










# “Assessment of the relationship between inequality, income and economic growth in the regions of Kazakhstan”

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# ASSESSMENT OF THE RELATIONSHIP BETWEEN INEQUALITY, INCOME AND ECONOMIC GROWTH IN THE REGIONS OF KAZAKHSTAN

## Abstract

This paper aims to analyze various indicators to explain the impact of inequality and income on economic growth at the regional level of Kazakhstan. The data collected from the Bureau of National Statistics from 1995 to 2020 examined the impact of country, interregional, and market inequality indices and real income/wage on the GRP of different regions. Applying the methods such as analysis of unique statistical data covering 16 regions of Kazakhstan and log-linear multivariate regression analysis, which was carried out using the STATA software package, evidence was provided on the influence of interregional, country inequality, and income on economic growth. The analysis showed the differential impact of inequality and income. It was found at the first stage that the gap between interregional inequality and country inequality is insignificant. It was identified at the second stage that in models with real incomes, an increase in income has a negative impact on the development of the economy of Kazakhstan. All the models obtained are consistent and have (although not very high) significant explanatory power and confirm the relationship between inequality and economic growth. The findings can help policymakers, regionalists, economists, and governmental bodies understand the importance of income inequality and which areas can contribute to the formation of effective regional policy.

## Keywords

economic growth, inequality, region, regional policy, Gini index, Kazakhstan

## JEL Classification

O15, R11, R12

## INTRODUCTION

Over the last two decades, the problem of inequality has been constantly raised, and it is often associated with social tension and instability. However, another reason for the increased interest in this problem is a concern about the possible impact of the level of inequality on the rate of economic growth. Such trends can lead to a critical recession in the economy and a decrease in the country's level of competitiveness. Moreover, the problem of inequality among countries, regions, and individual territories remains one of the global challenges. Thus, some empirical studies analyze the influence of various spatial properties on regional development and territorial inequality (Glaeser & Mare, 2001; Behrens et al., 2014; Dusek et al., 2014; Molero-Simarro, 2017). Several studies highlight a significant increase in GDP per capita in developing countries and a decrease in the Gini index by 20% (Hacibedel, 2019).

Other works show that the effect, either positive or negative, of inequality on growth depends on the country's level of economic development that is developing or developed (Lin et al., 2014; Barro, 2000;

Gutiérrez-Romero, 2021). A well-known basic inequality concept on the inverted U curve, accepted by economists as a fact for an extended period, is still applied in some studies. The migration from the agricultural to the industrial sector leads to an increase in inequality, but later the inequality diminishes as the economic condition rises (Kuznets, 1955; Bussolo et al., 2007). Later, urbanization is considered a key driver for economic growth and reducing inequality and poverty. Several investigators state that structural changes in the urban economy, agglomerations, and inequality are interrelated factors (Krugman, 1991; Galor & Zeira, 1993; Ros, 2000).

Previous literature and existing studies demonstrated the contradicting results on the subject of the relationship between inequality and growth. While some studies find empirical evidence of the negative impact, others show a positive relationship between variables. In addition, the research works are different in terms of the methodology applied, data used, assessment tools, and models developed.

Other studies on inequality consider, examine, and include additional factors in economic models and specifications. For example, some economic studies contain many factors, such as foreign direct investment, changes in tax policy, and income ranking, to reduce inequality and combat poverty (Adika, 2022; Ncube et al., 2014). At the same time, the migration of the labor force and accumulation of human capital play a crucial role in fostering the economy's growth. The effect of inequality on growth goes through human capital and different channels (Bloom & Finlay, 2009; Liu & McKibbin, 2020).

These inequality issues have been continuously investigated in many scientific papers for a long time. There are various causes, types, and forms of inequality. Addressing the problem of inequality has become a priority in many countries, and there are many studies examining this process. First of all, this is due to the need to study regional inequality, the stratification of society, and, as a result, the growth of social tension and political instability in the country. Therefore, in developed countries, tools are being actively introduced to reduce various types of inequality, and attempts are being made to manage economic growth to make this process sustainable.

