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БЕЛАРУСЬ В ЕАЭС: ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ ЭКОНОМИЧЕСКОГО РОСТА

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Анализируются выгоды для стран – участниц ЕАЭС при реализации сценария инновационного рывка. В первой части статьи авторы анализируют основные существующие проблемы, связанные с экономическим ростом в странах ЕАЭС. Вторая часть раскрывает возможные перспективы при реализации сценария инновационного рывка на основе гибридных моделей, а также консенсус-прогнозов. В третьей части исследования даются рекомендации для разработки дорожной карты при сценарии инновационного рывка.

Ключевые слова: ЕАЭС; экономический рост; инновационный рывок; цифровая экономика; модели роста.

BELARUS IN THE EAEU: PROBLEMS AND PERSPECTIVES OF ECONOMIC GROWTH

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The article analyzes the benefits for the EAEU member countries in implementing the innovation breakthrough scenario. In the first part of the article the authors analyze the main existing problems associated with economic growth in the EAEU countries. The second part reveals possible prospects for the implementation of the innovation breakthrough scenario based on hybrid forecasting models, as well as consensus forecasts. The third part of the article gives recommendations for the development of a roadmap in the scenario of an innovative breakthrough.

Keywords: Eurasian Economic Union; economic growth; innovation shoot; digital economy; growth models.

The Eurasian Economic Union began operating at the time when the fundamental changes were taking place in the world economy. These changes are associated with the emergence of new centers of economic development, such as China and India, and the loss of position of traditional centers like the EU, that affect the redistribution of raw material factors of economic development, as well as the directions of international trade and investment flows. The emergence of new economic centers contributes to the transition to multipolarity and intensifies the struggle of states for spheres of economic influence, which leads to instability of the world economy.

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The EAEU problems

The main complex indicator which shows the success of national economies in the context of the effects of integration unions is the growth of population welfare measured as GDP per capita. After the creation of the EAEU in 2015, the average annual growth rate of this indicator slowed significantly in all countries except Kyrgyzstan, and in Belarus has occurred stagnation, and in 4 years it has decreased in constant prices by 0.3 % (fig. 1).





Therefore, the first problem of the EAEU is the slow economic growth stemming from the economic dominance of Russia (fig. 2), on which the sanctions were expanded and prolonged. The sanctions have led to the development of secondary effects in the member states of the union: a reduction in exports to Russia due to the narrowing of its markets, a decrease in investment activity and a reduction in remittances from migrants. The shortage of investments (fig. 3) leads to a reduction in the potential for the economic growth of the EAEU member states and the development of the risk of a prolonged recession. The sanctions harm the transfer of modern technology, which has a destabilizing effect on the economy of the entire EAEU.

The EAEU countries, except for Kazakhstan, have accumulated small stocks of FDI per capita (fig. 3). The volume of mutual FDI is also small and volatile: 13.2 % of all FDI in 2015, and only 3.2 % in 2017.

An important indicator of a country is the capitalization of its stock market to GDP. The average indicator for the world is 70–100 %. A full-fledged stock market among the EAEU countries operates only in Russia. Transactions in the derivatives market of other EAEU countries are single. The stock market in Belarus by listing A was approximately 8–11 % of GDP (mainly due to Belarusbank).

Therefore, *the second problem of the EAEU is the insufficiently developed financial systems*, which are also at different stages of development, and in the case of integration scheduled for 2025 will lead to the dominance of a significantly more developed Russian one.

For the EAEU countries, the trade deficit with Russia is also important, the positive net export of which to the EAEU countries for 5 years amounted to about 80 billion US dollars, which increases Russia's GDP and reduces GDP of the EAEU partner countries (fig. 4 and 5).



 Fig. 2. The size and proportions of the EAEU member states in 2018, GDP at market exchange rates, %
(authors' calculations according to the IMF database, WEO, October 2019)



Fig. 3. Accumulated FDI by 2018 per capita in the EAEU countries (authors' calculations according to UNCTAD and EEC)



Fig. 4. Trade deficit with Russia of the rest of the EAEU member countries in the amount for 2015–2018 (author's calculations on the EEC statistics, *www.eurasiancommission.org*)





At the same time, the growth in mutual trade is mainly due to the growth in the value of imports of raw materials from the Russian Federation.

