MACROECONOMIC IMPACTS OF PERSONAL INCOME TAX IN THE CONTEXT OF INCLUSIVE DISTRIBUTION OF INCOME AND OVERCOMING INEQUALITY[1]

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Key words: personal income tax, inequality, Gini coefficient, Palma coefficient, Theil coefficient, progressiveness of taxation, flat taxation system.

Introduction

The issues of income generation and fair distribution have been essential in all countries and at all times. From this point of view, one of the priority tasks of the government of any country is the requirement to ensure a certain reasonable balance between fairness and social efficiency in fiscal policy. How to redistribute the primary incomes generated in the economy (salary, profit, rent, interest, etc.), what tools and approaches of taxation and macroeconomic regulation to use, in order to ensure, on the one hand, the necessary investments, innovation, productivity and the requirements of ensuring the proper level of efficiency, on the other hand, the requirements of social fairness and the acceptable level of solidarity in society and the balance of interests are met. In this sense, at the given stage of economic development, the personal income taxation regimes, in particular, when choosing the instrument's essence of progressiveness, regressiveness or flatness of taxation, in fact, the fundamental realities described above should be taken into account first of all. In this article, in the context of the inclusive distribution of income, the possible impacts of the transition from flat taxation regime to regressive and vice versa, as well as the risks and results associated with it, were discussed, considering the social realities of the Republic of Armenia as a basis.

Methodology

The calculations made in the study are based on surveys conducted as part of the " Integrated Living Conditions Survey "(ILCS) conducted by the RA Statistical Committee, and in this case, the risks of concealing income (especially in high-income groups) and survey errors are quite tangible. The RA Statistical Committee (SC) also specifically emphasizes that absolute income indicators are less reliable, as incomes are often hidden or under-reported by respondents (the effect of propensity not to disclose incomes). Based on that circumstance, the tax information on more than 800,000 income taxpayers included in the 2023 database of the RA State Revenue Committee (SRC) was taken as the basis for the research, on an annual basis. This approach made it possible to get information about taxpayers more rapidly and, therefore, the level of inequality more prompt-

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ly, because, compared to this approach, the RA Statistical Committee (SC) uses the approach of sociological surveys, which is highly subjective on the one hand, and time-consuming on the other (for example, at the moment, as of 2024, there is only the statistical data of 2022 formed as a result of the survey conducted at 2023 of RA households according to decile groups), and here the proposed approach makes it possible to reduce the time lag of economic measures aimed at alleviating inequality and decision-making regarding the application of the toolkit of the response of fiscal policy. From the point of view of assessing the proportionality of income distribution, it is important to study the dynamics of internationally accepted main indices and coefficients: Palma, Gini and Theil coefficients, which are calculated by the following formulas:

(1) $\boldsymbol{Palma_{coef} = \frac{d_{10}}{d_1+d_2+d_3+d_4}}$ **[Salmina A., 2021, 81]**

$Palma_{coef}$ – Palma coefficient,

d_n – average income of the n-th decile.

(2) $\boldsymbol{Gini_{coef} = \frac{N+1}{N} - \frac{2\sum_1^N (N+1-i)x_i}{N\sum_1^N x_i}}$

$Gini_{coef}$ – discrete Gini coefficient,

x_i – the average income of the household included in the i-th decile,

N – the number of units included in the sample, which in this calculation corresponds to the number of deciles: 10.

(3) $\boldsymbol{Theil_{coef} = \frac{1}{N}\sum_{i=1}^{N} \frac{y_i}{\bar{y}} \ln\left(\frac{y_i}{\bar{y}}\right)}$ **[Salmina A., 2021, 81]**

$Theil_{coef}$ – Theil coefficient,

$\bar{y}$ – average income of the sample,

y_i – the average income of the household included in the i-th decile,

N – the number of units included in the sample, which in this calculation corresponds to the number of deciles: 10.

Literature review

In the economic literature, there are many approaches and views on the regressiveness, proportionality or progressiveness of the labor income taxation system, and yet, for obvious reasons, there is no unanimity and consensus, because the design of such systems and the choice of tax types in many cases depend not only on accurate quantitative assessment, calculation from mathematical-statistical and similar factors, but also often with the fulfillment of political and public pressure requirements.

