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Measuring and Forecasting Inequality Based on Money Income and on Consumption

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Abstract

The inequality indicators play an essential part in the assessment of living standards of the population. This paper presents results of an evaluation and forecasting of income inequality in Kazakhstan. Using macroeconomic indicators and databases of household budget surveys, the authors give retrospective calculations of income inequality of the population over the past four years, also estimating inequality (Gini coefficient) and distribution of the population by income for 2013-2014. According to the forecasts for 2013-2014, inequality in Kazakhstan - both by income and by consumption - with current system of distribution and redistribution of income in the economy, will increase slightly. The Gini index by income is 0.445 for 2013 and will be 0.446 for 2014, Gini by consumption is 0.289 for 2013 and will be 0.291 for 2014.

Keywords: inequality income, cash income, consumption, the Gini index, the Lorenz curve, forecasting of income inequality

1. Introduction

In the modern society every state has a duty to promote social justice and protection of its population. Successes of socio-economic policies are expressed primarily in a uniform growth of all citizens' welfare and a reduction of excessive inequality between the members of that society.

Mean income indicators, such as per capita income or per capita consumption, do not always reflect the real economic condition of the majority of households in the country. Indicators that reflect their distribution and concentration must accompany them. Thus, the inequality indicators play an essential part in the assessment of living standards of the population. In the official statistics of Kazakhstan, the following inequality indicators are used: the Gini index, coefficient of funds, per capita consumption by quintile/decile income groups, cash costs, the distribution of consumption, as well as the graphical representation of the distribution of population by income (the Lorenz curve). These indicators reflect the economic inequality and are calculated on the basis of *consumption, rather than the money income of the population.*

In the period from 2001 to 2009 the main indicators of inequality by consumption in Kazakhstan - the Gini index and the coefficient of funds - fell markedly, but increased slightly in 2010-2011. The 2011 Gini index by decile groups, according to official statistics was 0.289. The coefficient

of funds, calculated as the ratio of average per capita incomes of the most and the least well-off 10% of the population, was 6.1. In 2012 they reduced once more: the Gini index was 0.284, the coefficient of funds - 5.9.

A number of authors (Berentayev, 2008), (Asylkhanova, 2008), (Sange Research Center, 2011), (Bobkov, 2010) study the issues of living standards and inequality in Kazakhstan, believe that the inequality indicators delineated by the official statistics do not reflect the current situation to its full extent. At present the Republic of Kazakhstan Statistics Agency calculates the main indicators of inequality based solely on consumption. This further involves using an aggregated indicator – *the income used for consumption (box 1,a)*. This is a very good and informative indicator for calculating poverty indices. It is more expedient, however, to calculate indicators of inequality based on *money incomes (box 1, b)*. Indeed, inequality in money income of the population may be substantially higher, and it more accurately reflects the situation of the stratification within the Kazakh society.

Box 1.

a. Income used for consumption is the sum of expenditures for current consumption, excluding investment in production activities and accumulation, as well as the cost of own production consumed, and transfers in natural form [ASRK]. Calculated on a *sample* survey of households.

b. Money income of the population - is the cash (including the income tax), directed by the population for current consumption, production activity and accumulation. Their value is determined by calculation at the macro level and includes an assessment of income from wage and self-employment (with adjustments for the withholding of wages and non-coverage of the employed population by statistical reporting) and a payment of social transfers [ASRK]. Calculated as macroeconomic indicators for the *general population*.

Econometric models for forecasting and estimating inequality use macroeconomic indicators of money income. Such macroeconomic indicators include the revaluation of shadow wages and income of the *total* population. This allows for the calculation of inequality to take into account all population groups, including both the richest and the poorest.

Aim:

Ipso facto, the researchers have set two major goals:

(1) To evaluate the degree of inequality in Kazakh society in terms of money income

(2) To attempt to predict the levels of inequality and population distribution by money income for 2013-2014, using economic-mathematical modelling.

2. Methodology

In statistical studies lognormal distribution is widely used as a mathematical model that accurately reflects the distribution of income in society. The methodology of this study was based on the work of the Russian scientist (Kolmakov, 2004). It was determined that in relation to the distribution of population by per capita income x, the following expression

$$p(x) = \frac{1}{\sigma x\sqrt{2\pi}} e^{-\frac{(lnx-\mu)^2}{2\sigma^2}} \quad (1)$$

approximates the density of this distribution well; where μ is the mathematical expectation, and σ - the standard deviation of the natural logarithm of the random variable x. These two parameters determine the required distribution, and they can be estimated on the basis of sample characteristics according to data of statistical surveys.