Thus, the trade deficit with Russia of other EAEU member countries reduces their economic growth and increases the growth of the Russian economy. *Imbalances in trade are the third main reason for slow integration processes.* To correct the situation, Russia should take measures to stimulate the export of its partners.

The fourth problem is the EAEU lag in the transition to a new model of economic growth based on know*ledge.* The general opinion of scientists is that in the 21^{st} century the world has entered a new stage of economic development, regardless of what it is called the knowledge economy, new economy or the 4th industrial revolution (Industry 4.0), in which the country's economic growth depends on the speed of mastering innovations in technology, products, and business. The geopolitical race of the USA and China for technological superiority will crowd out countries that passively participate in the global technological breakthrough to the periphery of the global economy. This will also happen with the EAEU countries if they do not take immediate measures. The EAEU countries are significantly lagging in responding to the global challenge of the 21st century, related to the intensification of the flow of knowledge into new products and technologies, the advent of new biotechnologies, and the digital transformation of traditional industries. The knowledge economy, due to the global nature of social network innovations, changes social and individual values and lifestyle, including labour, and fundamentally changes the learning process (the digital transformation of the education system causes structural changes in the labour market for example remote employment). The digital transformation of the economy, the spread of digital business models, the emergence of digital global value chains leads to the customization of production and the virtualization of consumption, the replacement of routine labour with artificial intelligence and robots, which leads to a change in the relationship between production factors in favour of knowledge while reducing the role of fixed capital and labour.

Thus, the digital economy, the knowledge economy, and innovative development will determine the growth of world economies in the long-term perspective, and, consequently, affect the development of the EAEU countries and their place in the world economy.

The increased contribution of knowledge to economic growth is indicated by modern growth models based on production functions, which show that the percent of GDP growth rate (Growth GDP) in the 21^{st} century is less the result of the growth of labour costs (Growth *L*) and capital growth (Growth *K*), but more the result of an increase in total factor productivity (TFP) (Growth *A*), which shows the speed of borrowing foreign technologies and developing their own. In OECD countries and other rapidly developing countries, labour costs are becoming less important compared to TFP and this will neutralize the situation when the population is aging and the number of labour resources is reducing. For this reason, world leaders are increasingly focusing on the TFP factor as an innovation-driven and the main source of future growth. Future differences in income levels in different countries will be due to differences in the rate of borrowing of innovations. New communication technologies have created opportunities for technology mobility (technology without borders), which, as China has shown, can be successfully used by many countries in implementing their catch-up modernization strategies.

Thus, the contribution of knowledge to economic growth in the future can be detected in two directions: the contribution of TFP and the contribution of the quality of human capital.

Already in certain periods of the past, high GDP growth was determined by a significant increase in TFP: in the USA during 1913–1950 TFP growth was 2.5 % and GDP growth was 3.5 %, in countries of the eurozone during 1950–1975 TFP growth was 3.6 % and GDP growth was 5.1 %, in Japan during 1950–1975 TFP growth was 4.4 % and GDP growth was 8.2 % [3–6]. The contribution of TFP to the percentage growth of GDP in Belarus from 1995 to 2000 amounted to about one-third of GDP growth and according to IMF estimates it provided 4-8 % of growth (for more details see [2]).

Prospects of economic growth of the EAEU in the implementation of the scenario of innovative breakthrough

Let us present a version of long-term forecasting of an economic growth model based on the theory of hybrid models [2], as the arithmetic mean aggregation of the well-known models of Cobb – Douglas, Denison, Solow, Mankiw – Romer – Weil, and Schults:

Growth GDP(t) =
$$\frac{12}{35}$$
 Growth $A(t) + \frac{10}{35}$ Growth $H(t) + \frac{8}{35}$ Growth $L(t) + \frac{5}{35}$ Growth $K(t)$.