Back in the 1980s, Arthur Laffer, the founder of supply-side economics [Laffer.A., 1981, 1-21], who was a supporter of a softer tax policy, argued that the state can raise taxes only if it aims to increase the social sphere expenses. Most of the theorists of that period [Diamond, Mirrlees, 1971, 8-27], who were inclined to the foundations of the so-called optimal tax policy, believed that the tax levers through the price mechanism affect

both production and investment, as well as income redistribution. This circumstance ultimately [Mirrlees., J, Vickrey., W. 1996] affects the distribution of the overall welfare, according to which the state, by redistributing the incomes with the tax policy tool, reaches the point that it equalizes the marginal quantities of consumption of different members of the society.

At the same time, there is no unanimity among theoreticians regarding the issue that it is impossible to achieve in short-term the development and application of personal income taxation rates [Morini, Pellegrino, 2014, 994-1004], by which, on the one hand, it is possible to solve the problem of reducing inequality, on the other hand, collect the amount of income needed for the state budget. A number of researchers [Peter K.S., Buttrick S. & Duncan D, 2009, 31-32] studying the long-term impacts of individual progressive taxation in countries with advanced and emerging markets, came to the conclusion that there is a statistically significant correlation in the advanced countries between taxes and budget revenues, while in countries with emerging markets, this interaction is very weak or not expressed at all, which is a consequence of large volumes of informal employment. Based on such judgments, a number of economists [Bird, Zolt, 2005, 1] believe that the application of a progressive scale of personal income taxation in developing countries does not provide the desired results of an efficient redistribution of incomes due to the high level of alternative transaction costs. In the context of the above judgments, an important issue is the assessment of the level of inequality caused by the effect of this or that tax regime. In this sense, the most common indicator for assessing inequality is the use of the Gini coefficient, which characterizes the ratio of the income of the two most extreme groups from all decile groups. Although, in honor of the famous Chilean professor Jose Gabriel Palma [Palma G., 2011, 87-153], in economic analysis, another inequality assessment coefficient is used, the Palma coefficient, which characterizes the asymmetric distribution of total income: the relation of top 10 percent wealthiest and the bottom 40 percent the income ratio of poor families, which is a more accurate estimate of poverty trends. The most characteristic feature of Palma's coefficient is that in such a division, the average income of the 5-9 groups of the population is approximately equal to half of the total income and is more stable, and the remaining half of the income is used as a basis for the assessment [Tchamyou V., 2018, 7-25]. Another opportunity to assess inequality is provided by the Theil index, the main advantage of which is that by dividing society into infinitesimally small parts, and then decomposing each group into different subgroups, it can make it possible to analyze their evolution and relationships. [www.capacity4dev.europa.eu]

Scientific novelty

The scientific novelty of the results obtained within the framework of the research is related to the multi-vector assessment of inequality, which, along with the use of the Gini

coefficient, was demonstrated in the form of a comparison and analysis of the results obtained in the context of the use of Palma and Theil coefficients and the state of inequality. The other component of the novelty of the research is related to the results of the implemented simulation analysis, which were obtained with the use of the personal income tax database of the RA State Revenue Committee and the evaluation of the results. As a result of the analysis made on the basis of this method, it was found that only the progressive taxation system has a certain positive impact from the point of view of reducing the level of income inequality, while the effect of the current flat taxation is insignificant.