Mathematically, it is easy to identify the relationships between the parameters of the distribution (1) of the logarithm of the random variable x and parameters of the distribution of the random variable x:

$$lnx_c = \mu + \frac{1}{2}\sigma^2 , \quad (2)$$

$$lnx_m = \mu - \sigma^2, \quad (3)$$

$$lnx_{me} = \mu, \quad (4)$$

Where x_c is the expectation, x_m- mode, x_{me} - the median of the random variable x. Substituting these characteristics of the distribution of the random variable x with the corresponding sample analogues: the nominal average X_c, the selective modal or median values X_m and X_{me} of the sample median monthly per capita money income, we can obtain formulas for estimating the parameters of the lognormal distribution (1).

In the work of the Russian scientist (Kolmakov, 2004) parameters μ and σ are estimated on the basis of the relations (2) and (3), i.e. the sample mean X_c and the sample modal value X_m are used, obtained by the surveys of the population. Accordingly, we obtain formulas for the parameters of the lognormal distribution:

$$\mu = \frac{1}{3}\ln(X_c^2 X_m), \quad \text{f} \quad (5)$$

$$\sigma^2 = \frac{2}{3}(lnX_c - lnX_m). \quad (6)$$

And if one uses the sample mean and the sample median X_c, X_{me} of per capita income, in accordance with (2) and (4) the formulas for estimating the expectation and variance of the lognormal distribution (1) will take the form

$$\mu = \ln X_{me}\,, \quad (7)$$

$$\sigma^2 = 2(lnX_c - lnX_{me}). \quad (8)$$

To estimate the parameters, it is also possible to choose a pair of sample modal value X_m, or sample mean value X_{me} of the per capita income:

$$\mu = \ln X_{me}\,, \tag{9}$$

$$\sigma^2 = lnX_{me} - lnX_m. \tag{10}$$

The estimated distribution law of per capita income (1) serves as the basis for constructing the Lorenz curve, which in turn allows one to calculate indicators of differentiation by income, in particular, the Gini coefficient.

To construct the Lorenz curve we must first determine the points $x_0,\ x_1, \dots, x_n$, such that each interval $[x_{j-1}, x_j), j = 1, 2, \dots, n$, contains a share, which measures 1/n of the entire population, in ascending order of the monthly per capita income *x*. At the same time $x_0 = 0$. Other values of x_j are determined from the condition

$$\frac{1}{\sigma\sqrt{2\pi}}\int_0^{x_j}\frac{1}{x}e^{-\frac{(lnx-\mu)^2}{2\sigma^2}}dx \;=\; \frac{j}{n}, \qquad j = 1, 2, \dots, n.$$

Substitution of $z = \frac{lnx-\mu}{\sigma}$ with the integration variable leads to the condition for calculating the value z_j:

$$\Phi(z_j) = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{z_j} e^{-\frac{z^2}{2}}dz \;=\; \frac{j}{n}, \qquad j = 1, 2, \dots, n,$$

Where $\Phi(z)$ is the Laplace function, which is tabulated function. Accounting for the substitution of the integration variable, we find the desired value

$$x_j \;=\; e^{\sigma z_j + \mu},\ \ j = 1, 2, \dots, n. \tag{11}$$

Now we can calculate the ordinates $y_1, \dots, y_n$ of the points of the Lorenz curve, corresponding to the values $\frac{1}{n}, \frac{2}{n}, \dots, \frac{n}{n}$ of its abscissa. Further, $y_0 = 0$ and $y_n = 1$. Cumulative income of the population with incomes in the range from 0 to x_j is

$$V_j = \frac{1}{\sigma\sqrt{2\pi}}\int_0^{x_j} e^{-\frac{(lnx-\mu)^2}{2\sigma^2}}dx\,.$$

Select the following substitution with the integration variable: $w = \frac{lnx - \mu - \sigma^2}{\sigma}$. After this transformation we obtain

$$V_j = \frac{1}{\sqrt{2\pi}} e^{\mu + \frac{\sigma^2}{2}} \int_{-\infty}^{w_j} e^{-\frac{w^2}{2}} dw = e^{\mu + \frac{\sigma^2}{2}} \Phi(w_j),$$

