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European Integration Risks in the Context of the COVID-19 Pandemic

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Abstract. Economic integration is one of the key trends in the modern economy. The undisputed leader of this process is the European Union (EU). The COVID-19 pandemic led to some instability in the EU. Brexit exacerbated this instability. Under these conditions, the question arises: is the impact of COVID-19 on European integration a one-time shock that will soon lose its significance, or are more fundamental reasons at the heart of the disintegration potential. The study aims to evaluate the risks of integration processes in the EU. Two indicators were used to quantify the degree of convergence: β-convergence and σ-convergence. A quantitative analysis of convergence showed a high degree of convergence of countries in terms of per capita gross domestic product (GDP) and a lack of convergence in terms of labor productivity. Consumption in countries with catch-up development comes primarily from the redistribution of the EU budget and the wages of migrants. This redistribution weakens integration incentives for donor countries. And restrictions of COVID-19 pandemic weaken incentives for integration for recipient countries. Therefore, the likelihood of disintegration in the EU is increasing.

Keywords: Convergence; COVID-19 pandemic; European Union; Economic integration; Risk

1. Introduction

Strengthening international integration and globalization are key trends in developing the modern global economy (Murata and Katayama, 2011; Widjanarko and Ubaydullaev, 2011; Bodrunov and Plotnikov, 2017; Agur et al., 2019; Vertakova et al., 2020). Combining resources, markets, introducing standard rules and regulatory institutions, and integrating customs and financial systems led to lower transaction costs in the economy (Aldokhina, 2017; Caserta, 2017; Egger et al., 2019; Miharja et al., 2021).

With the integration of national economies, return of scale (Lee et al., 2012) and experience curve (BCG, 1968) effects appear. These effects are well studied at the micro-

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level. Economies of scale decrease costs due to the joint execution of service and support operations. (At the macro level, this is the sharing of infrastructure and increased market capacity.) The effect of experience reduces costs due to the accumulation of knowledge and the development of competencies. (At the macro level, this leads to the irreversibility of the integration processes of countries.)

Thus, the primary economic motive for integration is cost reduction. The scale of possible economic effects is enormous. For example, from digital integration in the EU (creation of the Digital Single Market), an increase in European Union (EU) GDP of 415 billion euros is expected and an increase in EU GDP of 4% in 2010-2020 (EU, 2016b). Cost savings from integration are observed at all levels of the economy, and the international level is the object of our study. Integration is manifested at all levels of the economic system and not just at the international level. It is observed at the micro-level in the form of new networks, partnerships, and similar associations (Plotnikov and Vertakova, 2015; Shinkevich et al., 2016; Makarov and Plotnikov, 2018). A rather serious trend is integration at the mesoscale, where it manifests itself in the form of clustering (Pronyaeva et al., 2018; Sazonov et al., 2018; Vertakova, 2016). It is also manifested at the level of the national economy in the form of the development of interregional and intersectoral cooperation (Balli et al., 2018; Diez, 2019; Zaretskaya, 2019).

The most developed integration association globally is the EU (Eichenberg and Dalton, 2007; Trenz and Triandafyllidou, 2017; Hooghe and Marks, 2019). It dates to 1952, when Belgium, Italy, Luxembourg, the Netherlands, France, and Germany created the European Coal and Steel Association. In the future, this integration group continuously developed, changing its configuration, right up to the formation of the European Union in 1992. Among these countries, restrictions on the functioning of the markets for goods, services, capital, and labor were lifted. The EU has general laws, implements a common (supranational) economic policy, and has EU governing bodies.

EU countries have gained several advantages from pooling their available resources, but at the same time, have limited their national sovereignty. A part of state powers has been transferred to a supranational level of government. A significant number of the EU member states abandoned the national currency, moving to a supranational monetary unit - the euro. Several EU members states (France, Germany, Greece, Italy, Netherlands, and Spain) formed a Monetary Union and abandoned their national currencies. The EU has a common budget, developed by the participating countries, and then redistributed in accordance with the general policy of the EU by its governing bodies.

