UDC 316.34+311.3
JEL Classification: C82, Z13

Ivanova M.V., Ivanov A.V.

SOCIO-ECONOMIC DIFFERENTIATION OF SOCIETY: STATISTICAL TRENDS

Ukrainian State University of Chemical Technology, Dnipro, Ukraine

The purpose of the research was to study the statistical trends of social inequality in Ukrainian society. There are a lot of modern studies devoted to the methodology for quantifying this problem, but almost all of them concern the identification and study of the middle class. In Ukrainian society such a formulation of the problem seems to be debatable due to the small number of these social groups. Therefore, the attention of the authors was focused on the study of facts and dynamics in the distribution of the income of society. For this purpose, official statistical information was used: intervals of distribution of citizens by the level of total income. It is shown that these data do not allow to correctly establishing the pattern of changes in social inequality in long-term dynamics, for example, in the period 2012–2020. Also, for these purposes, it is problematic to use the «Gini's coefficient», since its quantitative values are quite dependent on the boundary values of the extreme intervals of the income distribution series. And they give a controversially dubious result. The study of issues of social inequality is also complicated by the fact of the existence of illegal economic activity in Ukraine and officially unaccounted income of citizens. To solve the problem, we have built a graphical profile of socio-economic differentiation, as the dependence of the number of the «i-th» income group of society not on the amount of income, but on the number of the corresponding ranked interval. Revealing the middle interval (or decile group) makes it easy to identify the asymmetry in the distribution of income. We see the advantage of this approach to the analysis of the set task in two aspects: in the possibility of a reliable and objective assessment of the dynamics of social stratification, and in a simpler method of calculation and visualization. The revealed regularity of increasing asymmetry in the distribution of incomes of society in 2020 confirmed by the calculated values of the asymmetry coefficients: Asμ(2012)=0.95 and Asμ(2020)=1.20. So, in the science work substantiates an increase in socio-economic differentiation and inequality in 2020 relative to the pre-crisis period of 2012. It is expected that the revealed statistical trend of increasing social inequality can be affect in the aggravation of socio-economic and political problems in society.

Keywords: socio-economic inequality, income differentiation, income groups, statistical trends, Gini's coefficient, asymmetry.

DOI: 10.32434/2415-3974-2021-14-2-15-21

Introduction

The concepts of socio-economic, income differentiation, social inequality, and economic stratification are often identified. All of them are associated with the distribution of income between middle class and groups of some socio-economic system (most often some country). The level of differentiation of citizens' incomes is an actual social issue. This problem can be studied from different angles of social sciences: demography, economics, applied social and political sciences. We consider the socio-political perspective to be especially important from the point of view of studying the political preferences of the electorate, forming an appropriate image and pre-election party slogans.

The economic aspect in the study of the socio-

economic differentiation of society is directly related to the assessment of the purchasing power of the population, the forecast of consumer demand and economic growth. If we objectively approach the understanding of this problem, then socio-economic differentiation and inequality is a normal and economically explicable phenomenon. From another point of view, the strong stratification of society in terms of income increases the socio-economic and political problems of the state. It is these aspects: the balance of the economy, high consumer demand and the socio-political stability of society that determine the particular relevance of this study.

Analysis of scientific publications

The theoretical basis and fundamental works in the field of studying socio-economic inequality were created by famous scientists with a worldwide reputation: K. Marx, S. Kuznets, V. Pareto, K. Gini, M. Lorenz, P. Sorokin, B. Milanovich, T. Piketty, A. Atkinson et al. It is shown that in the study of socio-economic inequality, it is important not only to assess the actual level of economic differentiation of society, but also to identify features, tendencies of such division.

At the present time the perspective of this problem is shifting towards the identification of the middle class in different types of social formation (informational, post-totalitarian, transformational, etc.). Special attention that devotion to the middle class, explained by the fact that this stratum of society differs significantly from others in terms of the level of socio-political stability, high purchasing power, new consumption standards and significant investment in the development of human capital [1]. It is also substantiated [2] that representatives of the middle class have mainly non-economic interests, which fundamentally distinguishes them from both the upper and lower social strata of society. A lot of modern research is devoted to the methodology for quantifying the middle class. For example, the authors of [3] proposed a criterial approach, according to which the middle classes are distinguished according to objective and subjective criteria. Objective criteria include professional status, education, income, wealth, and private property; and subjective criteria are the self-identification of individuals. In [4], a comprehensive model was developed to determine the share of the middle class in the information economy according to a number of criteria: well-known and widely used (such as income level, education level and self-identification), and relatively new ones. For example, the degree of involvement in the information society. It is substantiated that this criterion reveals the share of the middle class in modern society and the dynamics of its development. The dynamics of the development of the middle class, as shown in [1], can also be studied by the model of its investment behavior in the consumption of paid intangible services in the sphere of education and medicine.