Where $w_j = \frac{lnx_j - \mu - \sigma^2}{\sigma}$. If the upper limit of integration tends to ∞, then according to the property of the Laplace function, it follows that the total money income of the population is equal to $e^{\mu + \frac{\sigma^2}{2}}$. Dividing this value, we find the cumulative share of money income of the population in the range from 0 to x_j:

$$y_j = \Phi\left(\frac{lnx_j - \mu}{\sigma} - \sigma\right), \quad j = 1, 2, \dots, n. \tag{12}$$

The greater the number of intervals n, the more accurate the Lorenz curve approximation will be. In practice, one usually builds a quintile (for n = 5) or decile (for n = 10) Lorenz curve.

For measuring the level of inequality, the Gini coefficient is widely used. It represents a double area of the figure contained in the unit square between the bisector of the coordinate angle and the Lorenz curve. The smaller the value of the Gini coefficient, the lower the level of inequality.

Thus, the parameters of the lognormal distribution can be used to construct the Lorenz curve and estimate the level of population differentiation in income. However, there is interest in forecasting indicators that reflect the income differentiation. This can be done by estimating the expected values of the characteristics of the population income distribution. To assess the predictive value of the expectation $\mu_{t+1}$and variance σ^2_{t+1} in the next year *t +1* we need the predicted values of the sample mean X_{ct+1}, sample modal value X_{mt+1}), or sample median X_{met+1} of per capita average monthly money income. Then the required values $\mu_{t+1}$and σ^2_{t+1} can be estimated according to formulas (5) - (6), (7) - (8) or (9) - (10).

3. Data

In order to forecast the parameters of the lognormal distribution per capita income, official data published in 2009-2012 by the Kazakh Statistics Agency (ARKS, 2012), (ARKS, 2013 a), (ARKS, 2013 b) were used. Value of the nominal average monthly income per capita X_{ct+1} can be represented as part of the country's gross domestic product, which is used as the money income of the population, divided by the population and the number of months in the year. It is of particular note that this is a macroeconomic indicator, i.e. calculated for the entire population.

The Statistics Agency does not publish forecasts for this indicator. Therefore one has to assume that there is a sufficiently close relationship between the macroeconomic indicator of the nominal per capita income X_c and other macroeconomic indicators, and evaluate it using econometric methods for 2013-2014.

4. Result

To calculate the projected modal value of the money income X_{mt+1} we introduce a formula

$$X_{mt+1} = X_{mt} \frac{X_{ct+1}}{X_{ct}} k_{St+1} \frac{DS_{t+1}}{DS_t}, \quad (13)$$

in which the value DS_t is the total income by wages and transfers in the structure of the balance of income and expenditure of the population, and the coefficient k_{St+1} reflects the compensation impact of the indicators of the structure of income on the formation of the growth rate of the modal values of income, and differs little from 1 (Kolmakov, 2004).

Table 1 shows the actual and calculated (predicted) data for the Republic of Kazakhstan, used to construct the Lorenz curve and calculate the coefficient of the concentration of population income – the Gini index. The values of the monthly per capita money income, the share of the total wage income, and transfers in the structure of the balance of income and expenditure of the population, are published in "The standard of living of the population of Kazakhstan" compilations of the Kazakh Statistics Agency for the relevant years. The predictive values of these parameters are calculated by the authors using the approximations for 2013 and 2014 only.

Table 1. Income figures used to predict inequality for 2009-2012 and projected data for 2013-2014.

Indicator	2009	2010	2011	2012	*2013*	*2014*
Nominal money income per capita per month, KZT[1]	34282	38779	45936	51755	*59674*	*68803*
Modal value of money income per capita per month, KZT[2]	12180	*13810*	*15924*	*18282*	*20907*	*24077*
The total share of wage income, and transfers in the structure of the balance of population income and expenditure[3], %	86.4	86.6	84.3	85.9	*85.2*	*85.1*

Notes:

1 - official data of the Statistics Agency for 2009-2012 (ARKS, 2012), (ARKS, 2013 a), (ARKS, 2013 b), macroeconomic indicator
2 - the figure for 2009 is calculated by the authors on the distribution of income on the basis of a sample survey of household budgets of the Statistics Agency, and for 2010-2014 is estimated from the model (13)
3 - authors' calculations on the official data of the Statistics Agency on the structure of household income. Explanation: the normal font denotes actual numbers, italics - estimates.