The quality of human capital H(t) of a country is estimated by the function: $H(t) = e^{\psi(edu(t))}$, H(0) = 1. The piecewise linear function $\psi(edu(t))$ is the marginal return on the duration edu(t) of training, which is calculated according to the Hall – Jones model:

$$\Psi(edu(t)) = \begin{cases} 0.134edu(t), \text{ if } edu(t) < 4, \\ 0.101edu(t), \text{ if } 4 < edu(t) < 8, \\ 0.068edu(t), \text{ if } 8 \le edu(t) \end{cases}$$

and the average duration of training edu(t) is calculated taking into account the classical work of Barro and Lee (see [2]). The initial data on the growth factor of the quality of human capital is given in table 1. Labour growth is calculated based on demographic data (table 2, fig. 6).

Table 1

Place in the world		Years of schooling		
	Country	Mean	Expected	
49	Russia	12.0	15.5	
50	Belarus	12.3	15.4	
50	Kazakhstan	11.8	15.3	
81	Armenia	11.8	13.2	
122	Kyrgyzstan	10.9	13.4	

The quality of human capital based on HDI

Note. Authors' calculations based on the UN report 2019 (http://hdr.undp.org).

Table 2

Гhe average annua	l growth	of the working	population,	%
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Country	UN, 2015–2030; age 15–64	Hybrid approach, 2015–2030
Russia	-0.3	-0.6
Armenia	-0.3	-0.8
Belarus	-0.5	-0.4
Kazakhstan	0.6	0.6
Kyrgyzstan	0.8	0.8

Note. Authors' calculations based on UN statistics database.

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The fixed capital K(t) is projected taking into account depreciation rate δ and the scenario assumption on the investment rate Inv(t) according to the model:

$$K(t) = Inv(t-1)GDP(t-1) + (1-\delta)K(t-1),$$

which for growth rates in percent has the form:

Growth
$$K(t) = Inv(t)\frac{\text{GDP}(t)}{2K(t)} + Inv(t+1)\frac{\text{GDP}(t+1)}{2K(t)} - \delta_{\text{HYBRID}},$$

where the hybrid depreciation rate δ_{HYBRID} is the average of the rates used by different forecasters: 4 % (World Bank believes that the equipment serves 25 years), 4.5 % (Carnegie), 5 % (PwC), 6 % (CEPII), if we focus on the term of the equipment for 15 years, then $\delta = 6.7$ %. The results are summarized in table 3.

Fixed capital

Table 3

		1			
Country	Fixed capital in 2010, bln US dollars	The average annual growth rate of capital, CEPII, 2015–2030, %	The average annual growth rate of capital, hybrid approach, 2020–2030, %		
Armenia	20	5.2	5.9		
Belarus	108	5.3	5.1		
Kazakhstan	205	5.0	5.1		
Kyrgyzstan	8	5.5	4.8		
Russia	2547	3.3	3.9		
World	124 120	2.6	2.8		

Note. Authors' calculations based on World Bank data, CEPII methodology [7] and forecast by the hybrid method.

In the hybrid model, the Growth A(t) of a country i is determined from the following dynamic equation in percentage (fig. 7):

Growth
$$A(t) = 1.33 - \beta (\ln \text{GDP}_{p.c.}(t-1) - \ln \text{GDP}_{p.c.}^{US}(t-1))$$

in which 1.33 % is the TFP growth rate in the USA, and the model for calculating the convergence rate β of a country has the form:

$$\beta = \begin{cases} \frac{(-CCI)^{1.5}}{-800} + 0.015, \text{ if } CCI < 0, \\ 0.015, \text{ if } CCI \ge 0. \end{cases}$$



Fig. 7. Forecast of TFP growth for 2010–2025 by CEPII and for 2020–2030 according to the hybrid methodology (developed by CEPII [7] and the authors)

The methodology for calculating the conditional convergence index is based on the rating idea proposed by the Carnegie Foundation (see [8]), but on other rating indices Global Innovation Index 2019 (INSEAD, *www.globalinnovationindex.org*), ICT Index (IDI-2017 (ITU, *www.itu.int*)), Index of Business Climate (Doing Business – 2020, *www.doingbusiness.org*, World Bank), Digital Economy Index, suggested in [1].

Information for the indices was taken from the corresponding databases and summarized in table 4. Each index was standardized, and the arithmetic mean of them presented the index of convergence conditions (for more details see [2]). The forecast for TFP growth was significantly lower than in our previous forecast in 2015 [2] due to technological sanctions against Russia and the 5 years lost.