The success of the European integration model, until recently, served as an example for integration associations that were created in other regions of the world. At the same time, EU sustainability has been questioned in recent years. In early 2020, Brexit occurred, under which the people and the UK government concluded it was not economically feasible to continue their EU membership. As a result, Brexit raised the issue of EU sustainability (Huhe et al., 2020).

Until 2020, the EU expanded. The UK left the EU on January 31, 2020, at 23:00 London time. On June 23, 2016, a referendum was held in the UK. 51.9% of its participants voted to leave the UK from the EU. Great Britain had been a member of the European Community (predecessor of the EU) since January 1, 1973. Under the Brexit agreement, the UK lost its representation and voting rights in the EU authorities but will remain part of the single economic space until the end of 2020.

The case of the UK forces us to reconsider the attitude toward the integration of countries as a uniquely cost-effective phenomenon (Chopin and Lequesne, 2016). This study aimed to explore the potential for further disintegration of the EU using quantitative

research methods.

Despite concerns about Brexit, the EU is still stable. At the same time, in 2020, a new challenge arose for the existence of the Union. It is associated with the COVID-19 pandemic (Rodionov et al., 2021). Governments of the world (including EU members) have limited the social contacts of their citizens to counter the pandemic. In particular, the borders were closed, transport links were suspended, and many enterprises were stopped. The unity of the economic space, which was the main idea of the EU and the theory of economic integration (Curran et al., 2017; Didier et al., 2017), was broken.

Under these conditions, it is necessary to study the stability of the modern EU. Our research hypothesis was that the COVID-19 pandemic created powerful incentives for the disintegration of the EU. A study was conducted using quantitative modeling of integration processes to validate the hypothesis. The study aimed to assess the degree of homogeneity of the economic development of the EU member states and the presence or absence of a tendency toward homogenization of the economic field under this integrated association.

2. Methods

To conduct the study, we used official statistics published by Eurostat and OECD data (see: https://stats.oecd.org/Index.aspx?DataSetCode=PDB_LV). These data are quite detailed and highly reliable. They cover all EU member states. For the calculations, two primary indicators were selected that characterize the economies of the member countries of the European Union: (1) per capita GDP and (2) labor productivity of the EU member states.

It will be possible to expand the list of indicators used in further studies. The indicators that we have used allow us to draw sufficiently substantiated conclusions. The analysis of the first indicator (per capita GDP) allowed us to assess the level of economic development of the EU countries. The study of the second indicator (labor productivity) allowed us to evaluate the level of economic efficiency and social well-being of the EU countries.

The homogeneity of the economic space (the magnitude and significance of differences between the economies of the EU countries) was evaluated in statics and dynamics. For this, the convergence indicators were calculated. If the differences are insignificant and decrease, the economic space becomes more homogeneous. Therefore, there are intra-systemic reasons for enhancing integration. If the differences are significant and increase, this means an increase in the differentiation of the economic space. Consequently, prerequisites for disintegration arise.

The methodology is based on the use of two indicators:

- β-convergence. For its calculation, a mathematical model of the base growth rate of the studied indicator is used. The calculation is performed according to Equation 1:

$$\beta = T_n / T_1, \quad (1)$$

  where T_1 is the value of the studied indicator of the time series in the first year of observations; T_n is the value of the studied indicator of the time series in the last year of observations.

  Using these indicators, the rates of change of similar indicators of different countries within the EU are compared. If the growth rates of countries with relatively low indicators (outsider countries) are ahead of the growth rates of leading countries, this indicates the presence of convergence processes and vice versa;

- σ-convergence. For its calculation, the following mathematical model described by Equations 2 and 3 is used:

$$\sigma = STD = (\Sigma (x_{av} - x_i)^2 / n)^{0.5}, \quad (2)$$

$$V = \sigma / x_{av}, \quad (3)$$

where σ is the standard deviation; V is the coefficient of variation; x_i is the value of the observed indicator for the i-th period; x_{av} is the average value of the observed indicator for the entire period.

The standard deviation and coefficient of variation of the indicator are calculated for all countries members of the Union. If the standard deviation and coefficient of variation decrease, then convergence processes are present. As the differences between countries were gradually smoothed out, there was a convergence in labor productivity, living standards, etc. The disintegration prerequisites arise if the standard deviation and coefficient of variation increase.

