

The Quality of Growth and Digitalization in the Eurasian Integration Countries: An Econometric Analysis

B. D. Khusainov^a, A. A. Shirov^{b, *}, and N. A. Baizakov^a

^a*Economic Research Institute, Nur-Sultan, 020000 Kazakhstan*

^b*Institute of Economic Forecasting, Russian Academy of Sciences, Moscow, 117418 Russia*

**e-mail: schirov-mse@yandex.ru*

Received April 8, 2022; revised April 11, 2022; accepted April 12, 2022

Abstract—The article presents the results of an analysis of the impact of digitalization on the development trends and quality of growth of the economies of the Eurasian Economic Union member states. A comprehensive analysis of the phenomenon “quality of growth” is performed. The determinants of the quality of growth of the national economies that form the Eurasian Economic Union are analyzed. The novelty of the study lies in the construction and implementation of an econometric model for assessing the impact of digitalization indicators on national income growth, international and national inequality, and precarization of employment in the five Eurasian economies. The results confirm the hypothesis of multidirectional influence of information and communication technologies on the rates and quality of the economic growth of individual countries and integration unions.

Keywords: digitalization, economic growth, national income, inequality, precarization of employment, Eurasian integration, econometric model

DOI: 10.1134/S1075700722050082

Introduction. The heterogeneity of the rates and quality of national economic growth, as well as polarization of income levels, between different countries is partly due to technological differences, including different digitalization levels. It is known that using new technologies creates the opportunities for the production of new, cheaper goods, leading to accumulation of capital and, consequently, to increased productivity and competitive ability of the economies of individual countries and integration unions. That does not only increase the growth rates of their economies, but also the quality of that growth, which is more important than its speed. Advanced technologies and digitalization include the application of R&D results, especially for industrial or commercial purposes, and, naturally, for the development of production.

Technological development is an important factor that increases the economic growth rate at the macro level. At the same time, effectively utilizing technological advances in various spheres of society leads to not just economic, but also social development. Countries that effectively implement new technologies in all spheres of society have been able to create new areas of employment in their economies that require skilled labor with relevant competencies. This creates an incentive to change their educational policies in order to ensure adequate development of highly qualified

human resources to support the rate and quality of the national economic growth.

As global economic relations change, a new technological order comes to the forefront, with a complex of nano-bioengineering, information and communication, additive, and digital technologies at its core [1]. The COVID-19 pandemic has vividly demonstrated the dominant impact of digitalization on all aspects of economic and social development on the global, regional, and national scales. The increasing digitalization can be considered a new driving force that influences the development trends and the quality of growth of the economies of individual countries and integration unions. This fact determines the relevance of the present article.

Quality of growth. Modern research on the quality of economic growth was preceded by the research direction that first emerged in the 1970s concerned with the analysis of the unevenness of the reduction of poverty, the increasing inequality in many countries, and environmental degradation. However, serious studies of the phenomenon “quality of growth” with noteworthy results only appeared at the turn of the 20th and 21st centuries [2, 3].

The past three decades have been an important period in the development of many countries around the world. Sustained economic growth during this period has confirmed the belief that it is the founda-

tion of poverty reduction. The history of development has shown the importance of certain reforms for supporting growth in both developing and advanced economies. That does not refer just to increasing the volume of investment in education and healthcare, but also to the effectiveness of that investment, as well as reduction of trade barriers and many other tools of reform. At the same time, certain critical gaps in the development of both advanced and developing economies have also become clear. In particular, the reforms initiated in the early 1990s did not place due attention on the quality of growth, which significantly reduced their real potential. In some countries these reforms have led to significant economic growth, while others have gained almost nothing from them. At the heart of these reforms, in a figurative expression of Academician V. Polterovich, was the idea of “transplantation of institutes” from advanced countries, primarily Europe and the United States. “The fallacy of the straightforward approach of ‘shock transplantation’ of institutions was clearly revealed in the 1990s, when it turned out that this approach did not result in a success in either Africa or Latin America, and especially not in the countries of the former Eastern Bloc” [4].