Analysis

In the conditions of the liberal reforms of the late 1990s in the Republic of Armenia, the level of poverty and inequality in the country reached unprecedented levels. Later, opposite processes took place. This, in particular, can be seen from the results of our research. In particular, the trend of the Palma coefficient, which represents the ratio of the relative weights of the income groups of the upper (X) and lower (I-IV) income groups, proves that the level of inequality in RA has continuously decreased. Until 2008-09 Global crisis The Palma ratio averaged around 2.1 at the beginning of the considered time period, being at a fairly high level in 2003: the share of the upper income group was about 2.9 times higher than the lower income groups. It is noteworthy that in the pre-crisis period, this ratio had continuously decreased, reaching 1.7 in 2007, but the crisis and post-crisis recovery period stopped the decreasing trends of the ratio, further deepening the disparity of income distribution in individual years: on 2015, the ratio was 2.0 (Table 1). However, since 2015, the mentioned ratio of incomes has continuously decreased: 1.5 in 2022. The dynamics of this coefficient is comparable to the movement of two alternative measures of inequality: the Gini and Theil coefficients. In particular, according to the data on the Gini coefficient calculated by the RA Statistical Committee, the Gini coefficient continuously decreased to 0.352 in 2022, compared to 0.438 in 2003. According to our calculations, the Theil coefficient showed almost the same behavior, compared to 0.386 in 2003, the Theil coefficient continuously decreased to 0.210 in 2022 (Table 1). The above 3 indicators, which were calculated on the basis of the database of the Statistical Committee of the Republic of Armenia, document the decreasing trend of inequality in the Republic of Armenia.

Table 1. The dynamics of the main inequality assessment coefficients in 2003-2022.

	Palma coefficient[1]	**Gini coefficient**[2]	**Theil coefficient**[3]
2003	2.9	0.438	0.386
2004	2.3	0.395	0.305
2005	1.9	0.359	0.257
2006	1.6	0.370	0.226
2007	1.7	0.371	0.238
2008	1.7	0.339	0.231
2009	1.6	0.355	0.226
2010	1.8	0.362	0.241
2011	1.7	0.371	0.230
2012	1.9	0.372	0.258
2013	1.8	0.372	0.255
2014	2.0	0.373	0.274
2015	2.0	0.374	0.272
2016	1.9	0.375	0.265
2017	1.8	0.359	0.254
2018	1.9	0.360	0.256
2019	1.6	0.381	0.229
2020	1.6	0.363	0.220
2021	1.6	0.364	0.228
2022	1.5	0.352	0.210

As part of the research, the tax data on more than 800,000 income taxpayers of 2023, included in the RA SRC database, were brought to a monthly basis from an annual basis, and then stratified according to 10 decile groups, based on the size of the gross income of each individual before taxation, according to which for each taxpayer included in the decile group, the average gross income before taxation, the average income tax paid, the stamp duty, as well as the amount of the average allocations to pension funds were calculated. In parallel, a simulation analysis was carried out the essence of which was to illustrate what amount of personal income tax would have been paid from each taxpayer, if the progressive taxation system operating in RA before the personal income tax reform

[1] Palma coefficient was calculated by the author based on the dataset included in the 2003-2023 statistical reports «Social Snapshot and Poverty in Armenia» of the Statistical Committee of the Republic of Armenia. https://armstat.am/am/?nid=82&id=2617

[2] "Yearbook of Armenia", Statistical Committee of the Republic of Armenia https://armstat.am/am/?nid=586

[3] Theil coefficient was calculated by the author based on the dataset included in the 2003-2023 statistical reports «Social Snapshot and Poverty in Armenia» of the Statistical Committee of the Republic of Armenia. https://armstat.am/am/?nid=82&id=2617

was still in operation*, then these data were also averaged and matched according to deciles. The results are presented in the table below (Table 2).

Table 2. Summary calculations on average incomes and taxes paid of RA income taxpayers in 2023 [1]

	Gross income (before taxation)	Average income tax (flat taxation)	Average income tax burden (flat taxation)	Average income tax (progressive taxation)	Average income tax burden (progressive taxation)	Stamp duty	Pension contribu-tions
I	16,230	3,126	19%	3,733	23%	435	1,320
II	41,247	7,866	19%	9,487	23%	938	2,928
III	67,702	12,888	19%	15,572	23%	1,394	4,580
IV	97,422	18,812	19%	22,407	23%	2,020	5,843
V	118,622	23,496	20%	27,283	23%	2,621	7,122
VI	150,189	29,825	20%	34,778	23%	2,888	8,968
VII	195,555	38,839	20%	47,255	24%	3,667	11,818
VIII	266,394	52,876	20%	67,090	25%	4,879	17,484
IX	403,761	79,985	20%	105,553	26%	5,870	28,628
X	1,235,728	241,302	20%	353,889	29%	10,677	59,205