At the same time, in many developing countries, such as Kazakhstan, there is a high degree of territorial differentiation in terms of economic indicators and the degree of income differentiation. In turn, the primary tool for achieving sustainable annual economic growth rates is an effective policy of management tactics, which implies the modernization of Kazakhstan's regional systems through controlled urbanization.

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## 1. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The need to stabilize the economies of countries and regions after the COVID-19 pandemic determines the relevance of solving the problems of smoothing inequalities and uneven development. The issues of regional development and the smoothing of regional inequality are of particular interest for regional policy and the organization of regional development management. Theories, concepts, and models of regional inequality problems and their impact on spatial development are still discussed in many scientific papers (Goschin, 2015; Henning et al., 2011; Islam et al., 2017; Nurlanova et al., 2018).

In the scope of the assumption by Kuznets, economic growth is first accompanied by an increase in income inequality and then leads to its decrease (Kuznets, 1955). This is described in the obtained inverted U-shape that was developed during the study. So, in one of the works concerning the forecast of the evolution of global inequality, the Kuznets theory is applied to the migration of the population from the agricultural to the industrial sector and, accordingly, an increase in inequality in the early stages of industrialization and its decrease at later stages (Bussolo et al., 2007). As the result, a significant contribution to the theory of economic development is provided by the U-hypothesis theory of Kuznets, whereby inequality initially increases to a maximum and then declines during the process of a country's development.

Economic development is associated with the growth of urbanization and inequality in the early stages of its development (Krugman, 1991). Due to the inaccessibility to financial markets and limited budgetary resources, low-income families do not have opportunities to invest in education, considering education as a waste of time and a lack of benefits in the short term (Galor & Zeira, 1993). Economic growth is promoted through structural changes in the urban economy, which allows using benefits of increasing profits and the economy of urbanization. Remarkably, Ros justified that urbanization strengthens the redistribution of the labor force from rural to urban areas (Ros, 2000). Thuswise, inequality and geographic concentration denote capital accumulation (both physical and human). From this point, it was noted that the growth of regions and the growth of high concentration are associated with growing inequality (Behrens et al., 2014).

In more recent research, attention was given to the relationship between income inequality and the size of regions. Glaeser and Mare studied the determinants of variation in the degree of inequality between regions and cities (Glaeser & Mare, 2001). Thus, Baum-Snow and Pavan have explored the relationship between city size and income inequality (Baum-Snow & Pavan, 2012). Later works focused on spatial inequality, manifested primarily in the unequal distribution of income (Dusek et al., 2014; Molero-Simarro, 2017; Erman & te Kaat, 2019). Some works consider economic factors such as income level or applying a management policy of tax incentives to reduce inequality between the poor and rich segments of the population. Others observe demographic indicators such as population size and labor migration as critical factors of the difference between urban and rural areas, which bring changes to the economy (Bloom & Finlay, 2009; Liu & McKibbin, 2020). Although there is a significant emergence of data availability, the studies on economic growth primarily focus on income distribution inequality.

Growing inequality may gradually slow down economic growth in low-income countries, stimulating economic growth in high-income countries (Barro, 2000; Lin et al., 2009). Later, Ncube et al. (2014) underlined the difference in the population growth between the urban areas and

overall development. At the same time, the latter showed a negative impact on economic growth. Significantly, foreign direct investments (FDI) increased inequality in the labor market (Ncube et al., 2014). Interestingly, in the study of Adika, there is a positive and significant effect on economic growth. Nevertheless, savings and domestic investment more significantly contribute to economic development than FDI (Adika, 2022). However, Caraballo et al. (2017) argue that in developed countries, the level of unhappiness among the low-income population is lower than in developing ones (Caraballo et al., 2017). At the same time, social unrest is a characteristic of developing countries, since poverty in low-income countries is much more significant. On the contrary, governments in their management policies, are trying to achieve economic growth by using the mechanisms of monetary instruments to reduce income inequality, which harms economic development.