In many cases economic policy served the selfish interests of the ruling elites and did not contribute to the growth of investments in human and/or natural capital, which are necessary for qualitative growth. Obviously, increasing the standard of living of the poor population requires higher incomes. This creates the need for sound economic policies and the establishment of institutions that promote sustainable growth and inclusive development. Solving this problem also requires providing much better and much more equitable education and employment opportunities, improving population health and nutrition, and creating a cleaner and more sustainable environment. Additionally, while it is clear that some aspects of the quality of life improve with the increase of per capita income, that improvement does not encompass all aspects and is not uniform or inevitable. In different countries the same economic growth rates have been associated with very different degrees of progress in education, healthcare, and other important components of the population’s standard of living [5].

The quality of growth refers to key aspects that shape the process of economic development. The experience of many countries demonstrates the particular importance of several such aspects: the distribution of opportunities, environmental sustainability, and global risk management. These aspects reinforce the mutual influence of the rate and quality of growth.

Economic growth is not the end goal. However, it is one of the necessary conditions for improving the overall quality of life of the population. Moreover, in the absence of economic growth, i.e., an increase in the incomes of the population, business, and the state, it is hardly possible to improve the quality of life at all.

However, the next step should involve other issues, such as the content of economic trends, the primary and secondary distribution of income generated in the process of economic development, i.e., the issues of the quality of growth.

Assessing the quality of growth is a more complex methodological problem compared to assessing growth rates, which are traditionally measured by changes in the gross domestic product (GDP), including per capita, over time. The increasing interest of researchers in the quality of growth is caused by a number of reasons, one of which is the unevenness of the growth and development trends in different countries across the world. Global experience shows that growth can vary depending on its qualitative component. Indeed, a comparison of the growth trends of advanced and developing countries during the 1950s and 1970s indicates a slowdown in the growth rates of the first group of states. The second group demonstrated higher growth rates during this period, and their economies had a more equitable distribution of income [6].

The phenomenon “quality of growth” is still little studied [7, 8]. The existing points of view on its nature and genesis are ambiguous and diametrically opposed. Proponents of high growth rates claim that faster growth allows more funds to be directed to solving social, environmental, and other vital issues. An opposing point of view is based on the fact that rapid growth trends cannot be equated to rapid improvement in the standard of living of the population, but, on the contrary, are associated with aggravation of social, environmental, and political problems. Without engaging in the controversy, we shall note that assessing the quality of growth requires a system of indicators that reflect its various aspects—structural, resource, environmental, and social.

For example, the World Bank composite indexes of human development and environmental sustainability were constructed based on three indicators: human development, economic growth, and environmental sustainability. The following instrumental ratios were used: education spending to GDP; healthcare spending to GDP; trade volume to GDP, and other indicators [2]. A lot of research on the quality of growth is performed in China. Of undoubted interest are the results of an assessment of the quality of economic growth in all 31 provinces of mainland China from 1997 to 2016 [9] using an unconventional indicator “Genuine Progress Indicator” (GPI). We should add that the Government of China is seriously concerned with the quality and sustainability of its national economic growth, as evidenced by the official documents they adopt.

While it is clear that increasing the welfare of a country’s population depends very strongly on the accumulated national wealth, it is also obvious that an exclusive focus on economic growth can lead to

Table 1. Long-term trends of changes in the GDPs at PPP per capita and the average before-tax incomes of the population in the EAEU countries*, 1991–2021, 1991 = 100

Country	GDP growth per capita at PPP			Change in the average income of the lower 90% of the population			Change in the average income of the upper 1% of the population		
	2001	2011	2021	2001	2011	2021	2001	2011	2021
Armenia	96.7	210.6	275.1	102.2	228.3	268.1	72.2	133.8	185.7
Belarus	97.3	208.4	215.0	81.5	152.5	166.5	121.5	245.6	191.0
Kazakhstan	97.2	184.2	215.6	76.9	134.6	163.4	125.5	187.6	255.3
Kyrgyzstan	67.8	91.8	105.8	66.7	78.7	87.0	44.3	62.8	105.3
Russia	73.7	127.9	134.3	46.3	77.4	83.8	221.1	278.6	295.4

* For the calculation, the indicator values were taken at constant 2021 euro prices.