From the analysis of Table 2, it becomes obvious that the progressive tax system would have made it possible to generate larger amounts of tax revenues, and in the case of the progressive tax system, the tax burden would have been much higher for individuals included in relatively higher income groups, starting from the VII-th decile group: higher by an average of 6% compared to the current system, and the difference of 3% in the tax burden in the I-VI income groups is the result of the reduction of the rate from 23% to 20% as a result of the legislative change. I-IV decile groups also include entrepreneurs taxed at the reduced rate of micro-enterprises defined by the Tax Code, which began to be taxed according to the rules of the general tax system only from the 2nd half

* In the case of a monthly income of up to 150,000 drams, the gross income was taxed at a rate of 23%, in the case of an income of 150,000 drams to 2,000,000 drams, 34,500 drams + 28% of the part exceeding 150,000 drams, as well as in the case of incomes of 2,000,000 drams or more, 552,500 drams + 2,000.00 drams 36% of the part exceeding "Tax Code of Armenia", Article 150, 01.01.2020 edit The introduction of the current personal income flat taxation system proposed a flat rate of 20%, which was to be gradually reduced from 23% in 2020 to 22% in 2021, 21% in 2022, and 20% in 2023. "Tax Code of Armenia", Article 150 www.irtek.am

[1] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

of 2023[1], that is why the personal income tax burden in the above mentioned deciles is below 20% (Table 2).

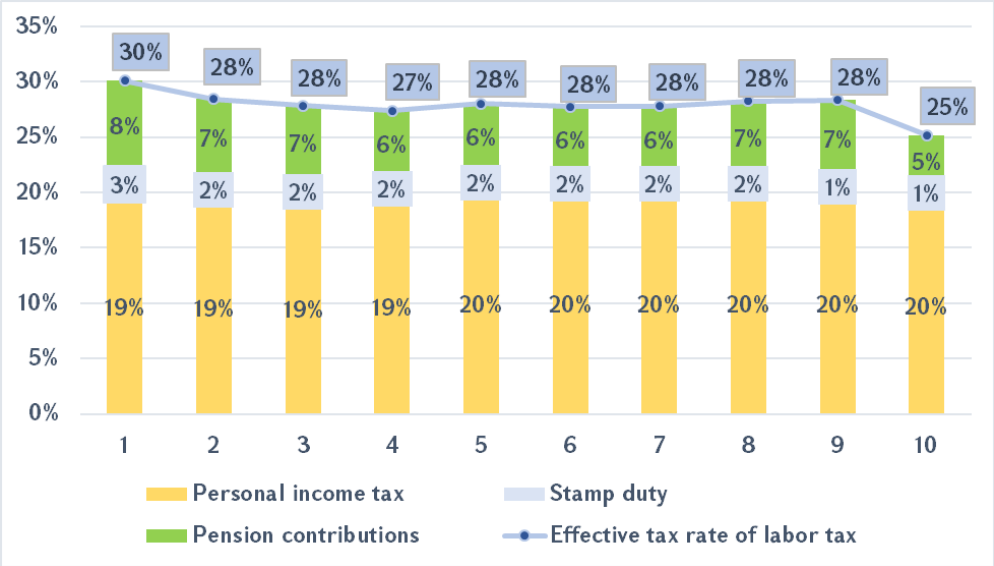

Figure 1. The structure of labor taxation in RA by decile groups in 2023 [2]

The analysis of labor tax structure disaggregated by decile groups states that despite the promises of equalization of the labor remuneration taxation system as a result of the personal income tax reform, in fact, as of 2023, the taxation system is regressive in nature. It is clear from Chart 1 that, in addition to personal income tax, other components of wage taxation, pension contributions and stamp duty have a regressive nature, that is, the tax burden of these components is higher in the low-income decile groups, that is, the weight in the income structure, and relatively low in the upper-income decile groups. All of this makes the labor taxation system regressive in the general, which also makes evident the tendency of the effective rates of taxation according to decile groups to decrease.