Other works studied the impact of inequality on economic growth in different factors. Thus, inequality negatively affects economic growth at a lower level of economic development, and there is a positive influence at a higher level of development (Lin et al., 2014). Other studies have analyzed the impact of income inequality alone. Firstly, across different countries, income inequality has a different effect on the economy of developing and developed countries, secondly, among the rural and urban populations, where also the rich and poor people are presented (Nguyen & Pham, 2018; Weber et al., 2005; Wenk & Hardesty, 1993). The assessment of the relationship at the regional level between the level of economic development (measured by GRP per capita) and various factors is given in the work on the example of China's provinces (Gao & Zhou, 2018). As a result, Pearson correlation coefficients between ECI and GRP per capita were calculated and evidence of a high correlation between these two indicators was obtained.

Provided literature review on economic growth revealed that inequality in income rates has a significant impact on the economic development in various countries. Thus, this paper presents the main theories and concepts of inequality's influence on economic growth, explaining the problems of inequality in countries, described in de-

tail in the above-mentioned scientific literature. Based on this literature review, it can be noted that the analyzed scientific theories explained the relationship between inequality and growth based on various regression analyses of cross-country growth. In general, many cross-country regressions are running over different datasets and periods with varying measures of income distribution. Research of several theoretical studies indicates the mechanisms of both positive and negative effects of inequality on economic growth.

Therefore, this paper aims to analyze the effect of inequality and income on economic growth at the level of regions of Kazakhstan. Based on the data from 1995 to 2020, this study analyzes the impact of inequality on economic growth (GRP), which is expressed by variables such as the interregional inequality index, the country inequality index, real incomes, and the Gini market index. For this purpose, assumptions were made that there is a positive relationship between the selected indicators. Thus, two main hypotheses are put forward in this study:

$H_0$ : *There is no relationship between indicators of inequality, income, and economic growth (GRP).*

$H_1$ : *There is a significant relationship between inequality, income, and economic growth (GRP) indicators.*

## 2. METHODS

The information basis of the research was the statistical data of Kazakhstan for 16 regions for 25 years from 1995 to 2020, available on the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of

Kazakhstan. The initial data of GRP, GRP per capita, and the average annual population indicators serve as a basis for calculations performed. Data interpretation is presented in Table 1.

The methodology of this study is based on the development of the concept of income inequality presented in the work of Cignano (Cingano, 2014). Result is expressed by assessing the impact of inequality and income on the dynamics of economic growth. The novelty of the research lies in the fact that the evaluation of the effect of interregional, country inequality, and income on economic growth was carried out in the example of Kazakhstan for the first time. Studies with a similar assessment were not found among many analyzed domestic and foreign works.

The present study, assessing the inequality and income impact on Kazakhstan's economic growth dynamics, includes two stages. At the first stage, Gini indices  $G_1$  and  $G_2$  are calculated on the basis of GRP and GRP per capita, respectively. At the second stage, the calculated Gini indices  $G_1$  and  $G_2$  are included in the regression equation. The two stages of evaluation are described in more detail below.

At the first stage, the Gini coefficients  $G_1$  and  $G_2$  are calculated. The essence of concepts of inequality consists of the following. The concept of interregional inequality focuses on the heterogeneity between regions in Kazakhstan. The indicator of inequality is based on statistical data on inequality that was calculated using the gross regional product obtained from household surveys in all regions of Kazakhstan, without considering the proportion of the population. Regions are used as the unit of observation in the calculation. To determine interregional inequality, the Gini coefficient ( $G_1$ ) is calculated using the formula (1) (Milanovic, 2005):

**Table 1.** Description of variables

Source: Compiled by authors.