Source: calculated and compiled by the authors using data from the World Inequality Database. <https://wid.world/data/> (date accessed: March 1, 2022).

ambiguous consequences, including a low quality level of that growth. A clear manifestation of this issue is a high level of income inequality both within national economies and between countries. Another negative manifestation is, in our view, precarization (instability) of employment of a country's population. Precarization of employment, which is an important characteristic of modern development typical for many countries, carries the risk of destruction of human resources due to increased unemployment. However, despite considerable attention to this problem, quantitatively measuring precarization is very difficult due to the multidimensional nature of the phenomenon, which manifests in the form of nonstandard and informal employment, new forms of employment, nonguaranteed employment, nontraditional temporary labor relations, flexible staffing mechanisms, etc. [10].

Income inequality and precarization of employment¹ are equated in this article as determinants of the quality of growth² of the five current members of the Eurasian Economic Union (EAEU), which our research is concerned with.

The turbulent, up-and-down changes that all post-Soviet countries have gone through in the process of their transformation indicate that over the past three decades the trends of GDP growth and increases in incomes of various population groups in the five EAEU member states have been ambivalent (Table 1).

A low economic growth rate over the last three decades is observed in Kyrgyzstan, a high one in

Armenia. It is noteworthy that during this period the average before-tax income of the lower 90% of the population increased the most in Armenia, while in Russia and Kyrgyzstan it still has not reached the pre-reform level. At the same time, the average incomes of the top 1% of the population in Kazakhstan and Russia were found to be the highest, which indicates a significant income polarization of these countries' populations. However, this phenomenon is characteristic not only of the national, but also of the international level.

The situation in the five EAEU countries was assessed using the well-established concepts of international and global inequality [11]. In our case, the first concept focuses on the heterogeneity between the five members of the integration union, i.e., the countries themselves are taken as the unit of observation. The second concept incorporates population sizes.³ A comprehensive analysis of the changes in the calculated indices G_1 and G_2 over time (in percentage terms) reveals the following trends (Fig. 1).

Firstly, index G_1 had had a marked downward trend throughout the 1990s and in the current millennium (although not in every year) until 2019, and has increased in the last two years of the analyzed period. Secondly, index G_2 has been following an upward

³The level of inequality according to the first concept is determined by calculating the Gini coefficient using the formula

$$G_1 = \frac{1}{\mu} \frac{1}{n^2} \sum_{i=1}^n \sum_{j>i}^n (y_j - y_i), \text{ where } G_1 \text{ is the coefficient of international inequality; } y_j \text{ and } y_i \text{ are the net national incomes (NNI) } j \text{ and } i; n = 5 \text{ is the number of countries; } \mu \text{ is the average NNI value for the five countries. The second type of inequality is determined based on the formula:}$$

$$G_2 = \frac{1}{\mu_1} \sum_{i=1}^n \sum_{j>i}^n (y_j - y_i) p_i p_j, \text{ where } G_2 \text{ is the coefficient of Eurasian inequality; } y_j \text{ and } y_i \text{ are the NNIs per capita in countries } j \text{ and } i; n = 5 \text{ is the number of countries; } p_j \text{ and } p_i \text{ are the shares of the population of countries } j \text{ and } i \text{ in the indicator for the EAEU countries; } \mu_1 \text{ is the average for the EAEU value of NNI per capita [9].}$$

¹ Precarization of employment is defined as the sum of the precariously employed and the unemployed; the precariously employed are self-employed workers (without employers) and their dependents.

² Within the grant study (grant no. AP08856289), the quality of growth is assessed using a wider set of determinants: income inequality, both international and national, average before-tax income for various population groups, precarization of employment, life expectancy, CO₂ emissions, and spending on education, healthcare, research and development, and on information and communication technologies.