For the first time, the term "beta-convergence" was introduced by economists R. Barro and H. Sala-i-Martin in "Economic growth and convergence in the USA" (Barro and Sala-i-Martin, 1990).

Beta-convergence processes were estimated using a regression model (Equation 4).

$$\ln(yi_T) - \ln(y_{i0}) = \beta_0 + \beta_1 \ln(y_{i0}) + \sum_{j=1}^{k} \beta_j ControlVar_{ij} + \varepsilon_i,\ \varepsilon_i \sim iid\ (0, \sigma^2). \quad (4)$$

where k is the number of additional variables, $ControlVar_{ij}$ is the average value of the variable with the number j for the country with the number i for the period under review.

This approach makes it possible to study the influence of various factors on GDP growth rates and simultaneously verify the consistency of the resulting model with the convergence hypothesis. In the future, the researchers can simplify the methodology because, to study beta-convergence, it is sufficient to determine the growth rate of individual indicators for each panel data object.

Studies using beta-convergence and sigma-convergence indicators were conducted in different years by authors from other countries using various types of information. Several papers investigated convergence across the EU (Iancu, 2007), completed before 2010.

Among recent papers assessing convergence by the level of research and development (R&D) expenditures, an article by F.A. Blanco, F.J. Delgado, and M.J. Presno is noteworthy (Blanco et al., 2020).

3. Results and Discussion

As of October 2020, the EU included 27 countries (January 31, 2020, Great Britain withdrew from the Union). There are also five candidate countries for EU membership. An important area of activity of the Union's governing bodies is the reduction of the differentiation of the economies of the member countries, which involves significant resources.

Great importance is attached to reducing the differentiation in the levels of socioeconomic development. Equalization programs apply to EU member states and neighboring countries (Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, Syria, Palestine, Tunisia, and Ukraine). "Through its European Neighbourhood Policy (ENP), which has been revised in November 2015, the EU works with its Southern and Eastern Neighbours to foster stabilisation, security and prosperity, in line with the Global Strategy for the European Union's Foreign and Security Policy… The EU provides its support to partners in the Neighbourhood region mainly through the European Neighbourhood Instrument (ENI), with over EUR 15 billion for 2014-2020" (EU, 2016a).

In 2019, the EU budget was €165.8 billion (EU, 2018). More than one-third (35.6%)

was planned to implement programs and equalization measures to stimulate economic growth and employment in the least developed regions and EU countries and support interregional cooperation. In addition to equalization programs, a significant part of the EU budget (42.5%) is spent on natural resources management to implement a common agricultural policy, rural development, and environmental programs. These costs also go primarily to support the poorest countries where agriculture plays a significant role.

Until recently, the prominent donors to the single European budget were Germany, France, Great Britain, Italy, the Netherlands, and Sweden, the developed countries. The primary recipients are countries recently admitted to the EU that were either part of the USSR or were in the zone of its political and economic influence: Estonia, Lithuania, Latvia, Hungary, Bulgaria, and Poland. In previous years (before joining the Union of post-Soviet countries), Portugal, Greece, and Spain were among the largest recipients.

The states united by a common market, a system of shared taxes, and a single currency should form a single and homogeneous economic space. If this condition is not fulfilled, asymmetries in development will inevitably lead to conflicts of economic interests, which will adversely affect the stability of the entire integration association. Economic development and economic growth of individual EU member states should not lead to a deterioration in the economic performance of other countries.

Balancing economic interests should be based on the Pareto optimality principle. If this condition is not met, we will observe the "consumption" of redistributed resources, the growth of dependent sentiments, and, ultimately, the emergence of an incentive for the wealthiest countries to leave the EU (as the UK did). The existence of the EU without rich (donor) countries is impossible since the goal of joining the Union is to receive economic assistance for developing countries.

For convergence calculations, data from 2000 to 2018 were used. The calculations were based on constant prices in 2015. We did not consider data for Cyprus and Malta, whose contribution to the economy of the Union is minimal. In our opinion, the neglect of those countries' indicators did not significantly affect the study results.