In this context, it is important to study the distribution of income tax payers according to income groups, which will make it possible to find out which income groups are the main carriers of fiscal policy actions.

[1] "Tax Code of Armenia", Article 150
https://www.irtek.am/views/act.aspx?tid=156204#p4416
[2] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

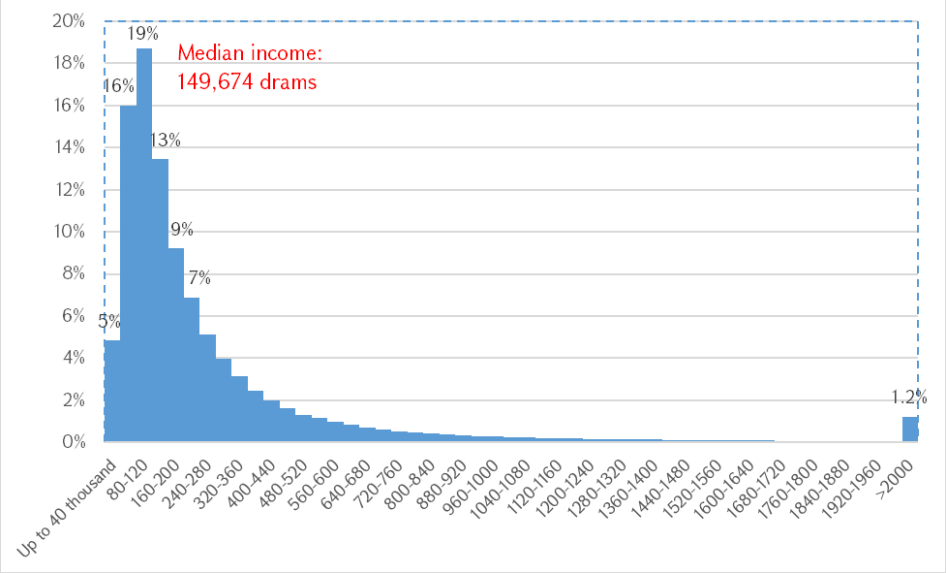

Figure 2. Distribution of personal income taxpayers in RA before taxation by income groups in 2023[1]

In Chart 2, we can see that about 50% of taxpayers are concentrated in income groups below the previous minimum threshold of progressive taxation: 150,000 drams, and the median pre-tax income almost corresponds to this threshold. As for the income tax payers of more than 2,000,000 drams provided by the progressive system, they make up 1.2% of the total tax payers. This has some implications for policymakers, as this picture shows that fiscal policy decisions can have a significant impact on households in the lower income groups, and the flat system places the interests of quantitatively significantly different social groups on the same level, therefore, puts the system in conflict in terms of both fairness and efficiency.