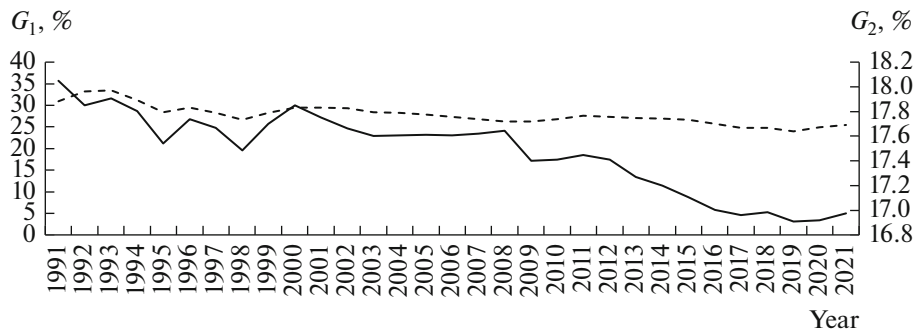


Fig. 1. Changes in the international (---) and Eurasian (—) inequality indexes in the EAEU over time, 1991–2021. Source: calculated and compiled by the authors using data from the World Inequality Database. <https://wid.world/data/>.

trend since 2009, especially in 2020–2021. Thirdly, surges in inequality between the EAEU countries, as well as globally, occurred after every major crisis: Asian (1998), global financial (2008), and COVID (2020).

Digital transformation. The emergence and rapid spread of the digital economy is the most important trend in the global development of the recent decades. Related phenomena—digitalization and digital transformation—are having an increasing impact on the economy on global and national scales, while digital products and services are increasingly transforming traditional sectors of the economy. This is especially true for developing countries and emerging markets, such as the EAEU market. Indeed, the most important economic changes may well occur due to the digitalization of traditional sectors and not due to the emergence of new sectors that use digital technologies.

During the COVID-19 pandemic, the digital transformation process accelerated, international data flows increased, and new digital technologies (platforms) emerged. The importance of the Internet and digital data for the economy and society has increased significantly. The historically large divide between the availability and use of the Internet in advanced and developing countries is growing larger and poses a serious problem for development [12]. In other words, a distinctive feature of the modern digital economy is large structural imbalances, whose impact on the trends and quality of the growth of national economies is likely to increase in the future.

Digital transformation and the related problems are discussed in a large number of studies by Russian and foreign researchers; a comprehensive analysis of some of them is presented in [13]. Study [14] examines the formation of the digital economy in Russia, the importance of its digital modernization, particularly the prospects for digital modernization of regional economies, an overview of the social consequences of the transition to the digital economy, and a number of other relevant issues. Along with this, a model toolkit that incorporates the issues of the technical progress in the digitalization era is being developed [15]. The

authors have developed an original mathematical model for calculating workforce productivity in the digital economy, which commonly relies on the symbiosis of Humans + Intelligent Machines. Of undoubted interest is the developed information model based on the use of different methods of obtaining technological information. Its relevance is due to the new global trends that have emerged under the influence of increasing digitalization and robotization of the modern economy [16].

In the context of the emergence of a new technological order that is associated, among other things, with dynamic development of information and communication technologies (ICT), digitalization can be used as a tool of ensuring a new quality of growth of the economies of individual countries and integration unions [17]. The authors rightly note that at the present stage of development the potential of the digital economy in ensuring a new quality of growth of national systems has not been fully realized. Digitalization has the potential to not only quantitatively accelerate the rates of economic growth, but also to improve the quality of that growth.

Within the scope of our research, the studies that analyze the consequences of the digitalization of the Russian economy in terms of its social aspects, in particular, the impact on employment, are of interest. Obviously, the social consequences of the development of digital technologies in particular and ICT in general concern many areas of the economy, not just the labor market. However, it is also obvious that the widespread use of digital technologies is causing “a reduction in the demand for labor from a high-tech economy” [18] and creates a new format of labor relations. As noted in [19], “in the early 1990s Russia experienced a deep postindustrial structural transformation of the labor market.”