We used two complementary indicators for the analysis: per capita GDP and hourly wages. In our opinion, these indicators reflect two sides of the process: production and consumption. Also, to analyze convergence and divergence, it is possible to study further the average hourly wage, per capita income, investment per capita, and budget security of the residents of EU countries.

Table 1 shows the indicators of σ-convergence for two indicators (GDP per capita in the EU at purchasing power parity (PPP) and labor productivity (LP) per hour worked in the EU at PPP, estimated during the study.

Analysis of the data in Table 1 showed that per capita GDP in the EU at PPP grew in the period under study. In 2000, the average was 31.1 thousand US dollars; in 2018, it was 42.1 thousand US dollars. The LP indicator per hour worked in the EU at PPP is growing. In 2000, the average was 40.63 US dollars; in 2018, it was 53.65 US dollars.

Table 2 shows the final data on the value of β-convergence for the countries considered. Analysis of the data in Table 2 showed that the β-convergence of EU countries' indicators vary widely. The β-convergence values for per capita GDP and LP are similar.

Consider the σ-convergence processes. The coefficient of variation for per capita GDP for the EU countries for 2000 was 0.542; it has steadily decreased over 18 years of observation. Currently, its value is 0.425. That is, the homogeneity of the economies of the Union countries, estimated by the GDP per capita indicator, has increased by more than 20%. The EU is aligning on this indicator.

Data analysis does not draw the same conclusions regarding LP. Convergence on this

indicator was not observed. From 2000 to 2008, we observed some convergence. After the global crisis of 2008, these processes ceased; countries lagging in their economic development stopped catching up with the more developed ones, and their development actually ceased.

Table 1 The σ-convergence indicators

Year	Uniformity indicators, GDP per capita in the EU at PPP, thousand US dollars			Indicators of homogeneity, LP per hour worked in the EU at PPP, USD		
	Standard deviation, σ	Mean	The coefficient of variation	Standard deviation, σ	Mean	The coefficient of variation
2000	16.8	31.1	0.542	19.3	40.63	0.48
2001	16.9	31.8	0.530	18.9	41.43	0.46
2002	17.0	32.5	0.523	18.8	42.47	0.44
2003	16.8	33.2	0.506	18.6	43.43	0.43
2004	16.9	34.3	0.493	18.7	44.65	0.42
2005	16.9	35.3	0.480	18.7	45.67	0.41
2006	17.2	36.7	0.468	18.6	46.85	0.40
2007	17.9	38.2	0.467	18.5	47.95	0.39
2008	17.0	38.2	0.445	17.7	47.59	0.37
2009	16.2	36.0	0.449	17.5	46.93	0.37
2010	16.7	36.6	0.457	18.1	48.46	0.37
2011	16.6	37.1	0.448	17.9	49.11	0.36
2012	16.1	36.8	0.438	17.6	49.32	0.36
2013	16.2	37.0	0.438	17.6	49.76	0.35
2014	16.5	37.7	0.437	18.0	50.34	0.36
2015	17.3	39.0	0.445	19.0	51.61	0.37
2016	17.6	39.8	0.441	19.1	52.01	0.37
2017	17.6	41.0	0.429	19.1	52.96	0.36
2018	17.9	42.1	0.425	19.0	53.65	0.36
2019	17.8	42.9	0,415	18.8	55.1	0.34

Calculated by Y. Vertakova and V. Plotnikov from OECD data

Table 2 Comparison of β-convergence of EU countries

Country	GDP per capita	Labor productivity
Austria	1.192	1.224
Belgium	1.191	1.141
Bulgaria	2.176	1.716
Croatia	1.524	1.389
Czechia	1.578	1.554
Denmark	1.144	1.225
Estonia	1.993	1.846
Finland	1.207	1.207
France	1.135	1.189
Germany	1.241	1.187
Greece	1.012	1.059
Hungary	1.590	1.500
Ireland	1.740	1.845
Italy	0.975	1.010
Latvia	2.330	2.032
Lithuania	2.547	2.076
Luxembourg	1.185	1.033
Netherlands	1.185	1.148
Poland	1.932	1.784
Portugal	1.116	1.169
Romania	2.354	2.637
Slovakia	2.001	1.799
Slovenia	1.442	1.440
Spain	1.159	1.164
Sweden	1.297	1.277
UK	1.215	1.184