At the same time, research aimed at deeply studying the issues of quantitative measurement of differentiation in society without highlighting the middle class as such is limited. Separately, it is worth noting the work of the authors [5], in which the main sociological and economic emphasis is placed on the essence of the concepts of classification and grouping of social strata. It also identifies the methodological nuances of quantitative approaches to assessing the level of socio-economic differentiation. So, the topic of socio-economic differentiation is in the focus of world economic science. The fundamental methodological problem of studying inequality in the distribution of income in society concerns approaches to the quantitative assessment of this phenomenon.

The basis of the modern science of social inequality is formed by the methodologies introduced by V. Pareto, K. Gini, M. Lorentz, and the measurement of the phenomenon of socio-economic differentiation using the «Gini's statistical indexes» (the graphical illustration of the index is the Lorenz curve), Atkinson and a number of others (for example, [6]). The identification of the middle class in Ukrainian society seems to be debatable [7-11] due to the small size of this group. Therefore, we consider it expedient to focus on identifying and studying some income groups or the social profile of Ukrainian society.

Purpose of the article

The purpose of the scientific work is to study of statistical trends in the differentiation of Ukrainian society by incomes of citizens using the numerical characteristics of the statistical distribution of interval samples.

Results and discussions

This study is based on the use of official statistical information: on the intervals of income distribution [12] and indicators of inequality in their distribution. To study the uneven distribution of citizens by the level of material well-being, the grouping method was used. According to this method, the population is distributed in ascending order of income indicators by deciles (10% income intervals) and quintiles (20% income intervals). The statistical indicators of income distribution presented in [6] are practically stable in dynamics and do not allow identifying the patterns of the phenomenon under study. For example, the quintile coefficient of income differentiation of the population (calculated as the ratio of the income level of the most well-off 20% of the population to the income level of the least well-off 20% of the population) over the past 10 years shows values of 3.1...3.5 without an obvious

Table 1

Interval samples of initial data for 2012, 2020

	№ interval	1	2	3	4	5	6	7	8	9	10	11
2012	Pi, UAH	up to 480	480–840	840–1200	1200–1560	1560–1920	1920–2280	2280–2640	2640–3000	3000–3360	3360–3720	over 3720
	Me(Pi), UAH	390*	660	1020	1380	1740	2100	2460	2820	3180	3540	3960*
	Yi, %	0.1	2.3	9.1	21.3	22.1	16.6	1.4	6.7	4.3	2.0	5.1
2020	Pi, UAH	up to 3000	3000–4000	4000–5000	5000–6000	6000–7000	7000–8000	8000–9000	9000–10000	10000–11000	11000–12000	over 12000
	Me(Pi), UAH	2700*	3500	4500	5500	6500	7500	8500	9500	10500	11500	13000*
	Yi, %	8.3	17.8	21.6	17.6	11.5	7.9	5.1	2.8	2.2	1.8	3.4

* – the extreme boundaries of these intervals are indicated presumably

pattern of their change.

Therefore, to study the problem posed, we analyzed the initial statistical series of the interval distribution of income [12]. An important point was the correct formation of the sample of these data: a more accurate picture of the actual distribution of income in society is displayed by the data for the earliest periods of the samples presented in [12]. Thus, two sets of interval data for 2020 and 2012 were selected for statistical analysis. The corresponding data of interval readings are given in the table. 1. The range of intervals (Pi), median values of intervals Me(Pi) and the share of the corresponding income group in the total population (Yi) are indicated there.

The boundary intervals (1 and 11) of the scale of differentiation presented in Table 1 and the corresponding median values were established by analogy with a similar assumption, as in [9]. These data directly affect the calculation of the generalized indicator of income concentration and socio-economic differentiation – the «Gini's coefficient». Therefore, we present variants of its calculation for different ranges of extreme intervals. Let's use the official method for calculating the «Gini's coefficient» – G-coefficient [6]:

$$G = 1 - 2\sum_{i=1}^{11} Y_i \times \mathrm{cum}(r_i) + \sum_{i=1}^{11} Y_i \times r_i, \qquad (1)$$

where Y_i – the share of the «i-th» group in the total population (Table 1); r_i – the share of income of the «i-th» group of the population. Calculated according to the equation (2) [9]:

$$r_i = \frac{P_i}{P_{max}}, \qquad (2)$$

where P_i – incomes of the «i-th» group of the population (Table 1); P_{max} – the maximum income for the corresponding interval sample (Table 1); cum (r_i) – the cumulative share of the income of the «i-th» group. It was determined by sequential summation of the «r_i» indicators in the intervals of relative shares of income.