However, the transformation processes that occurred in the post-Soviet countries, in some countries of the future EAEU, have caused even deeper deformations in this market. Thus, in Kazakhstan in 1991 the share of the self-employed in the total num-

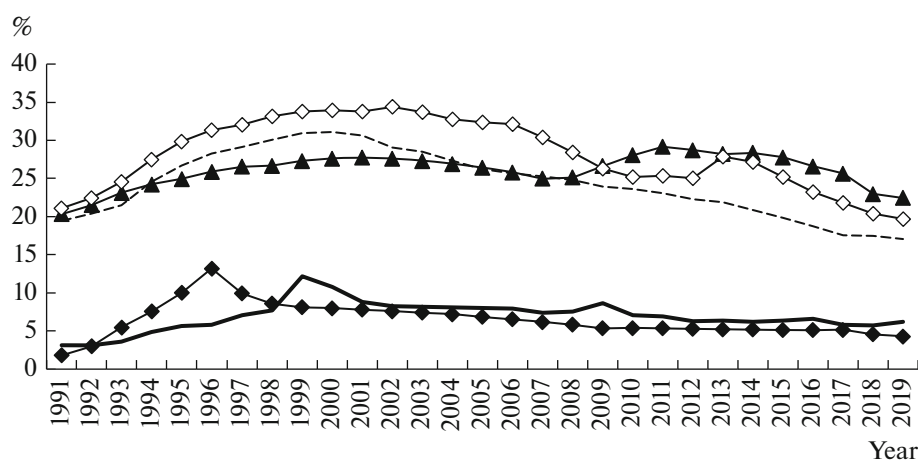


Fig. 2. Changes in the level of precarization of employment over time, 1991–2021.

—▲— Armenia; —◆— Belarus; —◇— Kazakhstan; ——— Kyrgyzstan; — Russia

Source: calculated and compiled by the authors on data from the International Labour Organization.

ber of people employed was 4.2%. During the 1990s it was consistently increasing and by 1999 had reached 45.1%. In subsequent years this indicator followed a downward trend, but still remained quite high at 23.4% in 2020 (compare to its value in Russia at 6.8%).⁴ Such processes have impacted the level of precarization of employment in all five EAEU member states (Fig. 2), although with varying severity. Thus, the largest shares of the precariat in the total population of the country, which poses a risk of social tension, are observed in Kyrgyzstan, Kazakhstan, and Armenia. Note that in Kyrgyzstan the maximum value of this indicator was observed in 2002 (34.4%). In Belarus and Russia the situation with the level of precarization of employment is noticeably better (Fig. 2).

Methodology and information base. The empirical equation evaluates economic growth and the determinants of its quality as a linear function of digitalization indicators for the five EAEU member states. The econometric specification is based on the Solow Growth Model. The equation is constructed using panel data; the original regression specification takes the following form:

$$\ln Y_{i,t} = b_1 \ln x_{i,1} + b_2 \ln x_{i,2} + \dots + b_n \ln x_{i,n}, \quad (1)$$

where i is the country; t is the time period. The variable $\ln Y$ is the logarithm of the real value of the dependent variable. At various stages of the study, the following variables were used as variable Y : Net National Income (NNI) at purchasing power parity (PPP), national Gini coefficient (Gini); precarization of employment (Prek), the index of Eurasian inequality G_2 ; $\ln x_{i,n}$ is a set of variables in logarithmic form that characterize the ICT sector, i.e., the digitalization

indicators: subscr is the number of mobile cellular subscriptions; users is the number of Internet users, emp is the number of full-time employees in the ICT sector, rev is the total revenue of all telecommunications services, inv is the volume of annual investments in telecommunications services, and net_exp is the net export of ICT-sector goods.

The analysis used the generalized method of moments (GMM). All results are based on the evaluation of the “GMM system,” which uses variations of variables both between countries and within countries (over time). Thus, this assessment takes into account the main source of variation in ICT variables (i.e., differences between countries).

Data quality. The NNI/PPP per capita indicator, calculated at purchasing power parity in constant 2021 euros, is based on data from the World Inequality Database for the 1990–2021 period. The national Gini coefficients are taken from the same source. Calculations to determine the amount and level of precarization of employment were performed on the basis of the database of the International Labour Organization. All indicators of the ICT sector (in current prices, USD) were taken from the ITU-D ICT database.

Statistical results. The econometric model (1) was implemented using the R language on panel data for 1995–2021. The first stage of the study involved assessing the impact of the digitalization indicators on the growth of the five EAEU economies as measured by the NNI/PPP indicator. A comprehensive analysis of the results suggests that four of the six digitalization indicators are significant for the EAEU member states (three indicators at the significance level of 1%, one at the level of 10%). However, only two indicators—the revenue from telecommunication services and the number of Internet users—can be classified as factors that contribute to economic growth in the EAEU

⁴ Source: Bureau of National Statistics of Kazakhstan. <https://stat.gov.kz/>.