[1] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

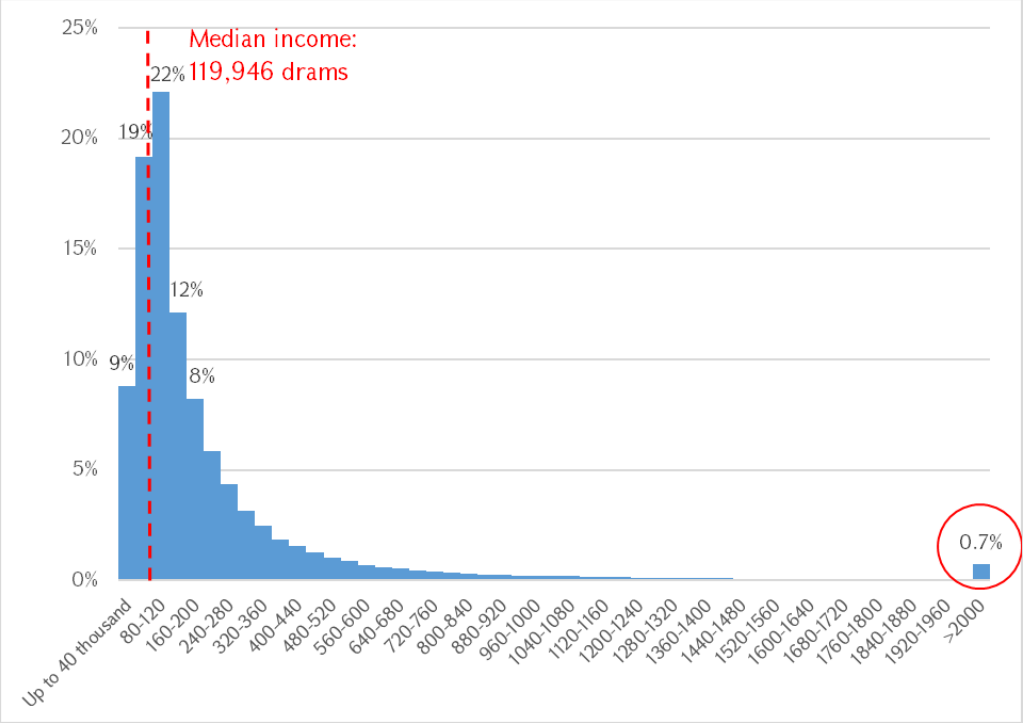

Figure 3. Distribution of personal income tax payers in RA after flat taxation according to income groups in 2023 [1]

If we look at the impacts of the current flat tax system on the distribution of taxpayers, it is clear that taxation reduces both total and median income and increases the number of taxpayers in the bottom two income groups by a total of 7 percentage points (Chart 3). As for relatively higher income earners of AMD 2,000,000 and above, their number decreases from 1.5% to 0.7% before taxation. In this context, it is interesting to study how the distribution of taxpayers would be in the case of the former progressive taxation system (Chart 3).

[1] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

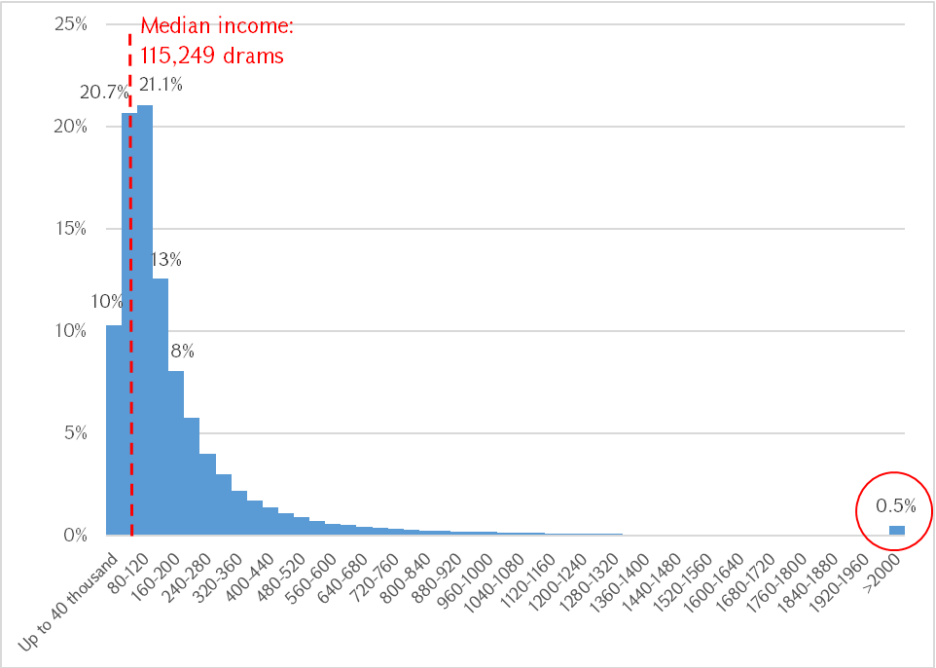

Figure 4. Distribution of personal income tax payers in RA after progressive taxation by income groups in 2023 [1]

It is obvious from Chart 4 that the progressive system would have a significantly greater impact on taxpayers with incomes of 2,000,000 AMD and more, and the share of this group would decrease to 0.5% in total, as opposed to 0.7% of flat taxation. Of course, it is also necessary to record here that the median income decreases at a higher rate than in the case of flat taxation, and also the number of taxpayers placed in the above-mentioned low-income two groups increases by about 10%. This phenomenon is largely due to the fact that flat taxation implies lower tax rates, and therefore also the tax burden, than the previous progressive taxation system. In this case, from the point of view of mitigating the effects on the lower income groups, an effective solution can be the definition of a non-taxable threshold, for example, in the amount of the minimum consumer basket.

