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Capital Income and Growth Dynamics as Determinants of Income Distribution:Evidence from Kazakhstan

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ABSTRACT

Given the high dependence of Kazakhstan's economy on capital-intensive industries, the importance of analyzing income distribution and the factors that determine the strengthening or weakening of economic inequality is increasing. The purpose of this study is to analyze the dynamics of income distribution in Kazakhstan by comparing the rates of return on capital and economic growth. The research methodology is based on Piketty's conceptual framework and includes constructing integral indicators of return on capital (r-index) and economic growth (g-index) from normalized macroeconomic and industry indicators. The empirical base of the study comprises official statistical data from the Bureau of National Statistics of the Republic of Kazakhstan for the period 2010-2024. The results showed that in 11 of the 15 analyzed years, economic growth outpaced the return on capital ($g > r$), indicating a more balanced income distribution. During 2010-2016, the gap between the g-index and the r-index remained positive, peaking at +0.42, reflecting the dominance of economic growth over capital incomes. In 2017-2018 and in 2020. The return on capital exceeded economic growth, with the difference reaching -0.08, indicating an increase in income inequality and income concentration in capital-intensive sectors. The directions of future research relate to the possibility of using the r–g approach to monitor the distributional effects of macroeconomic policy, as well as to expanding the analysis at the regional level and including institutional factors of income redistribution.

KEYWORDS: Economy, Resource Economy, Income Economics, Distribution, Income Distribution, Income Concentration, Inequality, Labour Productivity

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1. INTRODUCTION

Today, the state's primary goal is to establish a sustainable socio-economic model. Income distribution is an equally important factor. A market-based economy dictates its own terms, placing the return on capital at the forefront. Meanwhile, the economies of many countries are undergoing radical changes, accompanied by a profound economic crisis. Stagnation of economic processes ultimately leads to an income gap between different socio-economic groups. The state plays a significant role, with one of its key tasks being to compensate for market failures.

The majority of studies focus on issues related to income distribution and are limited to the use of aggregated indicators of inequality and to the relationship between labor and capital income (Bengtsson & Waldenström, 2018; Saez & Zucman, 2020). Nevertheless, the impact of the ratio of return on capital to the rate of economic growth on the income distribution remains insufficiently studied, as does who wins and at what expense in different periods. Income distribution is a central issue that fuels social tension and determines access to basic needs, including education, healthcare, housing, public goods, and employment opportunities. The greater the income inequality, the greater the social tension. At the same time, it affects the level of the population's trust in the state. Thus, the population, particularly the poor, perceives the economic system as incapable of providing fair conditions for development.

After the COVID-19 outbreak, in the majority of countries, the HDI has been undergoing tremendous changes due mainly to the decline in income, education gap, and limited access to medicine. In Arab States, the HDI declined due to unemployment and education costs. In East Asia and the Pacific, the main reason was mobility restriction, which affected the production chain and employment. In South Asia, a low level of digitalization and access to digital artefacts, and limited access to secondary education, affected the expected duration of education. In Sub-Saharan Africa, limited access to medicine and the deepening of economic vulnerability decreased the HDI. In Latin America and the Caribbean, the leading causes were inflation and unemployment, which reduced household income. In Europe and Central Asia, the key reasons were a decline in real income and an increase in social inequality (UNDP, 2025a). In 2024, Kazakhstan ranked 67th on the Human Development Index (UNDP, 2025b). The results showed that Kazakhstan declined significantly in two positions. First, gross national income per capita is explained mainly by economic stagnation, a weakening of the national currency, and price fluctuations in the oil and gas industry. Second, the reduction in the expected length of education. It can therefore be assumed that higher education is becoming less accessible for the current generation. In the future, there is a high likelihood that the labor market will experience a shortage of qualified human capital.

Income distribution analysis involves comparing the dynamics of capital income and economic growth rates. If the capital income increases faster than aggregate output and productivity, then income growth is concentrated among capital owners (Autor et al., 2020; De Loecker et al., 2020). On the contrary, in conditions of rapid economic growth, this affects a wider range of economic sectors. Therefore, the ratio of the rate of return on capital to the rate of economic growth is used in the study as a basis for assessing changes in income distribution.

Kazakhstan is a clear illustration of the suggested approach, given the high share of the raw materials sector in the economy and the dependence of income on external price fluctuations. The significant concentration of profits in capital-intensive industries, primarily oil and gas production, leads to changes in the return on capital that do not always align with changes in employment, labor productivity, and domestic demand (World Bank, 2024). Under these conditions, comparing r and g indicators allows for a more accurate assessment of the periods in which economic growth was accompanied by an expansion of

the revenue base, and those in which capital owners benefited (Iacono & Palagi, 2023; Jakurti, 2025).