Table 2. Results of the empirical assessment of a relationship between the trends of NNI/PPP changes and the ICT sector indicators*

Indicator	Estimate	SE	z-value	$Pr(> z)$
Ln subscr	-0.0297217	0.0051065	-5.8204	4.711e-08**
Ln emp	-0.5280616	0.0663907	-7.9539	9.627e-13**
Ln rev	0.1165737	0.0556825	2.0935	0.03834****
Ln inv	0.0060396	0.0415428	0.1454	0.88465
Ln net_exp	-0.0215362	0.0255802	-0.8419	0.40146
Ln users	0.1328254	0.0134971	9.8410	<2.2e-16**

Time period 27 yr; observations 135; R-Squared: 0.89936

* Here and further in Tables 3–5: Ln – logarithm, **, ***, **** – significance at the levels 10%, 5%, and 1% respectively.

Source: authors' calculations.

Table 3. Results of the empirical assessment of a relationship between the trends of changes in the Eurasian inequality index G_2 and the ICT sector indicators*

Indicator	Estimate	SE	z-value	$Pr(> z)$
Ln subscr	0.00080524	0.00105053	0.7665	4.4448
Ln emp	0.02126573	0.01365819	1.5570	0.1220
Ln rev	-0.00645572	0.01145525	-0.5636	0.5741
Ln inv	-0.01242254	0.00854637	-1.4535	0.1486
Ln net_exp	0.00130721	0.00526248	0.2484	0.8042
Ln users	-0.01390404	0.00277669	-5.0074	1.849e-06**

Time period 27 yr; observations 135; R-Squared: 0.8275.

Source: authors' calculations.

countries. Of course, the chosen indicators of the ICT sector are not the main factors of economic growth. This fact is also likely to explain, to a certain extent, the negative values of elasticity coefficients for two other variables: the number of mobile subscribers and employment in the ICT sector. The net export of ICT-sector goods has a constraining effect on the growth of the NNI/PPP (Table 2). This is due to the fact that its value for all five EAEU economies is consistently negative.

Let us make two important notes. Firstly, in the process of carrying out variant calculations, it became necessary to remove the constant in Eq. (1), because its use prevented us from obtaining a correct assessment of the relationship between the endogenous and exogenous variables. The value of the constant was highly significant in every case, while the statistical characteristics of the equation showed an absence of correlation between the NNI/PPP growth rates and the digitalization indicators, i.e., the constant “absorbed” the entire analyzed relationship. Secondly, the negative values of the coefficients for two indicators of the ICT sector are a subject for future research.

The second stage of the study involved testing the hypothesis about the impact of the ICT sector indicators on the Eurasian inequality index based on the

same model (1) (Table 3). In this specification, the only statistically significant digitalization indicator that affects the index of Eurasian inequality G_2 was the number of Internet users. Its influence is constraining, which seems quite reasonable, since the level of Internet development significantly differs across the five EAEU countries. The absence of a statistically significant relationship between the selected endogenous variable and the other exogenous parameters is, in our opinion, also understandable, since the index of Eurasian inequality G_2 largely depends on many other factors besides the digitalization parameters of national economies.

The third stage of the study involved assessing the impact of the ICT sector indicators on the level of precarization (instability) of employment (Table 4). A statistically significant relationship was revealed between the size of the precariat and two digitalization indicators: the number of mobile subscribers (at the 1% level) and the number of people employed in the ICT sector (at the 5% level).

Thus, the empirical results of the study confirm the hypothesis of a statistically significant relationship between the trends of the rate of economic growth, its quality, and digitalization indicators. Naturally, the conducted analysis does not provide a final answer about the influence of digitalization processes on

Table 4. Results of the empirical assessment of a relationship between the level of precarization (instability) of employment and ICT sector indicators*

Indicator	Estimate	SE	z-value	Pr(> z)
Ln subscr	0.093509	0.018814	4.9702	2.17e-06**
Ln emp	-0.728326	0.244603	-2.9776	0.003495***
Ln rev	-0.265731	0.205151	-1.2953	0.197625
Ln inv	0.175904	0.153056	1.1493	0.252653
Ln net_exp	0.038672	0.094245	0.4103	0.682270
Ln users	-0.071334	0.049727	-1.4345	0.153950

Time period 27 yr; observations 135; R-Squared: 0.33499.