Variable/Indicator	Explanation	Unit of measures
GRP	Gross regional product	KZT
GRP per capita	Gross regional product per capita	KZT
$G_1$	Gini index (unweighted population)	KZT
$G_2$	Gini index (population-weighted)	KZT
Rinc	Real income	KZT
Gini mark	Gini market	KZT

$$G_1 = \frac{1}{\mu} + \frac{1}{n^2} \sum_{i=1}^n \sum_{j>i}^n (y_j - y_i), \quad (1)$$

where  $G_1$  – coefficient of interregional inequality;  $y_j$ , and  $y_i$  – gross regional product (GRP);  $j$ ,  $i$ ,  $n$  – number of regions;  $\mu$  – average GRP.

In the concept of country inequality, the data on population size is also used instead of interregional inequality. The Gini coefficient ( $G_2$ ) for determining country inequality is estimated using formula (2):

$$G_2 = \frac{1}{\mu_1} + \frac{1}{n^2} \sum_{i=1}^n \sum_{j>i}^n (y_j - y_i) \rho_i \rho_j, \quad (2)$$

where  $G_2$  – coefficient of country inequality;  $y_j$ , and  $y_i$  – gross regional product per capita (GRP per capita);  $j$ ,  $i$ ,  $n$  – number of regions;  $\rho_i$  and  $\rho_j$  – share of population in regions  $j$  and  $i$  of Kazakhstan;  $\mu_1$  – average GRP per capita.

At the second stage, as in most empirical studies of growth factors, the Solow growth model was exploited (Binswanger, 2012; Baldassarri, 2017). The empirical equation for assessing economic growth is expressed as a linear function of real GRP per capita, inequality indices (country, interregional, market Gini indices), and real incomes. The regression specification is as follows:

$$\begin{aligned} \ln Y_t - \ln Y_{t-s} = & \alpha_1 \ln G1_{t-s} + \alpha_2 \ln G2_{t-s} + \\ & + \alpha_3 \ln RInc_{i,t-s} + \alpha_4 \ln Gini_{t-s}^{mark} + \mu_t, \end{aligned} \quad (3)$$

where  $i$  – region,  $(t - s)$  – time period (time lag) in  $s$  years,  $\ln Y_{i,t}$  – log of real GRP per capita in region  $i$  in period  $(t - s)$ ,  $\ln G1_{t-s}$  – log of interregional inequality index (unweighted by the population of regions) with lag  $s$ ,  $\ln G2_{t-s}$  – log of country inequality (weighted by population of regions) with lag  $s$ ,  $\ln RInc_{i,t-s}$  – log of real incomes (or their growth rates) of the population in the  $i$  region with lag  $s$ ,  $\ln Gini_{t-s}^{mark}$  – log of Gini market index (before tax) in Kazakhstan,  $\mu_{i,t}$  – standard error.

In the analysis frames, the Generalized Method of Moments (GMM) is used instead of Least Square Dummy Variable estimators (OLS). The GMM considers variations in inequality between regions within the country over time. This estimator provides a solution to the computational problems that are possible because of the presence of

a lag dependent variable ( $\ln Y_{t-s}$ ), the so-called “Nickell bias”.

The approach based on the GMM technique has several internal instruments that rely on the recent past data of chosen variables (inequality) and exploits multiple tests to check the validity of these instruments. They have been successfully applied in modern empirical research on the relationship between inequality and growth (Berg et al., 2018; Halter et al., 2014).