There is a more complicated situation with the indicator "Modal value of average monthly money income per capita" which is not published in the official statistics. But for each year the statistics compilation mentioned above contains a table "Distribution of households and population in them by average income" with intervals of 1000 KZT. According to these data, it is impossible to accurately determine the modal value of income. Therefore the following approach is used. For 2009 the modal value of per capita average monthly income is specified by calibration, so that the Gini coefficient, obtained by calculation and construction of the Lorenz curve, coincides with its actual calculated value from the official statistics. And for consequent years the modal values of the distribution are calculated from (13).

At the same time, the Statistics Agency in assessing the extent of population differentiation is relying on data for household income used for consumption. These data are shown in Table 2.

Table 2. Indicators of per capita consumption, and the modal values in the Republic of Kazakhstan for the prediction of the Gini

Indicator	2009	2010	2011	2012	2013	2014
Income used for consumption per capita per month, KZT[1]	21348	26152	30637	33745	*38739*	*44473*
Modal value of income used for consumption per capita per month, KZT[2]	14860	*18246,13*	*20807,59*	*23353,42*	*26591,07*	*30491,15*

Source: Statistics Agency of Kazakhstan and authors' calculations. 1 - official data of the Statistics Agency for 2009-2012 (ARKS, 2013 a), and for 2013-2014 the forecasted data, estimated by the authors using econometric methods; 2 - authors' calculations based on the official household survey of the Statistics Agency on the distribution of income spent on consumption. 2013-2014 is the forecasted data, estimated by the authors using econometric methods

The normal font in the table denotes the data of the Statistics Agency and italics show the forecasted data, estimated by the authors using econometric methods. For 2009 the modal value of per capita average monthly income spent on consumption is also clarified by calibration, so that the calculated value of the Gini index coincided with its actual value of 0.267, published in "The living standards of the population of Kazakhstan" (ARKS, 2013 a).

Limitations in the data.

Keep in mind that there are limitations in the data used in the construction of the econometric model. Since there are no indicators of modal values of consumption and modal values of money income for the entire population in the official statistics, for 2009-2012 they were evaluated by the authors according to a sample survey of the distribution of money income and consumption. Of course these are approximated values.

There are further no official forecasted values of per capita income, consumption, and income structure of the population for the future period of time. These figures were estimated for 2013-2014 by the authors on the basis of econometric methods for the purposes of this study. However, the development and testing of the methodology of this indicator forecasting is beyond the scope set out in this study and therefore is not considered in detail in the work.

Prediction of Population Differentiation.

In the publications on the living standards of Kazakhstan, in some cases, data on nominal income of the population is denoted, while in others - data on population income spent on consumption. In particular, the Lorenz curve and the Gini coefficient are calculated only for the consumption (personal income spent on consumption). In this paper we consider both options to compare differences in indicators of inequality.

Here, table values z_j of the standard normal distribution are given in the column z, the column x denotes the values x_j, calculated by formula (11), in the column lx are their respective natural

logarithms. Column *w* shows the values of the auxiliary variable equal to $\frac{lnx_j - \mu}{\sigma} - \sigma$, values in the column *y* are determined by formula (12) and represent the ordinates of the corresponding points of the Lorenz curve. Using the trapezoidal rule in increments, the area of the figure between the diagonal of the unit square and the Lorenz curve is calculated and is represented in the last column. Doubling the value of the number recorded in the lower right cell of Table 3 one obtains the Gini coefficient, i.e. for 2009 the Gini coefficient, calculated for consumption is 0.2670.

The basis for forecasting population differentiation in income distribution is the representation of the average monthly income per capita of the population in the form of the lognormal distribution (1). Average and modal values are presented in Table 2 for forecasting the Gini index of consumption. 2009 is taken as the initial period. Calculations are performed for the period 2009-2014. Using formulas (5)-(6), parameters of the lognormal distribution, the expectation μ_{2009} and variance σ^2_{2009} are calculated. Then, as described above, the Lorenz curve is constructed, and the Gini coefficient is calculated. The calculations are easy to carry out using Excel. Table 3 presents the results of calculations based on income used for consumption for 2009.