Source: authors' calculations.

Table 5. Results of the empirical assessment of a relationship between the national inequality indexes and the ICT sector indicators*

Indicator	Estimate	SE	z-value	Pr(> z)
Ln subscr	0.0078511	0.019770	3.9712	0.0001204**
Ln emp	0.0598019	0.0257034	2.3266	0.0216080****
Ln rev	-0.0263283	0.0215577	-1.2213	0.2242898
Ln inv	0.0184553	0.0160834	1.1475	0.2533943
Ln net_exp	-0.0345486	0.0099035	-3.4885	0.0006729**
Ln users	-0.0238450	0.0052255	-4.5632	1.194e-05**

Time period 27 yr; observations 135; R-Squared: 0.37349.

Source: authors' calculations.

inequality in the EAEU countries. However, it does form an understanding of the possible scale of that influence and creates a foundation for further research on the relationship between digitalization and the quality of economic growth.

Conclusions. Firstly, this article is part of a study aimed at identifying the characteristics of the quality of growth of economies of individual countries and integration unions. It is intended to contribute to the definition and explanation of the phenomenon “quality of growth” in the context of increasing digitalization, the role and significance of which has become especially relevant during the COVID-19 pandemic. Despite the fact that economists have been analyzing the problem of the quality of growth for over half a century, it is still far from being solved.

Secondly, the digital divide between regions and national economies of the world, in particular between the EAEU member states, will be a catalyst for increasing inequality between them. There is reason to believe that polarization will occur primarily in the sphere of income and capital. Given the above, the undoubted novelty of the present study is the assessment of the impact of digitalization indicators on the changes in the indexes of national and international inequality of the five Eurasian economies. The qualitative results of assessing whether there is a statistically significant relationship between the determinants of the quality of growth and digitalization indicators

require in-depth research. We have not been able to find such research among the many studies concerned with inequality.

Thirdly, precarization of employment is a complex and currently little studied phenomenon. It cannot depend on a single sector of national economies, even a very important one. However, as digital transformation develops and overtakes traditional professions, the problem of precarization of employment will become more and more relevant. Therefore, the preliminary estimates reflect the first step in this direction.

Fourthly, the study used individual digitalization indicators. Of course, these indicators do not reflect all the processes of digital transformation. Nevertheless, the fact that only a small number of digitalization indicators were used does not, in our view, detract from the significance of the results. The choice of the indicators was determined simply by the availability of high-quality statistical data in international sources. Naturally, a more complete study would require incorporating data on structural changes in national economies, in particular, the share of the added value of the ICT sector in various countries across the world. We were not able to find such information on the analyzed countries, preventing us from compiling continuous rather than discrete qualitative dynamic series.

FUNDING

The study was supported by grant financing of scientific and technical programs and projects by the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan (grant no. AP08856289 “The rates and quality of growth of national economies: determination in the neo-globalization era”).