Income distribution is a basis for a sustainable economy and for maintaining social peace. Limited access or inability to provide the population, especially minorities, with basic needs, such as education, medicine, and living standards, increases social unrest and becomes one of the key reasons for riots. Governments pursue the goal of providing public goods, increasing income, and ensuring the equal distribution of resources to help the population meet basic needs. Therefore, the purpose of this study is to analyze the dynamics of income distribution in Kazakhstan by comparing the rates of return on capital and economic growth.

2. LITERATURE REVIEW

Income distribution is defined in different ways. Alesina and Perotti (1996) defined income distribution as a determinant of political stability. Mainly because it affects social unrest and the risk of forced destabilization. According to Levin and Bigsten (2000), income distribution is a specific mechanism for human capital accumulation and institutional constraints. Timmer (2000) and Sakaki (2017) defined it as a macroeconomic strategy element aimed at achieving a sustainable economy. Equal distribution of income is a critical factor in achieving sustainable development, while unequal distribution limits the potential for long-term economic expansion. Checchi and García-Peñalosa (2008) related income distribution to the labor market. The authors stated that different countries have different systems, leading to differences in the labor market. For instance, in some countries it is easier to find a job, in others, employees' rights are not protected, and there is either a centralized wage system or a negotiated compensation system. As a result, there are differences in income. Moreover, an even distribution of income favors sustainable development and consumption-based growth as more people can buy goods and services. When incomes are not too concentrated, there are fewer surges in demand, fewer sharp declines in consumption, and less risk of crises. This creates a broader circle of buyers rather than a small, wealthy group (Sakaki, 2019). Saipudin (2024) stated that a moderate difference in income is characteristic of developed countries as they have strong institutional foundations. In contrast, in developing countries, inequality limits human capital and reduces growth rates (Saez & Zucman, 2020). The distributional impact is determined by access to education, the quality of institutions, and the economy's ability to provide mobility.

Existing studies on the income distribution in the economy focus on identifying the sources of income growth and analyzing the groups that accumulate it (Autor et al., 2020; De Loecker et al., 2020). In particular, several studies define the distinction between income associated with capital and income generated by general economic growth as the key factor. In these studies, income related to capital corresponds to the dynamics of return on capital (r-index). In contrast, income generated by overall economic activity reflects the dynamics of economic growth (g-index). Behringer and Van Treeck (2018) and Ramachandran et al. (2018) suggested that rising capital incomes can increase the gap between population groups even when the overall economy is performing well. Piketty et al. (2019), drawing on China's experience, stated that accelerated capital accumulation and rising incomes for asset owners lead to inequality, as income from capital grows faster than the economy. Bilan et al. (2020) and Ladykova et al. (2023) showed that an equal or balanced income distribution is one in which economic growth is accompanied by expanded employment, increased productivity, and rising household incomes, not just business profits. At the same time, Jackson and Victor (2021) found that economic growth has no significant impact on the well-being of the majority of the population when the return on capital exceeds economic growth. Therefore, for the analysis of

income distribution, it is important to consider the dynamics of capital income (r-index) and economic growth (g-index).

Some studies examine income distribution and income sources by comparing how capital income (r) and economic growth rates (g) change over time. For example, Piketty and Zucman (2014) found that the rise in inequality is associated with changes in the ratio of private capital to national income. When economic growth slows, even moderate savings rates increase wealth-income ratios. At the same time, the role of capital income in aggregate income increases. In this case, the analysis is based on the dynamics of key macroeconomic indicators to track long-term changes, where r and g are considered as equal categories reflecting different sources of income (Piketty, 2015). Strauss and Ventosa-Santaularia (2023) showed that the influence of r-g manifests in the dynamics of indicators; the gap between r and g explains a significant share of the long-term increase in inequality. Abatemarco et al. (2025) have considered r-g as one of the stable distribution mechanisms. During periods when capital returns exceed economic growth rates, a systematic redistribution of income in favor of asset owners occurs.

The use of r-g indices is based on a comparison of the dynamics of capital income and economic growth. Piketty (2014) emphasized that inequality analysis should rely on observing how different forms of capital income and growth indicators change over time. Thus, the indicators that form r and g are considered equal sources of information on income and growth, since assigning weights distorts the relationship between r and g. Atkinson (2015) and Milanovic (2016) take a similar position, noting that the use of weights in calculating aggregate indices assumes that some indicators are inherently more important than others. In contrast, in the analysis of income distribution, it is important to track the actual change in each component (Iacono & Palagi, 2023; Jakurti, 2025). Consequently, the use of the entropy method, which assigns weights to each indicator, will smooth the data and obscure the actual differences in the dynamics of capital income and economic growth.