Table 3. The results of calculations for constructing the Lorenz curve and calculating the Gini coefficient for 2009

Deciles	The standard normal distribution	Abscissae of the points of the Lorenz curve	The natural logarithm of x	Auxiliary variable	Ordinates of the Lorenz curve	½ Gini coefficient
	Z	x	lx	w	y	S
0	-5,612	1199,827	7,089932	-6,10345	5,19E-10	0
1	-1,28155	10078,23	9,218133	-1,773	0,038114	0,003094
2	-0,84162	12510,66	9,434337	-1,33307	0,091254	0,011626
3	-0,5244	14621,30	9,590235	-1,01585	0,15485	0,024321
4	-0,25335	16704,68	9,723444	-0,7448	0,228197	0,040168
5	0	18919,56	9,847952	-0,49145	0,311554	0,058181
6	0,253347	21428,12	9,972459	-0,2381	0,405901	0,077308
7	0,524401	24481,39	10,10567	0,03295	0,513143	0,096356
8	0,841621	28611,57	10,26157	0,350171	0,636895	0,113854
9	1,281552	35517,13	10,47777	0,790101	0,785266	0,127746
10	5,612001	298334,6	12,60597	5,120551	1	0,133483

Construction of the Lorenz curve and the calculation of the Gini coefficient for future years require an evaluation of the parameters of the lognormal distribution μ_{t+1} and σ^2_{t+1}. And this in turn requires the actual value or predictions of the average value X_{ct+1} and modal value X_{mt+1} of average monthly per capita consumption, and the total income share of wages and transfers in the structure of the balance of income and expenditure DS_{t+1}, shown in Table 2. On their basis, according to (5)-(6), predicted values of parameters μ and σ are calculated.

Table 4. Parameter estimates of lognormal distribution of average monthly income per capita, spent on consumption

Parameters	2009	2010	2011	2012	2013	2014
Expectation μ	9,85	10,04	10,19	10,29	10,42	10,56
Standard deviation σ	0,49	0,51	0,53	0,53	0,53	0,54

Similarly, parameter estimates of the lognormal distribution of per capita average monthly income are calculated.

Table 5. Parameter estimates of lognormal distribution of average monthly money income per capita

Parameters	2009	2010	2011	2012	2013	2014
Expectation μ	10,10	10,21	10,37	10,49	10,63	10,77
Standard deviation σ	0,83	0,84	0,86	0,85	0,86	0,86

Using the data from Tables 4 and 5 and carrying out calculations similar to those shown in Table 3, one can calculate the Gini coefficient for the distribution of the monthly average per capita consumption as well as the average monthly money income per capita. The corresponding Gini coefficients are calculated and presented in tables 6 and 7.

Table 6. The Gini coefficient of average monthly per capita income spent on consumption

	2009	2010	2011	2012	2013	2014
Value based on the model	0,267	0,278	0,289	0,284	0,289	0,291
Official data from the Statistics Agency	0,267	0,278	0,290	0,284	-	-

The magnitude of the Gini coefficient of 0.267 in 2009 was used as a starting point for the calibration of the model parameters, and for 2010-2012 the estimates of the Gini coefficient with the model are almost identical to the officially published values.

It is thus confirmed that this methodology predicts the measure of inequality - the Gini index - well, and can also be used to assess and predict inequality in money income. The future Gini index, estimated by the model will be 0,289 for 2013 and 0,291 for 2014. Its value will slightly increase, which means a slight increase in consumption inequality in Kazakhstan.

Table 7. The Gini coefficient of average monthly money income per capita

Gini	2009	2010	2011	2012	2013	2014
Value based on the model	0,433	0,439	0,445	0,442	0,445	0,446
Calculation based on a sample survey of 11523 households	0,433	-	-	-	-	-

The Gini coefficient for per capita money income is not calculated by the Statistics Agency and is not officially published. Therefore, for 2009 it was calculated by the authors on the basis of the household budget study of Kazakhstan (11,523 households) carried out by the statistics Agency (Table 7). The actual value of the Gini coefficient by money income for 2009 was 0.4331. Next, based on the model (12), an evaluation was carried out for 2009-2014.

As per Tables 6 and 7, the level of inequality among the population on per capita income is significantly higher than inequality on per capita consumption for 2009-2012, similarly so for predicted values for 2013-2014. It is also seen on the Lorenz curves. In Figure 1, this is shown by data from 2009 and 2012, because official data on the distribution of income are available for these years.

One of the reasons for significant differences in money income inequality and inequality in consumption, is that the differentiation of incomes of the population is always much higher than the differentiation in consumption. After all, money income further includes funds invested into savings, which are almost absent in the poorest groups, but are quite high among the more affluent groups.