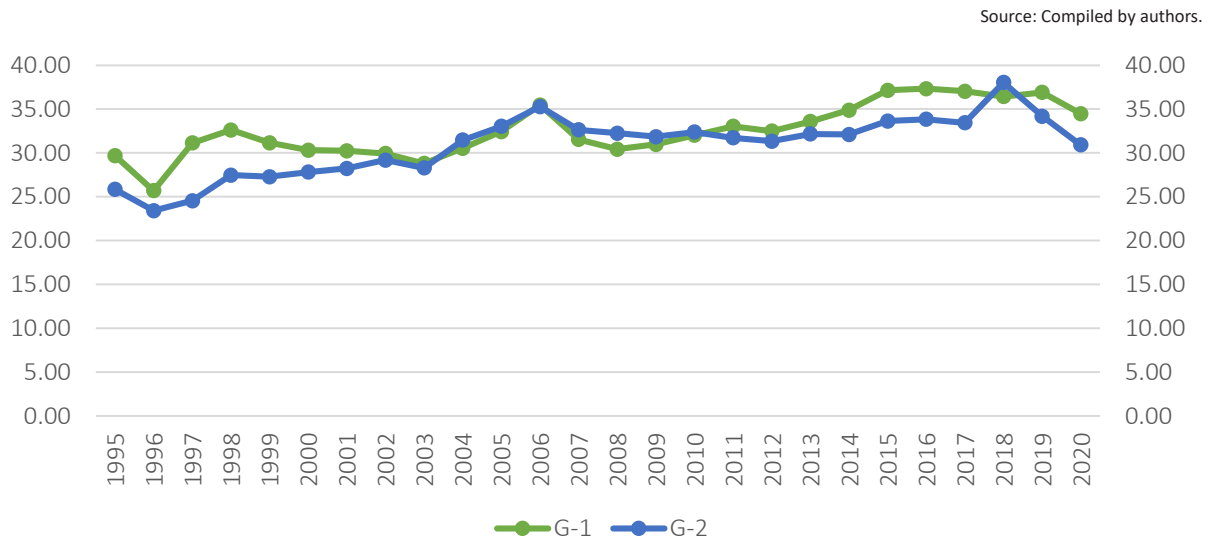
In addition, the Hansen test checking all instruments’ joint consistency was conducted (Roodman, 2009). The tests contain Arellano-Bond test for autocorrelation of residuals (which invalidates the use of lag values of potentially endogenous variables in the form of measures of their first differences).

### 3. RESULTS

*Results of the first stage.* Two required coefficients were determined when performing calculations based on formulas (1) and (2), respectively. The estimates were made in the following order. The initial data on GRP for 16 regions of Kazakhstan were ranked in ascending order separately for each year. Further, the smaller value was subtracted from the more considerable GRP value of two adjacent regions. The computations were carried out by an iterative method every 25 years separately. The coefficient of country inequality was calculated according to a similar algorithm but taking into account the share of the population of each region in the total population for 16 regions of Kazakhstan.

Further, the dynamics of calculated indices (coefficients in percentages) of interregional and country inequality for the period 1995–2020 are provided in Figure 1.

According to the data presented for 1995–2020, it can be seen that the gap between interregional inequality and country inequality is not significant. At the same time, the average indicators of both types of inequalities in the range of 24–29% fell in the period 1996–2003. In turn, in 2006, the



**Figure 1.** Dynamics of interregional ( $G_1$ ) and country's inequality ( $G_2$ ), in %

effect of convergence of the two indicators was observed. Further, the highest rates of interregional and country inequality were identified for 2015–2019. This can be explained by the economic consequences that occurred in Kazakhstan due to the devaluation of the national currency and the fall in energy prices. Surprisingly, both indicators showed downward trends from 2019 to 2020. Absolute country inequality ( $G_2$ ) during 1995–2006 mainly increased, then it is characterized by a downward trend until 2012. In subsequent years, there has been an increase in country inequality with a sharp rise in indicators in 2018 (38.04%) and an indicator decrease to 30.91% in 2020. Thus, it can be concluded that indicators  $G_1$  and  $G_2$  showed changes and fluctuations of a leaping nature.

If one considers the dynamics of nominal incomes on average per capita over the past 20 years, these indicators demonstrate a deepening of inequality between the regions of Kazakhstan. For the analyzed period by years and data presented, as of 2020, the highest indicators are shown by Atyrau (215,076 KZT), Nur-Sultan (174,396 KZT), Almaty (164,721 KZT), Mangistau (141,506 KZT), Karaganda (130,552 KZT) and Pavlodar (119,334 KZT). This can be explained by the presence of high incomes in Nur-Sultan and the financial center Almaty, as well as in regions with oil and gas and metallurgical industries. This is related to the increase in prices on energy carriers and metal products, which creates favorable conditions for

developing regions with a high share of the fuel industry and metallurgy working for export.