There exist different approaches to the analysis of equal distribution, which conclude that it is a condition for sustainable development, an effective economy, and justice. Four key fundamental principles are suggested. Cooperative efficiency regards income equality as the key condition for cooperation, trust, and efficiency (Schmidt, 1993). An excessively diversified market undermines trust. Equality motivates participants in the labor market to participate in activities. Therefore, equal income distribution ensures socio-economic sustainability in a globally competitive environment. The space of possibility states that an equal distribution eliminates barriers to self-development. According to Sen (2000), equality and justice require access to opportunities, including health, education, and social protection. Therefore, expanding opportunity increases productivity and limited to the use of aggregated indicators of inequality (Bengtsson & Waldenström, 2018). According to egalitarianism, social legitimacy and collective expectations explain that equal distribution is fair when society considers it morally justified and acceptable. Van der Waal et al. (2010) stated that equal distribution arises from collective expectations. This, in turn, affects people's willingness to support state programs for minority support.

Another principle is limiting market risks and excessive advantages, based on the understanding that inequality needs to be constrained. In particular, wealth should not exceed limits that undermine fairness, and income disparities should remain within socially acceptable limits. Vail (2010) developed the egalitarian principle that people should not be entirely dependent on how the market changes. The main idea is that the priority of needs is over profitability, even in periods of economic crisis, everyone has access to basic needs (education, medicine, and accommodation). When the gap becomes too large, fair rules disappear. Excessive inequality undermines public trust, since society relies on

the feeling that everyone has a chance. Green (2013) developed the Rawlsian principle, which states that excessive advantages for the rich destroy the sense of fairness and equal rules for everyone. Income differences are permissible if they improve the situation of those at the bottom; otherwise, such differences must be limited. Franke (2021) stated that equality must also be considered in the process when making decisions about income distribution and access to basic needs, regardless of wealth, family, connections, status, or a person's starting opportunities. Gökçekuyu (2024) stated that random differences must be compensated to ensure that everyone has equal opportunities. Therefore, natural abilities, family background, and social starting positions should not be the basis for differences in access to resources. In particular, there should be no more opportunities for those who were born into a wealthy or educated family or who have good natural abilities.

Numerous studies have examined income distribution and found that an analysis of inequality should consider the overall dynamics of the economy, the structure of accumulated capital, and return on capital generated by the private sector. Shaikh (2017) to analyze the difference between labor and capital income based on the profit share, wage share, and property income. The results showed that income growth is driven by increases in the share of profits and the concentration of capital. Mechling et al. (2017) and Cowell and Flachaire (2024) found that the wealth of the wealthy population grows much faster than expected under the Piketty principle. Moreover, they receive a much larger share of total income with an annual steady increase. Actual wealth concentration is higher, and inequality is more severe. Peterson (2017) included macroeconomic indicators such as real GDP, GDP per Capita, and population growth. Demographic changes affect long-term income and access to economic opportunities, as a decline in population growth increases income concentration and reduces the share of labor income. Stirati (2017) used profit share, wage share, capital–output ratio, and net operating surplus and showed that the primary distribution of income is regulated by institutional factors rather than by market mechanisms. However, the author's main point was that the share of income going to owners of capital is crucial. If the share of capital grows faster than income from labor, then the distribution of income becomes more uneven. Davis (2020) focused on macroeconomic factors (GDP, labour productivity) and the mining sector, using oil rents, mineral extraction output, refined petroleum output, and commodity price indices. The authors underlined the importance of the mining sector because the volatility of the raw materials sector affects the distribution of income and the concentration of rents. As a result, wealthy populations increase their capital along with the increase in oil and gas industry profits.

In Kazakhstani studies, social and socio-economic indicators are considered the main factors reflecting the population's income level. For example, Ashirbekova et al. (2023) examined the dynamics of income, employment, and social standards, and their separate impacts. A similar approach was applied by Zeinolla et al. (2025), which assesses income, employment, and education indicators in regions and requires separate analysis. Turchekenova et al. (2021) also rely on an analysis of the dynamics of individual macroeconomic and social indicators, such as economic growth, financial development, investment, and education, assessing their impact on income inequality. These studies allow us to track changes in individual socio-economic indicators; however, they address the relationship between capital income and overall economic growth to a lesser extent.

Most studies consider indicators related to capital returns and economic growth separately. This makes it difficult to trace how the changing balance between capital returns and economic growth shapes the distribution of income over time. In this article, the r- and g-indices are constructed based on aggregate indicators. In order to consider the contribution of each component, all indicators are treated as equally important sources of information. This

approach is crucial for Kazakhstan's economy, as a significant portion of revenue is generated in capital-intensive industries, primarily the extractive sector.