Calculated by V. Zaretskaya from OECD data

The data showed that the weak EU economies have not recovered to date despite the declared post-crisis recovery. This poses a threat to EU sustainability. The pandemic of the new coronavirus infection COVID-19, which has swept the world and Europe since the beginning of 2020, has further worsened the situation. A lockdown was announced in many countries in the spring. The second wave of the epidemic, which came in the fall, again led to lockdowns. As a result, economic development in the EU has been stopped.

By the end of 2020, a decline in the leading macroeconomic indicators was expected in all EU countries. According to the official EU forecast, "the forecast projects that the EU economy will contract by 7.4% in 2020" (EU, 2020). This decline would be uneven, increasing the differentiation in the EU and reducing the level of convergence of the EU member states' economies.

Table 3 shows the forecast unemployment, budget deficit, and real GDP of the EU countries (EU, 2020). From these data, it follows that the impact of COVID-19 on the EU economy was very significant. The economic recovery will take a long time. Real GDP in 2019 would be achieved in 2021 by only two countries (Ireland and Lithuania). In 2022, recovery to 2019 levels was forecasted in 15 more countries (Bulgaria, Czechia, Estonia, Finland, Germany, Cyprus, Hungary, Latvia, Luxembourg, Malta, Poland, Romania, Slovakia, Slovenia, and Sweden). The economies of nine countries (Austria, Belgium, Croatia, France, Greece, Italy, Netherlands, Portugal, and Spain) are not expected to recover by 2022.

Real GDP in the EU in 2022 is projected to be 99.3% of the 2019 level. From the standpoint of our analysis, it is essential to note that recovery will be uneven and asynchronous, reducing the level of convergence.

Table 3 Forecast of economic recovery in EU countries

Country	Real GDP % (2019 - 100%)			Unemployment (2020) %	Budget balance (2020) %
	2020	2021	2022		
Austria	92.9	96.7	99.1	5.5	-9.6
Belgium	91.6	95.4	98.7	5.9	-11.2
Bulgaria	94.9	97.4	101.0	5.8	-3.0
Croatia	90.4	95.6	99.1	7.7	-6.5
Czechia	93.1	96.0	100.3	2.7	-6.2
Denmark	96.1	99.5	101.9	6.1	-4.2
Estonia	95.4	98.6	102.1	7.5	-5.9
Finland	95.7	98.5	100.6	7.9	-7.6
France	90.6	95.9	98.8	8.5	-10.5
Germany	94.4	97.7	100.2	4.0	-6.0
Greece	91.0	95.6	98.9	18.0	-6.9
Cyprus	93.8	97.3	100.2	8.2	-6.1
Hungary	93.6	97.3	101.7	4.4	-8.4
Ireland	97.7	100.5	103.1	5.3	-6.8
Italy	90.1	93.8	96.4	9.9	-10.8
Latvia	94.4	99.0	102.5	8.3	-7.4
Lithuania	97.8	100.7	103.4	8.9	-8.4
Luxembourg	95.5	99.2	101.9	6.6	-5.1
Malta	92.7	95.5	101.4	5.1	-9.4
Netherlands	94.7	96.8	98.6	4.4	-7.2
Poland	96.4	99.6	103.1	4.0	-8.8
Portugal	90.7	95.6	98.9	8.0	-7.3
Romania	94.8	97.9	101.6	5.9	-10.3
Slovakia	92.5	96.8	101.0	6.9	-9.6
Slovenia	92.9	97.6	101.3	5.0	-8.7
Spain	87.6	92.3	96.8	16.7	-12.2
Sweden	96.6	99.8	102.2	8.8	-3.9
EU	92.6	96.4	99.3	7.7	-8.4

Calculated and compiled by authors from EU data

Comparing the β-convergence indicators for GDP and labor productivity shows that only one country with catch-up development - Romania - has a faster GDP growth rate than labor productivity growth. All other countries that joined the EU in 1992-1995 have a lower productivity growth rate than per capita GDP growth. This means that consumption in these countries is growing in part due to domestic resources and the redistribution of the total EU budget. The orientation toward receiving subsidies from the EU was one of the significant economic motives for these countries when making decisions to join the Union.