The second and more significant reason for the difference is the fact that the prediction model used a macroeconomic indicator for money income - nominal per capita income (an indicator of the total population). While in official statistics the Gini index is calculated for the total sample, which does not include wealthiest and the poorest layers of population. Therefore inequality indicators estimated for the total sample may be lower than the levels of inequality on the entire population. Using macroeconomic indicators for the general population, the income distribution model takes into account all groups, which avoids the disadvantages of sampling.

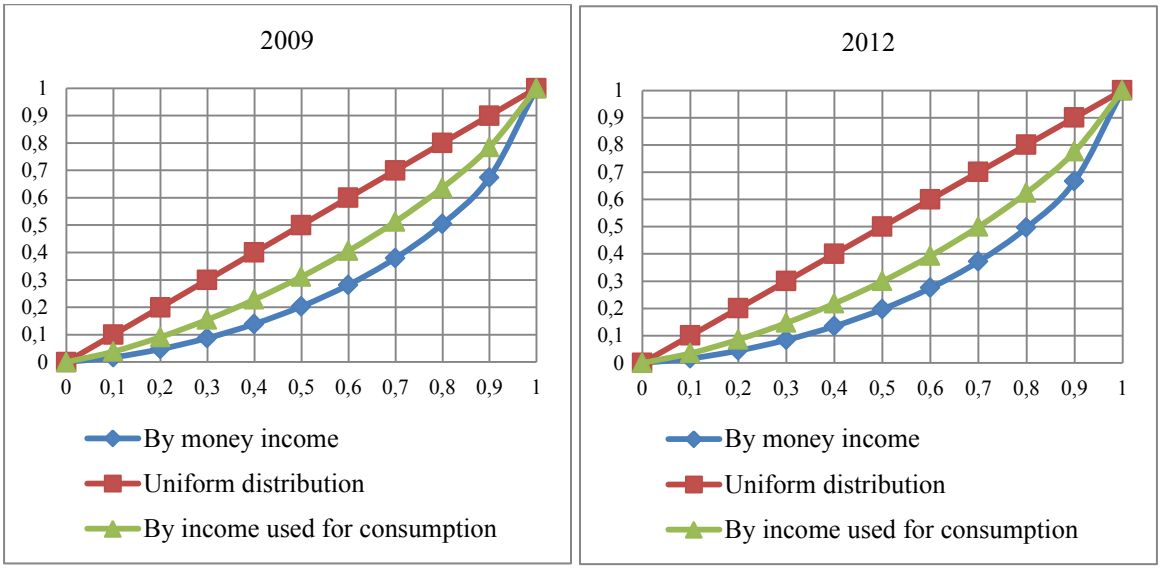

Figure 1. Lorenz curves based on the 2009 and 2012 data. Explanation: The Lawrence curve by money income, constructed using the modelling method, demonstrates that income inequality in Kazakhstan in 2009-2012 was significantly higher than consumption inequality.