The values «r_i», «cum (r_i)» significantly depend on the median values of the extreme intervals and therefore affect the values of the G-coefficient. It is shown in [8,9] the boundaries of the extreme intervals can be two times larger and smaller than the corresponding extreme boundaries of the interval. Therefore, we calculated the G-coefficients, changing the lower (in the 1st interval) and upper (in the 11th interval) their boundaries by 30; 50; 70% relative to the specified level of the extreme interval (Table 2).

Table 2

Dependence of the Gini coefficients on the boundaries of the extreme intervals of the income differentiation scale

Upper (lower) boundary of the boundary interval	2012	2020
± 0	0.216	0.222
± 0.3	0.234	0.256
± 0.5	0.246	0.278
± 0.7	0.257	0.300

From the data in Table 2, it can be seen that the values of the G-coefficients are in direct relationship with the predicted value of the extreme intervals. And at the same time, in 2020, all values of the G-coefficient are higher than for 2012. This indicates an increase in trends in socio-economic differentiation. The calculated values of the G-coefficients (Table 2) are identical to the data of independent studies [9,13]. It is interesting that with such values of the G-coefficients, Ukraine in this rating is next to the EU countries: Austria, Holland, Slovakia [13].

In other words, the absolute values of the G-coefficient as a characteristic of socio-economic differentiation in Ukraine may raise doubts. The most real reason that the statistical series (Table 1) distort the factual distribution of income, experts [7,8] consider the presence of the illegal economy and

shadow (illegal) economic income of citizens. In this regard, we consider it necessary to note the scientific works of Y. Kharizishvili, in which the schemes for obtaining illegal incomes by various economic entities are disclosed.

In addition to the considered indicators of the quintile distribution of income and the «Gini's coefficient», the median approach is used to analyze socio economic differentiation, which allows comparing the size of the income groups of society in dynamics [5]. In this case, it is recommended to take the analyzed interval of median income values from 0.75–1.25 Me (Pi) to 0.5–2.0 Me (Pi). Since the income boundaries of relatively wealthy social strata of society (or the middle class) are not clearly defined, and there is no consensus on this issue in science, it is very difficult to draw an objective conclusion regarding the increase or decrease of the problem of social inequality during the analyzed period.

We presented the generalized analysis of the data in Table 1 in a graphical form. Ranked interval series (or decile groups of citizens' incomes) are plotted along the abscissa, as the number of the corresponding income group. The indicator of the relative size of these income groups is plotted on a vertical scale (Yi). Since the initial statistical data (Table 1) reflect the distribution of society in ascending order of income indicators over equal intervals of income, this form of presentation and comparison of data, in our opinion, most objectively reflects the situation with income differentiation in society.

The ideal situation or desired socio-economic equality would correspond to the law of a normal distribution of income among all social groups. And in this ideal case, the shape of the curves for 2012, 2020 would be another: symmetric about to the income of the middle group of the variation series or the 6th decile group (this is shown by the dotted line in Figure). In fact, we observe something else: the modal and median values of the curves of the profile of socio-economic differentiation turn out to be significantly shifted to the left. In statistics, this corresponds to the state of right-sided asymmetry in income distribution or a shift in the modal interval of income groups towards lower incomes. Moreover, a stronger leftward shift of the modal and median values of the 2020 curve indicates an increase in socio-economic differentiation.

So, abstracting from the numerical values of the interval series of the statistical distribution of income by decile groups and identifying these groups only by ranked numbers make it possible to build a graphical profile of the socio economic differentiation of society for different time periods. We see the advantage of this approach to the analysis of the set task in the possibility of a reliable and objective assessment of the dynamics, as well as in a simpler calculation and visualization technique.

Table 3 shows the characteristics of the statistical distribution of interval samples (Table 1): sample mean (P*), median Me (P) and modal value Mo (P), and the «Pearson asymmetry coefficients» (Asp) [14,36] and the asymmetry coefficients (Asμ), calculated from the central moments of the third order [14,36].