The use of normalized and equally weighted indicators allows us to track how individual components of capital revenue and economic growth change over time, without distorting their contribution by artificially inflating the importance of individual variables. Therefore, to interpret inequality, it is necessary to consider indicators that reflect economic development, the growth of private capital, changes in its profitability, and redistribution in favor of asset owners.

3. METHODOLOGY

The current research is based on the framework suggested by Piketty. The main idea of the "r > g framework" is to analyze the disproportions revealed by comparing returns on capital growth with those on economic growth. The framework predicts that return on capital (r-index) can grow faster than economic growth (g-index). When there is growth in return on capital, the owners of such assets as enterprises, shares, and private capital double their wealth, which means an unequal distribution of resources. Consequently, the gap between the rich and the rest of the population increases. A more equal distribution is expected when the economy's growth exceeds the growth in return on capital.

The application of the r–g approach involves comparing the dynamics of capital income and economic growth, as processes of change in each component. Based on the conducted literature review, for income distribution, the use of weighting coefficients can distort the interpretation of the relationship between capital income and overall economic dynamics, since it implies a hierarchy of indicators. Thus, in the works of Piketty (2014), Atkinson (2015), and Milanovic (2016), it is shown that the basis of this approach is the dynamics of r and g. A similar approach was observed in the studies of Ashirbekova et al. (2023), Turchekenova et al. (2021), and Zeinolla et al. (2025), where socio-economic indicators were considered separately, without aggregating weights, to preserve the interpretability of the results.

Thus, to maintain transparency and comparability of results, data normalization and simple aggregation are a priority (OECD, Handbook on Constructing Composite Indicators, 2005). Therefore, data normalization and simple aggregation were used to align the data on a standard measurement scale, preserving the economic structure of the r–g comparison while avoiding bias in the contribution of individual indicators.

The data was collected from the official data resource, the Bureau of National Statistics, and covers the period from 2010 to 2024. In accordance with Piketty's framework, the following indicators were selected (Table 1).

Table 1. The following indicators were used in the analysis

Indicator	Unit of measurement	Assigned index
Net profit / mixed income	Million KZT	r-index
Crude oil and natural gas extraction; technical services for mining	Index (%, previous year = 100)	r-index
Refined petroleum products output	Index (%, previous year = 100)	r-index
Mining industry output	Index (%, previous year = 100)	r-index
Consumption of fixed capital	Million KZT	r-index
Real GDP volume index (production approach)	Index (%, previous year = 100)	g-index
Labour productivity index	Index (%, previous year = 100)	g-index
GDP per capita	KZT per capita	g-index

Note: compiled by the authors

The suggested approach will help evaluate changes in the income distribution. If the r > g condition is sustainable, it indicates growth in income inequality. If the r < g condition holds, it indicates a more balanced distribution. Therefore, the indicators were divided into two groups representing the r-index and the g-index. The main formula of the approach is the following (1):

$$r > g \qquad (1)$$

where:

r – rate of return on capital;

g – economic growth rate.

To conduct the analysis, the data was initially normalized and for this purpose there was used "Max-Min" method to aggregated r and g indexes. The calculations were conducted based on the following formula (2):

$$x_t^{norm} = \frac{x_t - \min(x)}{\max(x) - \min(x)} \qquad (2)$$

where:

x_t – the observation of the indicator in year t;

max(x) – the maximum values of the indicator over the entire observation period;

min(x) – the minimum value of the indicator over the entire observation period.

Traditionally, the normalization method aggregates yearly indices. In the current research, the goal was to reveal the difference between the two indices, rather than the difference in yearly dynamics. To quantitatively assess the relationship between capital income and economic growth, the indicators were grouped into two blocks, corresponding to the r-index and g-index. All original indicators are normalized to ensure comparability across differences in units of measurement. Additionally, due to differences in data measurement, normalization was conducted for each indicator separately (as a single indicator) to maintain the relative dynamics of change.

After normalization, the indicator values were aggregated into integral indicators r-index(t) and g-index(t). The calculations were conducted based on the following formula (3):

$$r/g_{index(t)} = \frac{1}{n}\sum_{i=1}^{n} r/g_i^{norm}(t) \qquad (3)$$

where:

$r_{index(t)}$ – the integral return on capital in year t;

$g_{index(t)}$ – the integral of economic growth in year t;

n – the number of indicators included in the index calculation;

i – the ordinal number of the component indicator within the index (from 1 to n);

$r/g_i^{norm}(t)$ – the normalized value of the i-th indicator, after min-max scaling.

For the r-index, five capital-dependent indicators were included (n = 5). These indicators capture different dimensions of returns on capital and were aggregated into an integral r-index. For the g-index, three macroeconomic growth indicators were included (n = 3). These indicators reflect the dynamics of overall economic growth and were aggregated into an integral g-index.

