. Signing RTAs with mutually beneficial partner terms lets countries promptly integrate into the world community, use existing resources more efficiently, deepen specialization, attract extra investment, and strengthen relations with other countries.

Conclusions

1. Currently, RTAs are one of the most significant mechanisms of international cooperation which went beyond bounds of a classical trade liberalization scheme. Among matters considered in RTAs, issues related to investments, competition, domestic regulation, and intellectual property are becoming more and more frequent. However, it does not imply a transit to creating a Customs Union, but only extension a list of RTA regulated aspects for receiving more economic effects from cooperation of two countries. However, along with the rapid increase of RTAs, the issue of multi-sided cooperation, which is sinking into the background, is a cornerstone.

2. RTAs compromise protectionism and anti-protectionism forces and are the best way to satisfy two polar interests, which on the one hand include a free trade support that is provided by consumers, branches depending on product import, and export economic industries, and on the other hand – supporting restrictions established by enterprises that compete on a domestic market.

3. Modeling integration processes influence on welfare of a country has justified the hypothesis of a direct dependence of RTAs, which boost trade liberalization, on economic growth rates as well as a direct dependence of RTAs on GDPs per capita. Therefore, positive influence of RTA number increase on country welfare has been proved with Chinese and Ukrainian empiric data and empiric data of their cooperation with partner countries in free trade areas used as examples. Moreover, RTA helps to support and strengthen peaceful relations, remove international tension, and create a system of international economic security.

4. As regards limitations of this article, the calculated model of multiple regression allows us to estimate influence of only those regional trade agreements which have already come into force, and makes it impossible to predict the impact of a particular RTA, which is planned to be signed, on country's welfare in the future. However, after adding new indicators to the model (depending on a purpose of the work), it can be used as a base for more extended studies aimed at forecasting development of economic growth rates and GDPs per capita.

Author contributions

Conceptualization, V.N.; Methodology, O.B.; Validation, O.Y. and N.R.; Formal Analysis, O.Y. and I.B.; Investigation, N.K.; Writing-Original Draft Preparation, O.Y. and I.B.; Writing-Review & Editing, O.B. and V.N.

All authors have read and agreed to the published version of the manuscript.

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Conflicts of interest

The authors declare no conflicts of interest.

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APPENDIX

Table A1. Basic input data for the model (3), (4) (source: elaborated based on World Trade Organization, n.d.; World Bank, n.d.; Ukraine National Debt, 2020; The Global Economy, 2020)

Year	$GROW_{it}$	LN (GDP_{it})	GDI_{it} / GDP_{it}	$DEBT_{it}$ / GDP_{it}	FDI_{it} / GDP_{it}	$TRADE_{it}$ / GDP_{it}	GDP per $capita_{it}$	TOT_{it}
2000	–0.010	24.166	20.870	43.790	1.903	119.858	0.636	100.000
2001	0.215	24.360	21.810	36.690	2.086	104.001	0.780	97.650
2002	0.115	24.469	27.390	33.580	1.636	100.657	0.879	104.620
2003	0.183	24.637	27.780	29.380	2.843	107.459	1.048	104.350
2004	0.294	24.895	24.540	24.800	2.646	113.772	1.366	111.130
2005	0.328	25.178	22.510	17.740	9.073	97.177	1.827	107.110
2006	0.251	25.402	24.540	14.800	5.206	91.462	2.301	103.870
2007	0.324	25.683	21.940	12.270	7.149	90.814	3.066	111.170
2008	0.261	25.915	20.190	20.410	5.951	96.947	3.887	111.350
2009	–0.349	25.486	21.810	35.430	4.072	89.866	2.543	95.900
2010	0.161	25.636	19.790	40.630	4.743	98.140	2.965	102.310
2011	0.200	25.818	19.420	36.880	4.417	106.242	3.570	106.550
2012	0.077	25.893	21.720	37.540	4.651	104.093	3.855	94.850
2013	0.043	25.934	21.660	40.520	2.460	95.150	4.030	94.570
2014	–0.272	25.617	22.620	70.320	0.634	100.692	3.105	91.200
2015	–0.318	25.234	26.760	79.500	3.351	107.807	2.125	83.590
2016	0.026	25.260	23.680	81.180	3.686	105.521	2.188	83.410
2017	0.202	25.443	33.610	71.920	2.520	103.718	2.641	84.800
2018	0.166	25.597	39.050	60.900	1.892	99.019	3.095	86.190

Table A2. Basic input data for the model (5), (6) (source: elaborated based on World Trade Organization, 2020; World Bank, 2020; Ukraine National Debt, 2020; The Global Economy, 2020; Ukraine Total Investment, 2020)

Year	$GROW_{it}$	LN (GDP_{it})	GDI_{it} / GDP_{it}	$DEBT_{it}$ / GDP_{it}	FDI_{it} / GDP_{it}	$TRADE_{it}$ / GDP_{it}	GDP per $capita_{it}$	TOT_{it}
2000	0.107	27.823	34.870	22.810	3.475	39.411	0.959	100.00
2001	0.106	27.923	34.330	24.380	3.513	38.527	1.053	97.44
2002	0.098	28.017	36.300	25.710	3.609	42.747	1.149	92.11
2003	0.129	28.138	36.900	26.570	3.487	51.804	1.289	92.93
2004	0.178	28.302	40.370	26.170	3.484	59.506	1.509	90.77
2005	0.169	28.458	42.660	26.100	4.554	62.208	1.753	88.44
2006	0.204	28.643	40.980	25.380	4.509	64.479	2.099	89.47
2007	0.290	28.898	40.610	29.040	4.401	62.193	2.694	88.55
2008	0.294	29.156	41.240	27.000	3.734	57.613	3.468	83.81
2009	0.110	29.261	43.210	34.350	2.569	45.185	3.832	91.10
2010	0.193	29.437	46.340	33.740	4.004	50.717	4.550	82.05
2011	0.241	29.653	47.880	33.640	3.709	50.741	5.618	79.05
2012	0.130	29.775	48.010	34.270	2.827	48.268	6.317	79.76
2013	0.122	29.890	47.180	37.000	3.040	46.744	7.051	80.65
2014	0.091	29.977	47.250	39.920	2.568	45.065	7.651	82.95
2015	0.055	30.030	46.780	41.070	2.201	39.629	8.033	92.53
2016	0.011	30.041	44.750	44.180	1.569	37.210	8.079	92.33
2017	0.090	30.128	44.140	46.790	1.368	38.150	8.759	87.29
2018	0.121	30.242	44.640	50.640	1.730	38.246	9.771	84.62