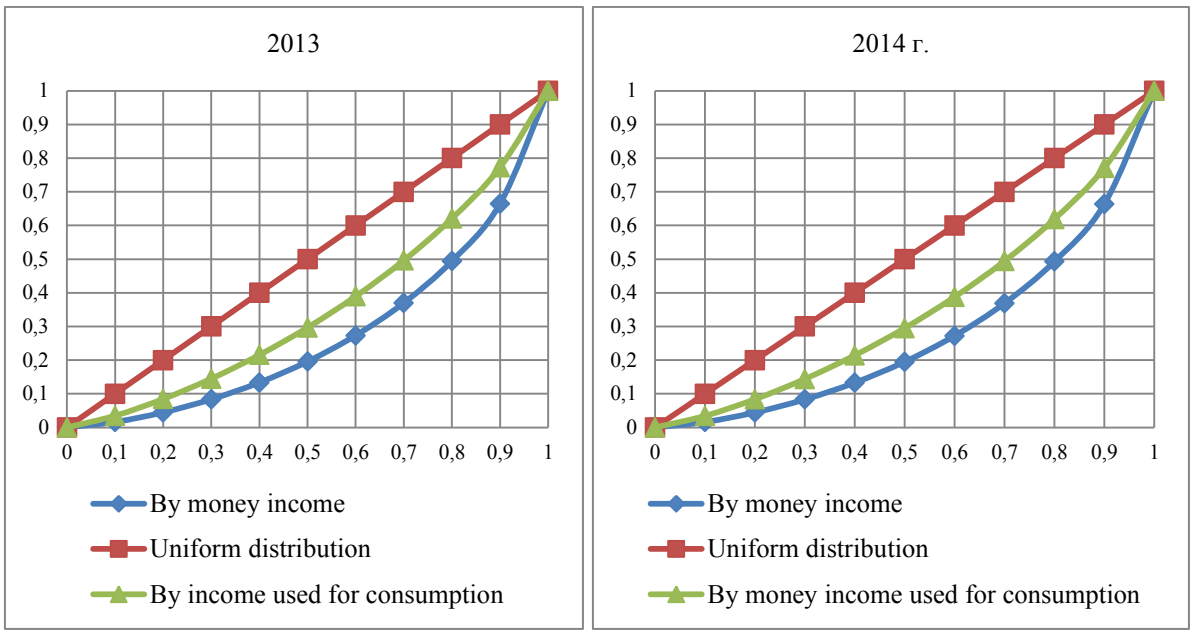

Figure 2. Predicted Lorenz curves, constructed by using the econometric model for 2013 and 2014

It will be interesting to compare the level of inequality in Kazakhstan, estimated by the Gini coefficient for income of the population, with other CIS countries exporting energy (Azerbaijan and Russia), as well as the developed countries of the OECD and BRIC. In these countries the Gini coefficient is estimated by money income, so the data on inequality between countries are comparable.

Of course, for a comparative assessment of the level of inequality between countries it is not sufficient to utilise only the Gini index. The common approach is to assess the level of inequality in cross-country comparisons, taking into account the size of per capita gross domestic product (GDP). In that case, the effect on inequality of the size and the structure of the economy is taken into consideration (Bobkov, On the social dimension of the new stage of development of Russia, 2013). However the authors believe that the welfare of the country is more adequately demonstrated using the gross national income (GNI) rather than GDP, which also includes the income of foreign nationals and companies within the national borders. After all, a part of the income produced in the country can go abroad, such as the payment of profits to foreign investors, and does not affect the welfare of the people of this country, and does not increase the purchasing power or improve the standard of living. It should be noted that the level of inequality of income of Kazakhstan is higher than those in Russia and Azerbaijan. This indicates a more significant stratification of Kazakh society in comparison with these countries, than is represented by the Gini index in the official statistics' Gini index, which is calculated by consumption.

5. Conclusion

Based on the methods of economic and mathematical modelling, the authors have attempted to produce retrospective calculations of the Gini index, reflecting the degree of economic inequality by money income for 2009-2012. The authors have also presented projected inequality - the Gini coefficient and the population distribution by income for 2013-2014 in the Republic of Kazakhstan.

In Kazakhstan, *the money income inequality* of the population is significantly higher (Gini coefficient = 0.442 for 2012) than *inequality by consumption* (Gini coefficient = 0.284 for 2012). On the one hand, it is commonly acknowledged that the differentiation of the population by money income is higher than the differentiation by consumption. On the other hand, the calculations for the model used a macroeconomic indicator of money income – *a general population indicator*. This indicator is produced with a balance of income and expenditure of the household sector with an evaluation of shadow wages and unregistered employment and tax payments. That is, the econometric model takes into account all income groups, including the wealthiest and the poorest. Whereas in the *sample survey* of households, these groups fall outside of the study and their income is not counted in determining the rates of economic inequality. Thus, the inequality in money income more adequately reflects the situation in Kazakhstan society than the estimated consumption inequality.

When juxtaposing countries, money income inequality of Kazakhstan is slightly higher than in Russia and Azerbaijan. These three countries are energy-exporting countries and get high profits from rising energy prices, i.e., have a similar economic structure.

According to the forecasted calculations for 2013-2014, the money income inequality and consumption inequality in Kazakhstan will increase with the fixed system of distribution and redistribution of income in the economy. Gini by money income will be 0.445 for 2013 and 0.446 for 2014. The Gini index for consumption will be 0.289 for 2013 and 0.291 for 2014.

We are aware that there are some limitations to the calculation of predictive indicators of inequality in Kazakhstan, related to the accuracy of parameter values used in the model: the predictive value of the nominal income of the population, income structure, the modal value of income. However, the use of such prediction methodology based on economic-mathematical modelling will allow for a more accurate assessment of population stratification in the Kazakh society.

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