The proposed methodology will enable the identification of structural changes in income-generation processes. Grouping indicators into r and g blocks and then aggregating their normalized values allows for a transparent assessment of the extent to which income dynamics are driven by capital accumulation or by the overall expansion of economic activity. This approach enables the analysis of long-term trends in income distribution and the identification of periods of increasing inequality or more balanced development.

4. RESULTS

To assess the dynamics of income distribution, it is important to analyze and compare the r-index and g-index values, and to examine the behavior of the indicators that make up the indices to identify key economic trends. This section examines the dynamics of the r-index components, then the indicators that make up the g-index, followed by a summary

of the comparison of r and g and an interpretation of the identified periods of increasing and decreasing inequality. Figure 1 shows results for r-index-forming indicators.

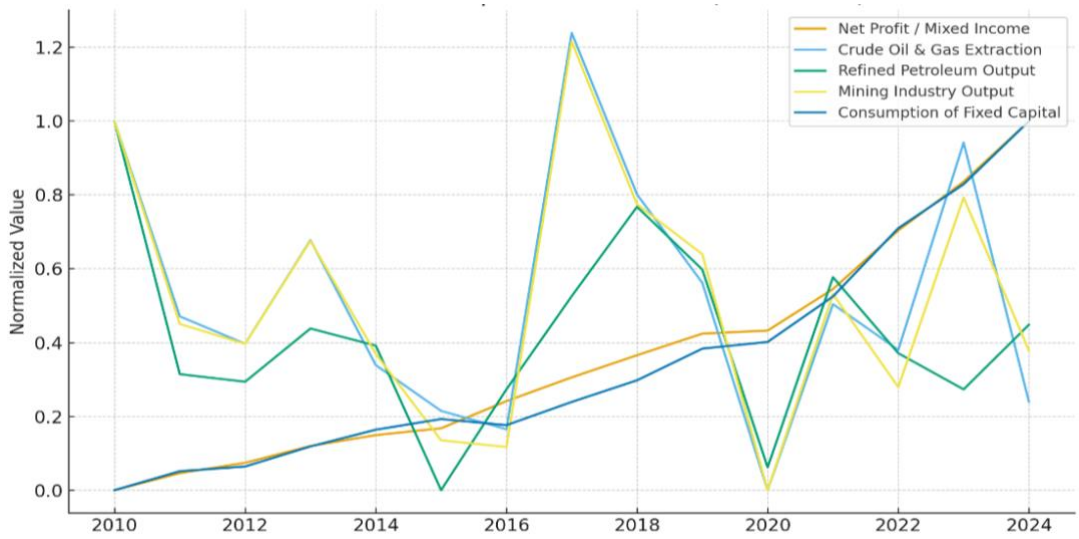

Figure 1. Dynamics of return on capital indicators (r-index) in Kazakhstan for 2010-2024

In the r-index, two groups of indicators can be distinguished. The first group includes industries related to raw materials, which have relatively similar dynamics. These industries are dependent on the global commodity prices, demand for oil and metals, export channels, and investment in production. The period 2011-2012 repeated the state of the world economy, slowdown of the economy after the economic crises in 2008 and 2009. A relatively similar situation is recorded in 2015 and 2016, when world commodity prices declined dramatically, almost twofold (from 100 USD to 30/40 USD). In Kazakhstan, at the same time, the following were observed: a reduction in production, in oil refining, and in the output of mining products. Therefore, the return on income declined sharply, and production stagnated. In 2017, exports increased significantly, and Kashagan began to improve its exports. Raw materials-related industries began to improve their positions. However, such improvement was temporary, and after COVID-19, Kazakhstan's dependence on world markets was extreme in 2020. The industrial activities and logistics, including air cargo, were blocked. Demand for oil and gas decreased significantly worldwide. After 2021, a gradual strengthening of the global economy was observed, and prices for raw materials began to rise, with worldwide exports recovering. However, there were also fluctuations, with a temporal increase from 2022 to 2023 and a decline in 2024.

The second group included macroeconomic indicators with similar behavior. Between 2010 and 2016, economic development increased gradually, followed by stability. In 2016, there was an insignificant decline that external factors could explain. Then, until 2020, macroeconomic indicators continued to increase steadily. After 2020, the dynamics for the second group of indicators were more active. Thus, it can be assumed that corporate growth was steady as well, and companies were improving production efficiency, adopting technological innovations, and focusing more on non-raw materials production. Corporate profit is distributed throughout the economy, as it comprises other sectors (trade, transportation, finance, etc.). Therefore, in the event of one sector's failure, the rest continue to develop and process. The increase in consumption of fixed capital showed that, overall, there was an increase in buildings, machinery, equipment, and infrastructure in Kazakhstan. The more assets are used in the

economy, the higher the capital consumption. Overall, the macroeconomic indicators increased significantly throughout the observed period.