REFERENCES

1. S. Yu. Glaz'ev, *Plague of the 21st Century: How to Avoid Catastrophe and Overcome the Crisis?* (Knizh, Mir, Moscow, 2020) [in Russian].
2. V. Thomas, M. Dailimi, A. Dhareshwar, D. Kaufmann, N. Kishor, R. Lopez, Y. Wang, *The Quality of Growth* (World Bank Group, Washington, DC, 2000). <https://doi.org/10.1596/0-1952-1593-1>
3. R. López, V. Thomas, and W. Yan, *The Quality of Growth: Fiscal Policies for Better Results* (World Bank Group, Washington, DC, 2008).
4. V. M. Polterovich, “To the leadership of the reformers: some conclusions from the theory of economic reforms,” *Ekon. Nauka Sovr. Ross.*, No. 1 (28), 7–24 (2005).
5. A. A. Shirov and V. V. Potapenko, “The paradox of Russian consumption,” *EKO*, No. 6 (552), 8–25 (2020). <https://doi.org/10.30680/ECO0131-7652-2020-6-8-25>
6. H.-J. Chang, *Bad Samaritans. The Myth of Free Trade and the Secret History of Capitalism* (Bloomsbury Publ. PLC, London, 2007).
7. B. D. Khusainov, Sh. A. Kaimoldina, and A. I. Nussupov, “Quality of growth and income inequality: A cross-country analysis,” *Uroven' Zhiz. Nasel. Reg. Ross.* 17 (4), 454–461 (2021). <https://doi.org/10.19181/Ispr2021.17.4.3>
8. M. N. Uzyakov, “Economic growth in Russia: The quantity and quality components,” *Stud. Russ. Econ. Dev.* 15 (3), 230–236 (2004).
9. X. Long and X. Ji, “Economic growth quality, environmental sustainability, and social welfare in China – provincial assessment based on genuine progress indicator (GPI),” *Ecol. Econ.* 159, 157–176 (2019).
10. V. N. Bobkov, A. A. Gulyugina, and E. V. Odintsova, “Social consequences of thirty years of capitalist reforms in Russia,” *Ross. Zh.*, No. 1, 78–107 (2022). <https://doi.org/10.33983/0130-9757-2022-1-78-107>
11. B. Milanovich, *Worlds Apart: Measuring International and Global Inequality* (Princeton Univ. Press, Princeton, 2005).
12. Catching Technological Waves Innovation with Equity, Technology and Innovation Report 2021, UNCTAD, Geneva. <https://unctad.org/page/technology-and-innovation-report-2021>.
13. B. Khusainov, A. Nussupov, Sh. Kaimoldina, and A. Shirov, “Assessment of the Quality of Growth of National Economies in the Context of Digital Transformation,” in *Digital Transformation and the World Economy, Studies on Entrepreneurship, Structural Change and Industrial Dynamics*, Ed. by A. Rudskoi, A. Akaev, and T. Devezas (Springer Nature Switzerland AG, Cham, 2022).
14. *Lecture Notes in Networks and Systems*, vol. 87: *Digital Economy: Complexity and Variety vs. Rationality*, Ed. by E. G. Popkova and S. S. Bruno (Springer, Cham, 2020), pp. 67–86. <https://doi.org/10.1007/978-3-030-29586-8>
15. A. A. Akaev and V. A. Sadovnichii, “The human component as a determining factor of labor productivity in the digital economy,” *Stud. Russ. Econ. Dev.* 32 (1), 29–36 (2021). <https://doi.org/10.1134/S1075700721010020>
16. A. Akaev, A. Rudskoy, B. Khusainov, and Z. Zeman, “Information Model for Calculating the Rate of Technical Progress,” in *Digital Transformation and the World Economy, Studies on Entrepreneurship, Structural Change and Industrial Dynamics*, Ed. by A. Rudskoi, A. Akaev, and T. Devezas (Springer Nature Switzerland AG, Cham, 2022), pp. 23–39. <https://doi.org/10.1007/978-3-030-89832-8-2>
17. R. Yalmaev, V. Shalaev, A. Giyazov, and G. Tashkulova, “The Perspectives of Provision of New Quality of Growth of Economic Systems in the Digital Economy,” in *Lecture Notes in Networks and Systems*, vol. 87: *Digital Economy: Complexity and Variety vs. Rationality*, Ed. by E. G. Popkova and S. S. Bruno (Springer, Cham, 2020), pp. 30–38. <https://doi.org/10.1007/978-3-030-29586-8-4>
18. E. Sadovaya, “Digital economy and a new paradigm of the labor market,” *World Econ. Int. Rel.* 62 (12), 35–45 (2018). <https://doi.org/10.20542/0131-2227-2018-62-12-35-45>
19. E. Sadovaya, “Social challenges of the digital economy: Russia in a global context,” *World Econ. Int. Rel.* 65 (9), 14–24 (2021). <https://doi.org/10.20542/0131-2227-2021-65-9-14-24>

Translated by A. Ovchinnikova