Table 4

Rating indices for calculating convergence conditions

Country	Global Innovation Index – 2019		ICT Development Index – 2017		Doing Business – 2020		Digital Economy Development Index	
	Place	Value	Place	Value	Place	Value	Place	Value
USA	3	61.73	16	8.18	6	84.0	_	_
China	14	54.82	80	5.60	31	77.9	_	_
Armenia	64	33.98	75	5.76	47	74.5	75	0.1324
Belarus	72	32.07	32	7.55	49	74.3	32	0.5421
Kazakhstan	79	31.03	52	6.79	25	79.6	52	0.1787
Kyrgyzstan	90	28.38	109	4.37	80	67.8	109	0.0967
Russia	46	37.62	45	7.07	28	78.2	45	0.3039

The average annual GDP by PPP growth over the period 2020–2030, defined as the consensus forecast of various world forecast centers, as well as using the hybrid model, will be in current international dollars under:

inertial scenario (Armenia – 4.9 %, Belarus – 2.7 %, Kazakhstan – 3.2 %, Kyrgyzstan – 3.8 %, Russia – 2.5 %);

• scenarios of innovative breakthrough (Armenia – 5.0 %, Belarus – 4.4 %, Kazakhstan – 5.1 %, Kyrgyzstan – 4.5 %, Russia – 3.9 %).

The dynamics of changes in the share of the EAEU by 2030 in the global economy is presented for both scenarios in fig. 8: under the inertial scenario, it will decrease to 3.2 %, with the innovative breakthrough it will grow to 3.9 %.

The results of calculations of the welfare of the population of the EAEU member countries, compared to the USA by consensus forecast, taking into account the hybrid model, are summarized in table 5.

When analyzing welfare figures, it should be taken into account that for Armenia, Russia, and Belarus, growth is associated not only with faster GDP growth than in the USA but also with a decrease in the population.



Fig. 8. The EAEU share in the global economy (GDP by PPP)

Table 5

GDP per capita by PPP in the USA, China, EU₂₇ and in the EAEU countries with an innovative breakthrough in 1992, 2018, 2024 and 2030

	1992		2018		2024		2030	
Country	GDP per capita, US dollars	Percentage of the US level						
World	_	-	14 233	26	-	-	22 871	33
China	1266	5	16 696	28	28 111	37	30 602	45
USA	25 393	100	59 792	100	76 252	100	68 541	100
EU ₂₇ (excluding Great Britain)	17 761	70	41 399	69	52 885	69	46 447	68
Russia	11 534	45	27 893	47	36 316	48	46 294	68
Kazakhstan	7229	29	26 305	44	36 251	48	42 459	62
Belarus	5144	20	18 871	32	23 415	31	36 697	54
Armenia	1423	6	9476	16	13 297	20	19 276	28
Kyrgyzstan	1830	7	3697	6	4899	6	6394	9

Note. Data for 1992, 2018, 2024 are taken from IMF; data for 2030 are taken from consensus estimates ([2; 7; 8] and hybrid methodology).

The innovation core countries (the USA, China, Germany, France, Great Britain, Korea, Israel, etc.), which are rapidly leaving for the innovation gap in building the knowledge economy and the digital economy, pose a threat to the EAEU countries due to a significant gap in the periphery of economic development. Only the concentration of the EAEU member states on innovative development (as during the USSR times) will allow us not to slide to the periphery of the world economy and create the conditions for eliminating the growing innovation gap. In the age of the knowledge economy, only with an innovative breakthrough, the growth rates of the EAEU countries will be higher than the average in the world. Therefore, the fundamental difference for the EAEU economies in the scenario of an innovative breakthrough from an inertial one is that with inertial development, the share of the EAEU in the global economy will decrease to 3.2 %, and with an innovative breakthrough it will increase to 4.0 %.