In parallel, within the framework of the research, as mentioned, a simulation analysis was carried out and the methods of calculating the Lorenz curve and the Gini coefficient, among the main theoretical approaches known for the assessment of inequality, were used in the case of flat and progressive taxation, based on the RA State Revenue Committee tax statistics.

[1] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

Table 3. The income structure of RA taxpayers before taxation, according to decile groups in 2023 [1]

Decile	Average income before taxation	Share in total income	Cumulative share in total income
I	16,230	0.6%	1%
II	41,247	1.6%	2%
III	67,702	2.6%	5%
IV	97,422	3.8%	9%
V	118,622	4.6%	13%
VI	150,189	5.8%	19%
VII	195,555	7.5%	26%
VIII	266,394	10.3%	37%
IX	403,761	15.6%	52%
X	1,235,728	47.7%	100%

Considering the limitation of the sample, the Gini coefficient was calculated using the discrete approach with the following formula:

$$\boldsymbol{Gini_{coef}} = \frac{N+1}{N} - \frac{2\sum_1^N (N+1-i)x_i}{N\sum_1^N x_i}$$

$Gini_{coef}$ – discrete Gini coefficient,

x_i – the average income of the household included in the i-th decile,

N – the number of units included in the sample, which in this calculation corresponds to the number of deciles: 10.

Table 4. The income structure of RA taxpayers after flat taxation, according to decile groups in 2023 [2]

Decile	Average income before taxation	Average tax pai	Disposable incom	Share in total income	Cumulative shar in total income
I	16,230	3,126	13,104	0.6%	1%
II	41,247	7,866	33,381	1.6%	2%
III	67,702	12,888	54,814	2.6%	5%
IV	97,422	18,812	78,610	3.8%	9%
V	118,622	23,496	95,126	4.6%	13%
VI	150,189	29,825	120,363	5.8%	19%
VII	195,555	38,839	156,716	7.5%	26%
VIII	266,394	52,876	213,519	10.2%	37%
IX	403,761	79,985	323,777	15.5%	52%

[1] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

[2] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

X	1,235,728	241,302	994,426	47.7%	100%

The study of the income before taxation of taxpayers shows that they are extremely unevenly distributed. The bottom 10% of the population (decile I) gets about 1% of the total income, while the top 10% (decile X) gets about 48% of the total income. In other words, the top 10% of the population has on average as much income as 90% of the population, cumulatively 52% of income. The Gini coefficient before taxation is 0.5721, which documents the high level of income inequality in RA (Table 3).

It is obvious from the Table 4, that the situation is almost identical in the case of flat taxation: about 48% of the disposable income belongs to the taxpayers included in the upper income group. The current tax system has little positive impact on income inequality: the Gini coefficient in the case of flat taxation is 0.5719 (Table 4).

Table 5. The income structure of RA taxpayers after progressive taxation, according to decile groups in 2023 [1]

Decile	Average income before taxation	Average tax paid	Disposable income	Share in total income	Cumulative share in total income
I	16,230	3,733	12,497	0.7%	1%
II	41,247	9,487	31,760	1.7%	2%
III	67,702	15,572	52,131	2.7%	5%
IV	97,422	22,407	75,015	3.9%	9%
V	118,622	27,283	91,339	4.8%	14%
VI	150,189	34,778	115,411	6.1%	20%
VII	195,555	47,255	148,299	7.8%	28%
VIII	266,394	67,090	199,304	10.5%	38%
IX	403,761	105,553	298,208	15.6%	54%
X	1,235,728	353,889	881,839	46.3%	100%

As for the calculation based on the previous approach of progressive taxation, it can be seen from Table 5 that in this case inequality decreases to some extent: the Gini coefficient in this case is 0.5598. However, in the case of the given scale, the problems remain relevant, as around 46% of the disposable income belongs to households placed in the upper decile (Table 5). Therefore, in order to optimize the level of inequality, it is not only necessary to make a transition to a progressive taxation system, but also it is necessary to apply higher tax rates in the case of taxpayers included in the upper income groups, and the application of the above-mentioned non-taxable threshold will make it possible to mitigate the possible negative effects on the lower income groups.