Average indicators have been found in the western (Aktobe 98,360 KZT, West Kazakhstan 112,319 KZT), northern (North Kazakhstan 103,292 KZT, Kostanay 105,856 KZT, Akmola 107,224 KZT), and eastern (East Kazakhstan 111,632 KZT) regions of Kazakhstan. Low rates are in the southern areas, where incomes do not exceed 100,000 KZT: Turkestan (63,443 KZT), Shymkent (75,725 KZT), Zhambyl (80,516 KZT), Kyzylorda (85,142 KZT), Almaty (86,606 KZT). The relatively low level of industrial development, the emphasis on agricultural sectors, combined with the rapidly growing population are causes of low rates in these regions.

Further, it is suggested to consider the indicators of average incomes of the Kazakhstan population (Table 2).

It should be noted that to analyze indicators of average nominal income per capita, data have been taken every five years from 2000 to 2020, the limitation of this study was the lack of data before 2000. According to the data provided, it can be seen that in 16 regions of Kazakhstan, there is an almost 24-fold increase in nominal income per capita, with a rise in the average regional value of 17.3 times. The smallest growth is observed in Mangystau and East Kazakhstan regions (around 9.5 times). In this case, the convergence effect is confirmed, developing regions have higher economic growth rates than de-

**Table 2.** Indicators of average nominal income per capita of Kazakhstan's population

Source: Bureau of National Statistics (2020).

Regions	The average nominal income per capita of the population. KZT					
	2000	2005	2010	2015	2020	2020/2000 ratio
Akmola	4817	11443	31169	56579	107224	22.3
Aktobe	6916	16982	36356	60921	98360	14.2
Almaty	3712	9486	26476	53860	86606	23.3
Atyrau	15056	39197	82662	123202	215076	14.3
West Kazakhstan	6555	17873	43556	64317	112319	17.1
Zhambyl	3245	9101	28333	43143	80516	24.8
Karaganda	7769	15561	40701	66841	130552	16.8
Kostanay	5472	12574	30514	55399	105856	19.3
Kyzylorda	4678	12385	34653	49400	85142	18.2
Mangystau	14906	35713	59909	101302	141506	9.5
Turkestan	3049	8206	23280	35830	63443	20.8
Pavlodar	7481	15326	38396	66488	119334	16.0
North Kazakhstan	5105	11405	31478	54653	103292	20.2
East Kazakhstan	7418	12793	33101	55392	111632	9.4
Nur-Sultan city	11936	32738	67172	128956	174396	15.3
Almaty city	11382	29347	67190	111530	164721	14.5
Shymkent city	–	–	–	–	75725	–
Highest Income / Lowest Income	4.9					3.4

veloped. It can be concluded that the gap between the maximum and minimum values in 2000 was 4.9 times, in 2020 – 3.4 times, which indicates a significant reduction in inequality and equalization of population incomes.

*Results of the second stage.* A factor analysis was performed at this study stage, and the Solow growth model was exploited. Based on formula (3),

an assessment was made of the effect of selected factors on economic growth, namely, the economic growth assessment equation is expressed as a linear function of real GRP per capita, inequality indices (country, interregional, market Gini indices) and real incomes. All initial data for calculating the level of impact of interregional, country inequality, and income were obtained using the STATA software package and then summarized in Table 3.

**Table 3.** Regression analysis results for regions with income data (lag 1) (all models are consistent)

Source: Compiled by authors.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
L.InGINI1	0.105 (0.108)	-0.00492 (0.147)	-0.0463 (0.0696)	0.399*** (0.124)	
L.InGINI2	0.548** (0.216)	0.515*** (0.158)	0.909*** (0.216)		0.610** (0.212)
L.InReal_Income	0.0613 (0.0798)	-0.191** (0.0709)		0.0795 (0.0778)	0.0673 (0.0745)
L.Ingini_mkt	1.585 (1.424)		-1.689 (1.534)	1.946** (0.805)	1.895* (0.979)
Constant	-7.936 (5.399)	-0.357 (0.663)	4.361 (5.476)	-8.615** (3.399)	-9.014** (3.482)
Observations	287	287	287	287	287
Number of regions	16	16	16	16	16
Hansen test <sup>a</sup> (p-value)	0.573	0.541	0.565	0.549	0.534
Arellano-Bond test for AR(2) <sup>b</sup> (p-value)	0.640	0.658	0.523	0.665	0.767