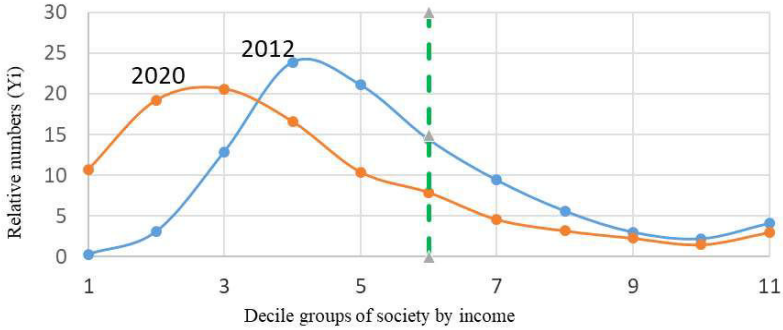
Table 3

Numerical characteristics of the statistical distribution of interval samples

Year	P*, UAH	Me(P), UAH	Mo(P), UAH	Asp	Asμ
2012	1877	1560	1840	0.413	0.95
2020	5706	5130	5012	0.536	1.20

The data in Table 3 and the positive values of the asymmetry coefficients confirm the right-sided asymmetry in the distribution of income in society and its rather significant level (according to the value of Asp). A tendency has been revealed that social groups that fall into the extreme left – low-income intervals are becoming more numerous. That is, the number of citizens with incomes less than the average is increasing.

Of the two calculated values of the asymmetry coefficients Asp and Asμ, we consider the Asμ indicator to be the most objective, which is less dependent on the extreme members of the sampling intervals and their boundaries. The statistical



Graphic profile of socio-economic differentiation of Ukrainian society

significance of the Asμ values, established by the sample size [14,37], is high. Thus, the values Asμ (2012)=0.95 and Asμ (2020)=1.20 confirm the increasing asymmetry in the series of income distribution in the entire general population – in the whole society in 2020.

Conclusion

The most complete picture of socio-economic inequality in society is provided by indicators of differentiation of the total income of citizens, shown in the official statistical information. But these indicators do not allow to unambiguously establishing the regularity of changes in social inequality in the long-term dynamics of economic changes. We consider the problem of measuring socio-economic inequality to be very important from the point of view of preventing social upheaval. To measure socio-economic trends, the period was taken: from crisis to crisis (2012–2020).

The Gini's coefficient is quite applicable for displaying the dynamics of socio-economic differentiation, but its numerical indicators are quite dependent on the boundary values of the extreme intervals of the income distribution series. This gives a contradictory and dubious result, which reduces the informative value of the Gini's coefficient in the analysis of the problems of socio-economic inequality in dynamics. The study of the issue is also complicated by the fact of the existence of large-scale illegal economic activity in Ukraine and the unaccounted for income of citizens.

An interesting solution to the problem posed in the study, we consider the construction of a graphical profile of socio-economic differentiation, as the dependence of the number of the «i-th» income group of society not on the amount of income, but on the number of the corresponding ranked interval. Revealing of the median interval (or the «i-th» decile group) makes it easy to identify the asymmetry in the distribution of income. We see the advantage of this approach to the analysis of the set task in the possibility of a reliable and objective assessment of the dynamics of social stratification, as well as in a simpler calculation and visualization technique. The revealed regularity of increasing asymmetry in the distribution of incomes of society in 2020 is confirmed by the calculated values of the asymmetry coefficients: Asμ (2012)=0.95 and Asμ (2020)=1.20.

So, in the science work substantiates an increase in socio-economic differentiation and inequality in 2020 relative to the pre-crisis period of 2012. Despite the possible statistical inaccuracies in the formation of the sample of the initial data (officially unaccounted or illegal incomes, assumptions about the boundaries of the extreme intervals of decile groups), we consider this conclusion to be quite reasonable. It is expected that the revealed statistical trend of increasing social inequality can be affect in the aggravation of socio-economic and political problems in society.

REFERENCES

1. Pishnyak, A.I., Goriainova, A.R., Nazarbaeva, E.A., & Khalina, N.V. (2020). Investitsii srednego klassa v chelovecheskiy kapital: potreblenie platnyih uslug v oblasti obrazovaniya i meditsinyi [Middle Class' Investment in Human Capital: Consumption of Paid Services in Education and Medicine]. *Voprosy Ekonomiki*, *11,* 69-85 [in Russian].