The dynamics of the r-index components showed that capital income has been more volatile than economic growth indicators. Strong fluctuations were observed in oil and gas production, mining output, and petroleum product manufacturing. Consequently, the r-index components are directly dependent on global commodity prices, export demand, and the state of international supply chains. Moreover, declines in these components were observed during periods of falling global oil prices in 2015–2016 and in 2020 amid restrictions on international trade and transport flows. As a result, production volumes declined, and incomes in capital-intensive sectors declined. During years of global economic recovery and growth in export deliveries, the increase in normalized capital indicators occurred more rapidly than in overall macroeconomic indicators. Thus, concentration occurs in specific sectors of the economy, resulting in an uneven distribution of economic growth and rapid income accumulation in capital-intensive activities.

Next, the dynamics of the g-index indicators are shown in Figure 2.

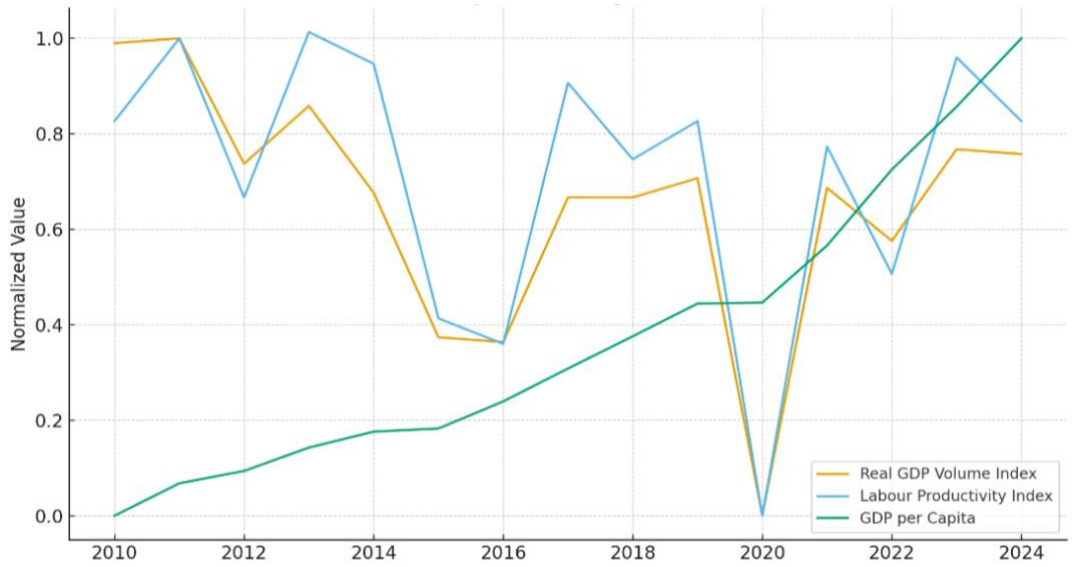

Figure 2. Dynamics of economic growth indicators (g-index) in Kazakhstan for 2010-2024

The results for the G-index showed that the absolute GDP volume index and и labour productivity index had similar trends. Between 2010 and 2014, moderately high values were recorded. After the global crisis, Kazakhstan's economy recovered and maintained sustainable development. However, there was a gradual decline in 2015-2016, most likely due to declining oil prices, reduced exports, and poor investment. Consequently, GDP volume declined similarly, as enterprises depend on production volume. Between 2017 and 2019, there was a temporary recovery. In 2020, following COVID-19, there was a dramatic decline in economic activity, including a reduction in employment and working hours, as well as a halt in mass production. However, as before COVID-19, the Kazakh economy began to develop in non-raw-material production, and the recovery process was relatively fast. From 2021 to the end of the period, both indicators showed a steady increase. At the same time, GDP per capita showed an opposite trend. Throughout the period, from 2010, a steady increase was recorded. Even after COVID-19, the decline was insignificant. Therefore, the GDP per capita is conditioned not only by the production output. Another condition is a

general increase in nominal GDP, which can be driven by inflation, wage growth, economic diversification, the expansion of the service sector, and increased government spending.

The g-index has two regimes, volatile growth (short-term) and income stability (long-term). The short-term is sensitive to external factors, rapidly increases during favorable periods and declines during world crises. The long-term ensures gradual growth and sustainable development. Moreover, the long-term regime contributes to sustainable development.