*Note:* Dependent variable is GRP per capita,  $[t-(t-1)]$  is a 1-year period. All models are estimated by System GMM using a robust, two-step method. All regressions include country and period dummies Robust standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , and \*  $p < 0.1$  indicate significance at the 1%, 5% and 10% level, respectively. <sup>a</sup> The null hypothesis is that the over-identifying restrictions are valid. <sup>b</sup> The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.



Model 1 represents the original specification, including all variables (interregional and country inequality indices, real income, pre-tax market Gini index). Models 2-5 are built by taking into account the exclusion of one of the predictors. For instance, model 2 does not contain the Gini market index ( $G_{mark}$ ), model 3 does not contain real income RInc and so on. Empirical results show that inequality positively affects the growth of Kazakhstan's GRP per capita.

Model 2 confirms that there is a significant relationship between country inequality, real income and economic growth. The coefficient 3 is negative and statistically significant, reflecting that with an increase in income by 1%, real GRP per capita will decrease by 0.2%. The coefficient 2 is positive, statistically significant, and means that the growth of country inequality by 1 point will contribute to an increase in Kazakhstan's GRP by 0.5%.

Models 1, 3, and 5 demonstrate a significant positive impact of country inequality on economic growth. Model 4 is characterized by the positive effects of interregional and market inequality. To confirm the nature of the inequality impact on economic growth, an additional study was conducted, where real incomes are replaced by real wages of the Kazakhstan population. The results of the study are provided in Table 4.

Similar to the previously presented results (for regions with real incomes), model 1 contains an initial specification with the following variables: indices of interregional and country inequality, real wages, and Gini market index before tax. In models 2-5, one of the variables is excluded.

The results of data analysis show a positive relationship between country inequality and GRP per capita growth. Models 1, 2, 3 and 5 show a relationship between country inequality and economic development. While model 4 reveals the relationship between interregional inequality and GRP growth of Kazakhstan.

According to model 5, country inequality and real wages positively affect economic growth. The coefficient 3 is positive and statistically significant, meaning that with a 1% increase in wages, real GRP per capita will increase by 0.4%. The coefficient 2 is positive, statistically significant, and reflects that an increase in country inequality by 1 point will be accompanied by an increase in GRP of Kazakhstan by 0.5%.

All obtained models are consistent and have (though not very high) significant explanatory power. In addition, the data in Tables 2 and 3 reflect the fixed effects for all five models. The applied robust estimates indicate the significance of

**Table 4.** Regression analysis results for regions with wage data (lag 1) (all models are consistent)

Source: Compiled by authors.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
L.InGINI1	0.0820 (0.0988)	0.0346 (0.150)	-0.0463 (0.0696)	0.348*** (0.0942)	
L.InGINI2	0.509** (0.230)	0.537*** (0.160)	0.909*** (0.216)		0.526** (0.186)
L.InReal_Wage	0.318* (0.158)	-0.157 (0.123)		0.345** (0.141)	0.366*** (0.120)
L.Ingini_mkt	2.768* (1.310)		-1.689 (1.534)	3.212*** (0.968)	3.105** (1.343)
Constant	-13.75** (5.110)	-0.508 (0.867)	4.361 (5.476)	-14.84*** (4.089)	-15.10*** (5.116)
Observations	287	287	287	287	287
Number of regions	16	16	16	16	16
Hansen test <sup>a</sup> (p-value)	0.584	0.559	0.565	0.559	0.571
Arellano-Bond test for AR(2) <sup>b</sup> (p-value)	0.733	0.726	0.523	0.729	0.899

Note: Dependent variable is GDP per capita,  $[t-(t-1)]$  is a 1-year period. All models are estimated by System GMM using a robust, two-step method. All regressions include country and period dummies Robust standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  indicate significance at the 1%, 5% and 10% level respectively. <sup>a</sup>The null hypothesis is that the over-identifying restrictions are valid. <sup>b</sup>The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

included factors. All models confirm the relationship between inequality and Kazakhstan's economic growth. Thus, the alternative hypothesis is accepted and approved based on the study, and the null hypothesis is rejected.