An increase in the number of countries requiring protectionist policies and direct budget injections has led to a decrease in the attractiveness of EU membership for countries with relatively high levels of socioeconomic development. In Europe, two trends began to appear in parallel: centripetal for the countries of the European "periphery" (Ukraine, Georgia, Moldova, and Serbia), and centrifugal for the countries of the "center" (the primary representative being Great Britain). In the pre-pandemic period, these two opposing trends were somewhat balanced by labor migration flows.

Residents of the new EU member states and countries on the "periphery" are reflected in the flow of labor migration within the EU. The more developed countries of the Union benefit from this influx of cheap labor. And the economies of donor countries receive remittances from foreign labor migrants. For example, the volume of private remittances to Ukraine in 2018 amounted to 10.888 billion US dollars. This amount was four times higher than the country's foreign investments (Krivoguz, 2019). The pandemic and related restrictions on the movement of citizens, including border crossings, deprive countries of these benefits from labor migration. These factors reduce the economic motivation to participate in the EU.

An interesting relationship was observed in the analysis of the significant dissimilarity in the β-convergence indicators of the EU countries in labor productivity and per capita GDP. That relationship was explained by the COVID-19 pandemic and the accompanying restrictive measures. In many poor EU countries, labor productivity is growing slower than average per capita incomes, while in rich countries, it is vice versa.

In addition to the large-scale redistribution of budgetary resources within the EU from rich to developing countries, this phenomenon has another economic explanation. It is associated with labor migration from developing countries to wealthy, often illegal or semi-illegal. According to studies (Sinitsina, 2017), for the first decade of the 21st century, the number of migrants from Eastern Europe to the EU-15 countries increased five times, amounting to about 19% of the total number of non-residents in Western Europe. This explains the difference identified above between the growth rate of per capita income and labor productivity. The source of this gap is the funds of labor migrants entering the poor EU countries from the rich through legal and illegal channels.

The restrictive measures introduced in connection with the COVID-19 pandemic significantly reduced migration flows to the EU, striking at the efficiency of equalization processes and the incentives of poor countries to integrate. At the same time, the wealthier EU countries suffered from these restrictions. COVID-19 deprived them of the opportunity to massively attract labor migrants from new member countries of the Union and extract additional income from them (due to the use of labor migrants in jobs with low wages or seasonal production).

4. Conclusions

The authors conducted a study of integration processes in the EU using the β-convergence indicator (based on the convergence of growth rates) and the σ-convergence indicator (based on the convergence of the degree of differences across countries). Based

on an analysis of 2000-2018 per capita GDP and labor productivity, qualitative and quantitative analysis of intra-European migration flows, and formal and informal redistributive financial processes, the authors concluded that the integration processes in the EU are unstable.

The research hypothesis (the COVID-19 pandemic created powerful incentives for the disintegration of the EU) was confirmed. The hypothesis was proven using quantitative analysis. The impact of COVID-19 and the pandemic-led restrictive measures could trigger disintegration processes in the EU. There are objective reasons for this. The EU member states' governments and the EU authorities should strengthen their convergence policies. Otherwise, the COVID-19 pandemic could play a fatal role in European integration.

The authors' conclusions are not final. Integration processes are very complex and varied. In addition, the economies of the countries belonging to the integration alliances are highly adaptable. In the near future, political measures may change the vector of convergence processes (EU, 2021). Therefore, further research is needed. That research should collect and process new relevant data on European integration, making it possible to draw more reliable conclusions about its prospects.