An analysis of the g-index components revealed differences in the dynamics of economic activity indicators and household income levels, revealing sensitivity to economic changes with varying speed and intensity. Real GDP volume and labor productivity were susceptible to changes in external factors, including fluctuations in commodity prices, investment activity, and restrictions on economic activity during crisis years. A decline was observed in 2015–2016 and in 2020 among the components, due to a reduction in production, employment, and business activity. Moreover, production volume and labor productivity directly depend on enterprises' current economic activity. Therefore, during periods of deteriorating external conditions, output and employment decline quite rapidly. At the same time, the GDP per capita indicator was more stable, due to the influence of nominal income growth, government spending, population changes, and the expansion of the service sector. As a result, short-term economic shocks have a greater impact on production activity, while household income indicators react less sharply and recover gradually as the economy adapts.

Next, Table 2 presents the overall results of the r-index and g-index comparison.

Table 2. Results of the r-g principle

Year	R-index	G-index	Δ = g − r	Interpretation
2010	0,6	0,605522	+0,005522	More Equal Distribution
2011	0,266702	0,689272	+0,422570	More Equal Distribution
2012	0,245053	0,499265	+0,254212	More Equal Distribution
2013	0,40595	0,671521	+0,265571	More Equal Distribution
2014	0,282633	0,599822	+0,317189	More Equal Distribution
2015	0,142122	0,323213	+0,181091	More Equal Distribution
2016	0,194622	0,320998	+0,126376	More Equal Distribution
2017	0,70529	0,62719	−0,078100	Income Inequality
2018	0,601599	0,596373	−0,005226	Income Inequality
2019	0,521469	0,659362	+0,137893	More Equal Distribution
2020	0,179236	0,148793	−0,030443	Income Inequality
2021	0,536615	0,675414	+0,138799	More Equal Distribution
2022	0,488913	0,602537	+0,113624	More Equal Distribution
2023	0,734634	0,861539	+0,126905	More Equal Distribution
2024	0,6133	0,861414	+0,248114	More Equal Distribution

Note: compiled by the authors

The results of the dynamics of the r-index and g-index for 2010–2024, with a year-by-year evaluation of the relationship between the return on capital and the rate of economic growth, determined whether income distribution tends toward greater equality (when g > r) or increasing inequality (when r > g), following the Piketty framework. The difference between the g and r indices revealed a deviation between economic growth and capital returns. This difference is considered as the excess of the g index over the r index, or vice versa. Positive values of the difference reflect years in which the g index exceeds the r index. In contrast, negative values correspond to periods when capital returns, reflected by the r index, grow faster than economic growth. An even distribution of income is considered if the

g index for a year exceeds the r index. That is, economic growth outpaces capital returns. An increasingly uneven distribution of income occurs when the r index exceeds the g index, meaning capital returns grow faster than overall economic growth.

The g-index mainly showed higher values, indicating that the economy was expanding, compared to the results of the r-index, capital profitability, first between 2010 and 2016, then in 2019, and from 2021 up to the end of the observed period. On the contrary, in 2017, 2018, и 2020, when the r-index exceeded the g-index, capital growth outpaced economic development. During these years, the gap between the income of capital owners and the rest of the economy has increased. Notably, in 2020, the gap increased dramatically due to a sharp decrease in the g-index, caused by a general decline in economic activity. During the final years, 2021–2024, the economy (g-index) was more stable.

At the beginning of the period, the economy of Kazakhstan showed rapid growth relative to capital profit, as indicated by the difference between the g-index and the r-index. Between 2010 and 2016, there was an improvement in production, employment, and labor productivity. Moreover, the domestic market was expanding, particularly in services, trade, construction, and banking. Although the raw materials industry declined, the economy continued to grow and develop overall. Consequently, income distribution was more even. In other words, employees had the possibility of increasing their income more than capital owners.

Over the following two years, the r-index increased, so capital income grew faster than the economy as a whole. One of the reasons was the recovery of world oil prices, an increase in exports, and higher profits for large enterprises. The increase in return on capital was due to large projects, which increased the profit of capital owners. Among them are cases such as the relaunch of the largest offshore oil and gas fields, Kashagan, the Tengizchevroil Future Growth Project – Wellhead Pressure Management Project, and the Karachaganak Expansion Project (TASS, 2016; KazMunayGas, 2017), leading to an increase in the owners' profits. Therefore, these years are characterized by the strengthening of the unequal distribution of income.

Economic growth was recorded in 2019 and 2021. Economic activity during COVID-19 and after the lockdown was intensive. In 2019, consumer demand was recovering, the domestic market was growing and expanding, and non-resource industries were expanding. After COVID-19, the g-index began to grow as economic activity recovered and new communication channels were established, including logistics and local production. Over the years, until the end of the observed period (2023-2024), the g-index reached its maximum values. In 2020, the g-index fell dramatically compared to the r-index. The pandemic had a tremendously negative effect on the private sector and labor productivity. Therefore, in 2020, the capital was growing faster than the economy, exacerbating inequality.