## 4. DISCUSSION

The impact of income inequality on economic growth is significant but depends on various factors. In addition, there are different views on the economic consequences of inequality in many works. Therefore, the purpose of this study is to assess the impact of inequality on the growth of the economy of Kazakhstan. It was rightly noted that social unrest is characteristic of developing countries, since poverty in low-income countries is much more significant (Caraballo et al., 2017). Since the results of the analysis of the average nominal income per capita have shown that in developed regions, there is a relative reduction in inequality and equalization of incomes of the population, and in some regions, equalization measures are still required.

The factor analysis carried out in this paper confirmed that the structures of country and inter-

country growth impact inequality in the economy. Thus, positive and negative results of the impact of economic growth on inequality were found. Some research works found a negative effect of inequality (Dusek et al., 2014; Halter et al., 2014), others proved the existence of positive results depending on the level of a country's development (Barro, 2000; Lin et al., 2014), on unequal distribution due to the process of urbanization (Ros, 2000; Glaeser & Mare, 2001), on the characteristics of demographic indicators (Bloom & Finlay, 2009; Liu & McKibbin, 2020). The range of observations of the method of moments (GMM) showed a positive impact on the economic growth of a demographic indicator, such as real wages. At the same time, for most of the sample, the estimated effect of inequality has a positive impact on the growth of Kazakhstan's GRP per capita.

Besides, in the future, the problem of inequality's impact on economic growth requires the study of additional parameters and the inclusion of various factors in growth models. In particular, the econometric model should be supplemented with factors such as the population's level of education and qualifications, knowledge economy, and health capital.

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## CONCLUSION

This paper examined the impact of inequality on the growth of Kazakhstan's economy. The objectives of this study were to analyze the trend of inequality in Kazakhstan, expressed by Gini indices, to examine the dynamics of population incomes over the past 20 years, as well as to estimate the effect of inequality, both interregional and country, and income on the growth of country's economy.

It was identified at the first stage that the gap between interregional inequality and country inequality is insignificant. In addition, the average indicators decreased in the period 1996–2003, which is characteristic of the state policy to stimulate economic growth. In addition, in 2015–2019, the highest indicators of interregional and country inequality were revealed. This can be explained by the economic consequences in Kazakhstan due to the devaluation of the national currency and the fall in energy prices.

It was found at the second stage that there is the relationship between inequality, income, and economic growth. It is noteworthy that in models with real incomes, an increase in income has a negative impact on the development of Kazakhstan's economy. With income growth of 1%, real GRP per capita will decrease by 0.2%. The growth of country inequality by 1 point will increase Kazakhstan's GRP by 0.5%. In models with real wages, the opposite effect is observed. Namely, an increase in real wages positively affects the country's economic growth. With a 1% rise in wages, real GRP per capita will increase by 0.4%. All models demonstrated a positive link between inequality and economic growth. In general, the hypothesis of this study about the impact of inequality and income on the economic growth in Kazakhstan is confirmed by empirical calculations.

In conclusion, the correct assessment of factors and causes of inequality is of great importance for the development and implementation of the modernization strategy and management of Kazakhstan. When considering regional policy, policymakers and those who evaluate the success of regional policy should be aware that conclusions may depend on timely taken measures. Therefore, future research can develop in two different, albeit interrelated, directions: firstly, the study of the causes of inequality between regions, and, secondly, the impact of the level of GRP on the differentiation of incomes of the population to determine the further policy of the regional development management.

## AUTHOR CONTRIBUTIONS

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