2. Baizidi, R. (2019). Paradoxical Class: Paradox of Interest and Political Conservatism in Middle Class. *Asian Journal of Political Science, (3),* 272-285 [in English].

3. Bobkov, V.N., Odintsova, Ye.V., & Kvachev V.G. (2019). O kriterialnoy identifikatsii rossiyskih srednih klassov [Russian Middle Classes Criterial Identification]. *Sotsiologicheskie Issledovaniya – Sociological Studies, (4),* 118-125 [in Russian].

4. Khusnullova, A., Absalyamova, S., Sakhapov, R., & Mukhametgalieva, C. (2017). Impact of telecommunication technologies on the middle class formation. *Conference Paper 6th International Conference on Mathematical Modelling in Physical Sciences (IC-Msquare 2017)* Pafos, Cyprus, 012093 [in English].

5. Anikin, V., & Lezhnina, Yu. (2018). Ekonomicheskaya stratifikatsiya: ob opredelenii granits dohodnyih grupp [Economic Stratification: On Defining the Boundaries of Income Groups]. *Sotsiologicheskoe Obozrenie – Russian Sociological review, 17 (1),* 237-273 [in Russian].

6. Sait derzhavnoi sluzhbi statistiki Ukraini [Site of the State Statistics Service of Ukraine]. *ukrstat.gov.ua.* Retrieved from https://ukrstat.org/uk/operativ/operativ2020/gdvdg/duf/arh_duf_u.htm [in Ukrainian].

7. Yurchik, G.M., & Samolyuk, N.M. (2016). Otsinyuvannya diferentsiatsii dohodiv naselennya Ukraini z urahuvannyam yih tinovoyi komponenti [Assessment of Income Differentiation of the Population of Ukraine, Taking into Account Their Shadow Component]. *Demografiya ta sotsialna ekonomika – Demography and Social Economy, 3 (28),* 133–145 [in Ukrainian].

8. Naumova, M.A. (2018). Diferentssatssya dohodsv naselennya Ukraini: tendentsii i faktori [Differentiation of Incomes of The Population of Ukraine: Tendencies And Factors]. *Naukoviy Poglyad: Ekonomska ta Upravlinnya – Scientific View: Economics and Management, 2(60), 130-141* [in Ukrainian].

9. Kostrobiy, P., Kavalets I., & Gnativ L. (2013). Matematichne modelyuvannya indeksu suspilnoi nerivnosti [Mathematical Modeling of the Index of Social Inequality]. *FIziko-matematichne modelyuvannya ta informatsiyni tehnologii – Physical and Mathematical Modeling and Information Technology, 17,* 81-91 [in Ukrainian].

10. Opalko V.V., & Denisenko V.O. (2018). Nerivnist dohodiv i problema formuvannya serednogo klasu v Ukraini [Income Inequality and The Problem of Middle Class Formation in Ukraine]. *Naukoviy visnik Mizhnarodnogo gumanitarnogo universitetu. Seria: Ekonomika i Menedzhment – Scientific Bulletin*

of the International Humanities University. Series: Economics and Management, 33, 28-35 [in Ukrainian].

11. Nagorna A.M., & Nikolenko L.A. (2019). Diferentsiatsiya dohodiv naselennia ta ekonomichne zrostannya v Ukraini [Differentiation of Incomes of Citizens and Economic Growth in Ukraine]. *Infrastruktura Rynku – Market Infrastructure, 35,* 343-350 [in Ukrainian].

12. Sait derzhavnoi sluzhbi statistiki Ukraini [Site of the State Statistics Service of Ukraine]. *ukrstat.gov.ua.* Retrieved from http://www.km.ukrstat.gov.ua/ukr/statinf/vrd/rnssv_r.htm [in Ukrainian].

13. Sait Svitovogo Atlasu Danih [Site of the World Data Atlas]. *knoema.ru/atlas.* Retrieved from https://knoema.ru/atlas/ [in Russian].

14. Grigulich S. M., LIsovska V. P., & Makarenko O. I., et al. (2015). *Matematichna statistika [Mathematical Statistics].* Kiyv: KNEU [in Ukrainian].

Received 05.10.2021.
Reviewer: Doct. of Econ. Sc., Prof. Fedulova S.O.

СОЦІАЛЬНО-ЕКОНОМІЧНА ДИФЕРЕНЦІАЦІЯ СУСПІЛЬСТВА: СТАТИСТИЧНІ ТЕНДЕНЦІЇ

Іванова М.В., Іванов А.В.