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References

Agur, I., Chan, M., Goswami, M., Sharma, S., 2019. On International Integration of Emerging Sovereign Bond Markets. *Emerging Markets Review*, Volume 38, pp. 347–363

Aldokhina, T., 2017. Systematisation of Effectiveness Indicators for International Economic Integration. *Economic Annals-XXI*, Volume 164(3-4), pp. 28–31

Balli, F., Pericoli, F.M., Pierucci, E. 2018. Globalization and International Risk-Sharing: The Role of Social and Political Integration. *European Journal of Political Economy*, Volume 55, pp. 324–345

Barro, R.J., Sala-i-Martin, X., 1990. Economic Growth and Convergence Across the United States. *NBER Working Paper Series*, No. 3419, pp. 1–39

BCG, 1968. The Experience Curve. Available Online https://www.bcg.com/publications/1968/business-unit-strategy-growth-experience-curve, Accessed on 30 September 2020

Blanco, F.A., Delgado F.J., Presno M.J., 2020. R&D Expenditure in the EU: Convergence or Divergence? *Economic Research-Ekonomska Istraživanja*. Volume 33(1), pp. 1685–1710

Bodrunov, S., Plotnikov, V., 2017. Institutional Structures Influence on the Technological Development of The Economic System. *In:* Proceedings of the 30th International Business Information Management Association Conference, IBIMA 2017 - Vision 2020: Sustainable Economic development, Innovation Management, and Global Growth, pp. 2658–2665

Caserta, S., 2017. Regional Integration through Law and International Courts - The interplay between de Jure and de Facto Supranationality in Central America and the Caribbean. *Leiden Journal of International Law,* Volume 30(3), pp. 579–601

Chopin, T., Lequesne, C., 2016. Differentiation as a Double-Edged Sword: Member States' Practices and Brexit. *International Affairs,* Volume 92(3), pp. 531–545

Curran, J., Esser, F., Hallin, D.C., Hayashi, K., Lee, C.-C., 2017. International News and Global Integration: A Five-Nation Reappraisal. *Journalism Studies*, Volume 18(2), pp. 118–134

Didier, T., Llovet, R., Schmukler, S.L., 2017. International Financial Integration of East Asia and Pacific. *Journal of the Japanese and International Economies*, Volume 44, pp 52–66

Diez, T., 2019. Transforming Identity in International Society: The Potential and Failure of European Integration. *Comparative European Politics,* Volume 17(3), pp. 512–529

Egger, P.H., Erhardt, K., Lassmann, A., 2019. Immigration and Firms' Integration in International Production Networks. *European Economic Review,* Volume 111, pp. 1–34

Eichenberg, R.C., Dalton, R.J., 2007. Post-Maastricht Blues: The Transformation of Citizen Support for European Integration, 1973-2004. *Acta Politica,* Volume 42(2-3), pp. 128–152

EU., 2016a. European Neighbourhood Policy. Available Online at https://eeas.europa.eu/diplomatic-network/european-neighbourhood-policy-enp/330/european-neighbourhood-policy-enp_en, Accessed on 30 October 2020

EU., 2016b. Reducing Costs and Barriers for Businesses in the Single Market. Available Online at https://www.europarl.europa.eu/RegData/etudes/STUD/2016/578966/IPOL_STU(2016)578966_EN.pdf, Accessed on 30 October 2020

EU., 2018. The EU Budget for 2019: Growth, Solidarity and Security in Europe and Beyond - Provisional Agreement Reached. Available Online at https://ec.europa.eu/commission/presscorner/detail/en/IP_18_6381, Accessed on 30 October 2020

EU., 2020. European Economic Forecast, Autumn 2020. Available Online at https://ec.europa.eu/info/sites/info/files/economy-finance/ip136_en.pdf, Accessed on 30 October 2020

EU., 2021. The European Union and Regional Economic Integration Creating Collective Public Goods – Past, Present and Future. Available Online at https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/689369/EPRS_BRI(2021)689369_EN.pdf, Accessed on 09 May 2021

Hooghe, L., Marks, G., 2019. Grand Theories of European Integration in the Twenty-First Century. *Journal of European Public Policy,* Volume 26(8), pp. 1113–1133

Huhe, N., Naurin, D., Thomson, R., 2020. Don't Cry for me Britannia: The Resilience of the European Union to Brexit. *European Union Politics* Volume 21(1), pp. 152–172