A comparison of the r-index and g-index dynamics revealed discrepancies between the rates of change in capital income and overall economic growth indicators. In some years, the growth of normalized r-index values exceeds the dynamics of the g-index, indicating a more rapid recovery and expansion of income in capital-intensive sectors than in the economy as a whole. Income distribution disparities widen, as the increase in capital income is not accompanied by comparable growth in macroeconomic indicators. In other periods, the r-index and g-index values converge, reflecting more synchronous changes in capital income and economic growth and indicating a more even distribution of economic outcomes. These differences characterize the income generation model in the Kazakh economy, in which high dependence on commodity sectors leads to periodic outpacing growth in capital income and exacerbates fluctuations in inequality.

The results confirm Piketty's conclusion that the nature of income distribution depends on whether capital or the economy grows faster. Table 3 summarizes the results.

Table 3. Summary of key results on income distribution dynamics

Period	Type	What dominated / key economic features
2010–2016	Favourable period (Growth > Capital)	Stable macroeconomic growth. Domestic market diversification: services, trade, transport. Employment rate growth. Rise in labor productivity. Moderate capital profits (low relative to GDP growth).
2017–2018	Unfavourable period (Capital > Growth)	Surge in capital income due to profit growth in the raw materials industry (the extractive sector), the recovery of world prices for oil and gas, and the expansion at Karachaganak.
2019	Favourable period	Recovery of domestic demand; growth of services; stable productivity; reduced dependence on oil price spikes; balanced corporate income.
2020	Unfavourable period	Pandemic shock: fall in real GDP and productivity. Lockdown-conditioned shutdowns in the private sector. Supply chain disruptions.
2021–2024	Favourable period (Growth > Capital)	Strong post-pandemic recovery. Active growth of the domestic market (services, logistics, IT). Rise in retail and internal consumption. Rapid GDP per capita growth compared to capital income growth.

Note: compiled by the authors

The results confirm Piketty's conclusion that the nature of income distribution depends on whether capital or the economy grows faster. In 2017–2018, returns to capital grew faster than real income. This was a period of strength in the commodity sector and rising profits for large companies. However, this led to rising incomes and a more inequitable income distribution.

However, when economic growth exceeded returns to capital (2010–2016, 2021–2024), a more equal income distribution was observed, accompanied by the following changes. First, the domestic market expanded, employment and productivity grew, and SMEs developed and expanded. Second, this economic activity encompassed a larger number of industries and the population. As a result, the impact of a narrow capital-intensive sector on compound income became insignificant.

However, Piketty's theory was not applicable in 2019 and 2020, as persistent shocks drove both periods. 2019 was a period of recovery from a series of international economic crises, including the 2015–2016 decline in global oil prices and the slowdown in global trade. This period saw a peak in economic expansion and a focus on the non-resource sector. As a result, incomes temporarily improved regardless of capital market dynamics. In 2020, the COVID-19 lockdown led to a global recession.

5. CONCLUSIONS

The current research aimed to assess the dynamics of income distribution in Kazakhstan. The analysis compared capital income dynamics and economic growth rates, aggregated into integral r- and g-indices. The approach, based on Piketty's framework, showed structural differences between return-on-capital and income-growth models of economic growth.

The results showed that income distribution in Kazakhstan is susceptible to changes in capital income and overall economic growth. During periods when economic growth exceeded capital income dynamics, a more equal income distribution was observed. These periods included expansion of the domestic market, an increase in employment and labor productivity, and the development of the service sector and non-resource sectors of the

economy. Moreover, income growth was generated across a broader spectrum of economic activity, reducing the dominant role of capital-intensive industries.

When capital income grew faster than the economy as a whole, income distribution worsened. Additionally, profitability in capital-intensive raw material industries, rising external commodity prices, and the economy's dependence on raw material exports were identified. Moreover, income growth was concentrated primarily among capital holders.

The analysis also indicates that income distribution dynamics in Kazakhstan are cyclical and structural in nature. High volatility in the r-index components reflects the economy's dependence on global commodity markets. In contrast, the g-index demonstrates more sustainable long-term growth, supported by gradual increases in productivity and household incomes and the expansion of the service sector. Thus, an increase in return on capital increases distributional imbalances. Reducing income inequality requires economic diversification, developing non-resource sectors, supporting small and medium-sized businesses, and increasing employment. The main goal is to weaken the dependence of income dynamics on capital return and reduce income concentration in a narrow range of industries.

The role of the state in shaping an inclusive growth model is critical. Countercyclical fiscal policy, targeted support for sectors with a high employment multiplier effect, and stimulation of domestic demand help smooth the distributional impacts of external shocks. Aligning economic growth strategies with objectives to increase labor productivity and develop the domestic market contributes to the formation of a more sustainable and socially balanced income distribution model.

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