An innovative breakthrough that requires a significant increase in the cost of education, science, and innovation will only affect about 2025 in the form of higher GDP growth rates of about 2 %, but the main thing will bring the technological level of the economies of the EAEU countries to the countries of the innovation frontier, which will bring the EAEU further to the world level of competitiveness. The initial condition of the innovation scenario is the development of the Strategy (Declaration) of the EAEU innovative breakthrough until 2030, which should outline common technological platforms for organizing effective cooperation between education, science, business and states in the EAEU for the commercialization of innovations. The growth of well-being of the population (GDP per capita by PPP) under the innovative breakthrough is significant: by 2030, Russia can equal to the EU at the level of 68 % of the United States, with the inertial development it will be only 58 %, about the same difference for the rest of the countries except for Kyrgyzstan, which by 2030 will reach the US welfare level of only 9 % in both scenarios.

The main threat to the scenario is the expansion of foreign, primarily Chinese, goods, which, displacing national goods, hamper economic growth and technological development. When working out the conditions for creating free trade zones with a wide range of countries and economic blocs (Vietnam, Iran, China, India, Iran, Singapore, Serbia, Egypt, ASEAN, etc.), it is necessary to more carefully analyze the losses from duty-free imports of partner state goods, giving preference for the import of innovative technologies. Equalization of oil and gas prices by 2024 within the EAEU will significantly increase the competitiveness of energy-intensive industries (cement industry, agriculture, etc.) in Belarus, Armenia, and Kyrgyzstan, which previously received gas and oil at higher prices than Russian ones. This will allow these countries to increase exports to Russia and reduce the negative trade balance with Russia, which will ultimately increase their economic growth and slow down Russian.

Recommendations for the road map of innovative breakthrough

1. The likelihood of an innovative breakthrough depends on the ability of the EAEU countries to send part of customs payments, according to the EU example, to the EAEU's general budget for the development of joint innovative projects (educational, innovative, petrochemical, food and climatic, transit). In this case, the growth of the EAEU budget will directly depend on the growth of exports to third countries.

2. EAEU's global competitiveness will depend on the ability to create multinationals competitive in global markets through the consolidation of enterprises from partner countries. The scenario should also include measures to expand the high-tech processing of raw materials, including oil and gas in the EAEU, and expand the export of petroleum products and petrochemicals, instead of exporting oil and gas. In particular, a large Russian – Belarusian – Kazakh multinational company can be created on the basis of the Belarusian petrochemical industry with the admission or offsetting of the supply of Kazakh oil. Moreover, corporate governance at a state-owned multinational company should be significantly improved in all EAEU countries [9].

3. The growth driver in the innovative breakthrough will also be a transit potential of the corridor «One Belt One Way». The innovative breakthrough also implies a significant intensification of the interaction of member states in innovative directions for the implementation of the Union's transit potential, including the formation of digital Eurasian transport corridors and the implementation of joint infrastructure projects with China for the transit of Chinese products to the EU along the corridor «One Belt One Way». Integration cooperation in this area involves the modernization and creation of new transport corridors, the development of transport engineering and high-speed railway lines, including the development of competition for logistics operators through the joint development of modern digital logistics. It is necessary to negotiate with China so that the Silk Road will become not only a route for transferring Chinese goods but, like in antiquity (silk, gunpowder, compass, paper) route of innovations, as well as a zone for developing joint innovations (for more details see [10]). Therefore, it is also important for countries along the way to create joint venture funds.

4. Given the fact that Kazakhstan, Russia, and Belarus are world leaders in the availability of arable land, 1.68, 0.85 and 0.6 ha, respectively (world average rate is 0.19 ha) per capita, the general priority is the innovative development of the EAEU agribusiness (precision farming and smart animal husbandry) in the face of climate change. The EAEU should also become one of the world leaders in high value-added agri-food markets: grain exports should be replaced by exports of meat and dairy products. The example of Belarus, which in 2018 took the third place in the world (when considering the EU as a whole) in the export of butter, the fourth in cheese, and the fifth in skimmed milk powder (FAO data), should be distributed using the corresponding unified agricultural policies for the entire EAEU (for more details see [1]). This would be facilitated by the formation of Eurasian dairy, meat, sugar, etc. unions.

5. The experience of the Belarusian high tech park should be extended to the entire EAEU (for more details see [1]), creating a powerful Eurasian cluster of the digital economy this is exactly the direction where the EAEU can become a world leader, and the problem of using created export digital innovations within the EAEU should be solved.