Iancu, A., 2007. Economic Convergence. Applications-Second Part. *Romanian Journal of Economic Forecasting*, Volume 8(4), pp. 24–48

Krivoguz, M., 2019. Ukrainian Labor Migrants: Incentive or Brake for the Economy? *Russia and the New States of Eurasia,* Volume 2, pp. 185–197

Lee, G., Yu, M.-M., Wang, L.-C., 2012. DEA-based Integrated Relationship of Returns to Scale - An Application to Road Maintenance in Taiwan. *Journal of Civil Engineering and* Management, Volume 18(5), pp. 709–723

Makarov, I., Plotnikov, V., 2018. Public-Private Partnership as a Financial Instrument for the Transport Infrastructure Modernizing. *MATEC Web of Conferences,* Volume 170, p. 1–7

Miharja, M., Woltjer, J., Arsallia, S., Diab, A.H., 2021. Bandung Metropolitan Transportation Planning Collaboration and Perceived Transaction Cost Changes after 2 Decades of Decentralization. *International Journal of Technology,* Volume 12(3), pp. 506–517

Murata, K., Katayama, H., 2011. Study on Support System of Kaizen Activity for Sustainable Improvement of Global Competitiveness. *International Journal of Technology,* Volume 2(3), pp. 215–223

Plotnikov, V., Vertakova, Y., 2015. Formation of Networks as a Form of Business Integration. *Procedia Economics and Finance,* Volume 24, pp. 511–518

Pronyaeva, L., Polyanin, A., Pavlova, A., Shchegolev, A., Polozhentseva, Y., 2018. State Regulation and Strategic Management in Clusters. *In:* Proceedings of the 31st International Business Information Management Association Conference, IBIMA 2018: Innovation Management and Education Excellence through Vision 2020, pp. 4169–4178

Rodionov, D.G., Konnikov, E.A., Nasrutdinov, M.N., 2021. A Transformation of the Approach to Evaluating a Region's Investment Attractiveness as a Consequence of the COVID-19 Pandemic. *Economies,* Volume 9(2), pp. 1–20

Sazonov, S.P., Fedotova, G.V., Sazonov, V.E., 2018. Formation of the Concept of Sustainable Development of Territory in the Worsening Ecological Conditions. *Espacios,* Volume 39(12), pp. 1–7

Shinkevich, A.I., Farrakhova, A.A., Shinkevich, M.V., Pavlova, A.V., Vyukov, M.G., 2016. Integrated Management of Flows in Petroleum Products Supply Chains in the Field of Hydrocarbons Deep Processing. *International Journal of Economics and Financial Issues,* Volume 6(2), pp. 523–528

Sinitsina, I.S., 2017. International Labor Migration in Central and Southeast Europe. *Russia and the Modern World,* Volume 1(94), pp. 103–119

Trenz, H.-J., Triandafyllidou, A., 2017. Complex and Dynamic Integration Processes in Europe: Intra EU Mobility and International Migration in Times of Recession. *Journal of Ethnic and Migration Studies,* Volume 43(4), pp. 546–559

Vertakova, Y. 2016. Propulsive cluster as a tool to promote economic growth. *In:* Proceedings of the 27th International Business Information Management Association Conference, IBIMA 2016 - Innovation Management and Education Excellence Vision 2020: From Regional Development Sustainability to Global Economic Growth, pp. 1100–1108

Vertakova, Y., Kryzhanovskaya, O., Shuyi, D., Yayi, L., 2020. Integration Interaction of Russia and China in the Conditions of Digital Transformation of the Economy. *E3S Web of Conferences,* Volume 157, pp. 1–8

Widjanarko, S., Ubaydullaev, B., 2011. The Role of Carbon Capture and Storage in The Global Energy Portfolio. *International Journal of Technology,* Volume 2(1), pp. 65–73

Zaretskaya, V.G., 2019. Diversification or Specialization: Development of the Regions of the Far Eastern Federal Disrict. *Smart Innovation, Systems and Technologies,* Volume 139, pp. 280–288