[1] The calculation were made by the author as a result of combining the data available in the SRC database https://www.src.am/am

In order to display income inequality graphically, within the framework of this research, based on the above calculations, Lorenz curves were constructed before taxation, after flat taxation and after progressive taxation. It is obvious from the chart that only the progressive taxation system has a certain positive effect in terms of reducing income inequality, while the effect of flat taxation is insignificant, almost 0 (see chart 5).

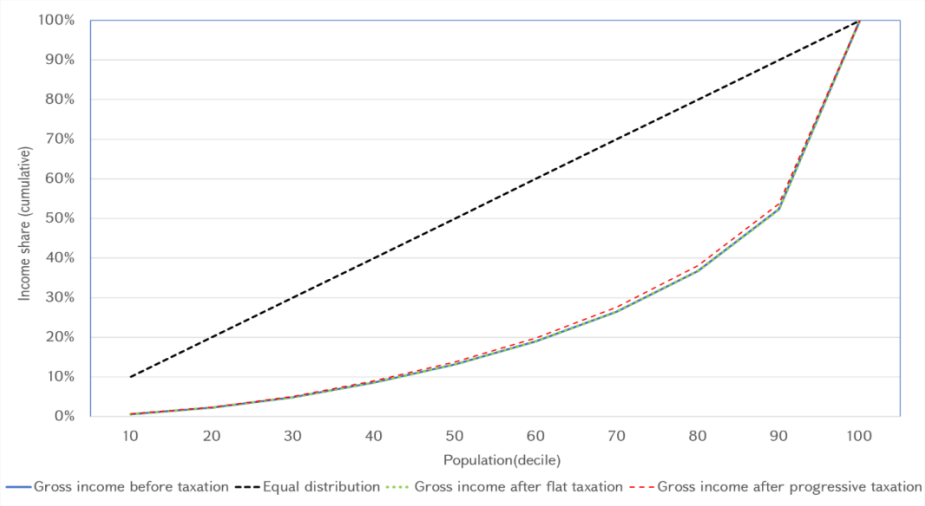

Figure 5. Lorenz curve before taxation and after taxation in the case of RA economy in 2023[1]

Conclusion

The research carried out in this study proves that the level of inequality in the Republic of Armenia has decreased to some extent over the last two decades. Nevertheless, the analysis performed on the basis of the calculation of various indices and coefficients describing inequality show that the established tendencies of income distribution between different groups of society continue to be preserved. One of the other consequences of the analysis is that the transition to a flat taxation system of personal income from 2020 not only did not solve the problem of inequality, but also deepened it.

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Macroeconomic impacts of personal income tax in the context of inclusive distribution of income and overcoming inequality

Key words: income tax, inequality, Gini coefficient, Palma coefficient, Theil coefficient, progressiveness of taxation, flat taxation system

The article examines the issues of the generation and distribution of labor income in the Republic of Armenia in the context of the experience and witnessed results of the application of various personal income tax regimes, particularly flat and progressive taxation systems. Based on the analysis of official statistics, main trends of inequality were observed, based on a number of tools used in scientific analysis: the Gini and Palma coefficients, as well as the Theil index. From the results of the study, it was found that the level of inequality in the country has decreased to some extent in the last two decades. At the same time, within the framework of the research, a simulation analysis was carried out and the methods of calculating the Lorenz curve and the Gini coefficient from the well-known theoretical approaches to inequality assessment were applied in the case of flat and progressive taxation, using the personal income tax database of the RA State Re-venue Committee. Based on this method, as a result of the analysis, it was found that only the progressive taxation system has a certain positive impact in terms of alleviating in-come inequality, while the effect of flat taxation is insignificant.