6. The innovative breakthrough will be accelerated in the case of scientific and technological cooperation between the EAEU countries and the European Union. The slogan «integration of integrations» proclaimed by A. G. Lukashenko in 2011 can and should be gradually realized, and Belarus should become a bridge of innovative cooperation: on its territory, it is possible to create venture funds, business incubators with European partners within the framework of business and science partnerships implemented in the EU on planned technological platforms involving scientists from other countries EAEU.

Библиографические ссылки

1. Головенчик ГГ, Ковалев ММ. Цифровая экономика. Минск: Издательский центр БГУ; 2019. 395 с.

2. Господарик ЕГ, Ковалев ММ. ЕАЭС-2050: глобальные тренды и евразийская экономическая политика. Минск: Издательский центр БГУ; 2015. 152 с.

3. UNESCO science report: towards 2030. Paris: UNESCO Publishing; 2015. 794 p.

4. OECD. The innovation imperative: contributing to productivity, growth and well - being. Paris: OECD Publishing; 2015. p. 54.

5. OECD. ICT and total business expenditure in R & D intensities: as a percentage of GDP, in OECD Digital Economy Outlook 2015. Paris: OECD Publishing; 2013.

Gerami M. The growth of ICT investment in OECD countries. Bulletin de la Société Royale des Sciences de Liege. 2016;85:244–251.
Foure J, Benassy – Quere A, Fontagne L. The great shift: macroeconomic projections for the world economy at the 2050 horizon.
Paris: CEPII; 2012. 943 p.

8. Dadush U, Stancil B. The world order in 2050. Washington: Carnegie Endowment for International Peace; 2010. 29 p.

9. Ковалев ММ, Румас СН, Шахуб МК, Юшко КЮ. Управление государственным сектором экономики. Минск: Издательский центр БГУ; 2018. 250 с.

10. Ковалев ММ, Ван Син. *Китай в XXI веке – мировая инновационная держава*. Минск: Издательский центр БГУ; 2017. 239 с.

11. Ковалев ММ, Червякова ЕА. Прогнозирование развития белорусского агропромышленного комплекса до 2030 г. на фоне глобальных агротрендов. *Журнал Белорусского государственного университета*. Экономика. 2017;2:120–139.

References

1. Goloventchik GG, Kovalev MM. *Tsifrovaya ekonomika* [Digital economy]. Minsk: Publishing Center of the Belarusian State University; 2019. 395 p. Russian.

2. Gospodarik CG, Kovalev MM. *EAES-2050: global'nye trendy i evraziiskaya ekonomicheskaya politika* [The EAEU-2050: global trends and Eurasian economics policy]. Minsk: Publishing Center of the Belarusian State University; 2015. 152 p. Russian.

3. UNESCO science report: towards 2030. Paris: UNESCO Publishing; 2015. 794 p.

4. OECD. The innovation imperative: contributing to productivity, growth and well - being. Paris: OECD Publishing; 2015. p. 54.

5. OECD. ICT and total business expenditure in R & D intensities: as a percentage of GDP, in OECD Digital Economy Outlook

2015. Paris: OECD Publishing; 2013.

Gerami M. The growth of ICT investment in OECD countries. Bulletin de la Société Royale des Sciences de Liege. 2016;85:244–251.
Foure J, Benassy – Quere A, Fontagne L. The great shift: macroeconomic projections for the world economy at the 2050 horizon.
Paris: CEPII; 2012. 943 p.

8. Dadush U, Stancil B. The world order in 2050. Washington: Carnegie Endowment for International Peace; 2010. 29 p.

9. Kovalev MM, Rumas SN, Shakhub MK, Yushko KYu. Upravlenie gosudarstvennym sektorom ekonomiki [Public sector management]. Minsk: Publishing Center of the Belarusian State University; 2018. 250 p. Russian.

10. Kovalev MM, Wang Sin. *Kitai v XXI veke – mirovaya innovatsionnaya derzhava* [China in the 21st century is a world innovation state]. Minsk: Publishing Center of the Belarusian State University; 2017. 239 p. Russian.

11. Kovalev MM, Chervyakova EA. Forecasting the development of the Belarusian agro-industrial complex before 2030 against the background of global agro-trends. *Journal of the Belarusian State University. Economics.* 2017;2:120–139. Russian.

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