Завдання дослідження полягало у вивченні статистичних тенденцій соціальної нерівності українського суспільства. Сучасних досліджень, присвячених методології кількісного оцінювання цієї проблеми, досить багато, але практично всі вони стосуються ідентифікації та вивчення середнього класу. В українському суспільстві така постановка проблеми видається дискусійною через невелику відносну чисельність цієї соціальної групи. Тому увага авторів була сфокусована на вивченні фактів і динаміки у розподілі доходів суспільства. З цією метою було використано офіційну статистичну інформацію: інтервали розподілу громадян за рівнем загальних доходів. Показано, що ці дані не дозволяють коректно встановити закономірність зміни соціальної нерівності у тривалій динаміці, наприклад, у період 2012–2020 років. Також з цією метою проблематично застосування коефіцієнта Джині, оскільки його чисельні показники сильно залежать від граничних значень крайніх інтервалів рядів розподілу доходів і дають суперечливо-сумнівний результат. Вивчення питань соціальної нерівності також ускладняється фактом існування масштабної тіньової економічної діяльності в Україні та неврахованими доходами громадян. Для вирішення поставленого завдання нами побудовано графічний профіль соціально-економічної диференціації, як залежність чисельності і-ої доходної групи соціуму, але не від розміру доходу, а від номера відповідного ранжованого інтервалу. Виділення медіанного інтервалу (або децильної групи) дозволяє досить легко виявити асиметрію розподілу доходів. Перевага такого підходу до аналізу поставленого завдання ми бачимо у можливості достовірного та об'єктивного оцінювання динаміки соціального розшарування, а також у простішій методиці розрахунків та візуалізації. Виявлена закономірність посилення асиметричності у ряді розподілу доходів суспільства у 2020 р. підтверджена розрахунковими значеннями коефіцієнтів асиметричності: Asμ (2012)=0,95 та Asμ (2020)=1,20. Таким чином, обґрунтовано збільшення соціально-економічної диференціації та нерівності у 2020 р. відносно докризового періоду 2012 р. Очікується, що виявлена статистична тенденція посилення соціальної нерівності може знайти своє відображення у загостренні соціально-економічних і політичних проблем у суспільстві.

Ключові слова: соціально-економічна нерівність, диференціація доходів, доходні групи, статистичні тенденції, коефіцієнт Джині, асиметрія.

СОЦИАЛЬНО-ЭКОНОМИЧЕСКАЯ ДИФФЕРЕНЦИАЦИЯ ОБЩЕСТВА: СТАТИСТИЧЕСКИЕ ТЕНДЕНЦИИ

Иванова М.В., Иванов А.В.

Задача исследования состояла в изучении статистических тенденций социального неравенства украинского общества. Современных исследований, посвященных методологии количественной оценки этой проблемы довольно много, но практически все они касаются идентификации и изучения среднего класса. В украинском обществе такая постановка проблемы представляется дискуссионной по причине малочисленности этой социальной группы. Поэтому внимание авторов было сфокусировано на изучении фактов и динамики в распределении доходов общества. Для этой цели была использована официальная статистическая информация: интервалы распределения граждан по уровню общих доходов. Показано, что эти данные не позволяют однозначно установить закономерность изменения социального неравенства в длительной динамике, например, в период 2012–2020 гг. Также для этих целей проблематично применение коэффициента Джини, так как его численные показатели довольно сильно зависят от граничных значений крайних интервалов рядов распределения доходов. И дают противоречиво-сомнительный результат. Изучение вопросов социального неравенства также осложняется фактом существования масштабной теневой экономической деятельности в Украине и неучтенными доходами граждан. Для решения поставленной задачи нами построен графический профиль социально-экономической дифференциации, как зависимость численности і-ой доходной группы социума не от размера дохода, а от номера соответствующего ранжированного интервала. Выделение медианного интервала (иди децильной группы) позволяет достаточно просто выявить асимметрию распределения доходов. Преимущество такого подхода к анализу поставленной задачи мы видим в возможности достоверной и объективной оценки динамики социального расслоения, а также в более простой методике расчетов и визуализации. Выявленная закономерность усиления асимметричности в ряду распределения доходов общества в 2020 г. подтверждена расчетными значениями коэффициентов асимметричности: Asμ (2012)=0,95 и Asμ (2020)=1,20. Таким образом, обосновано увеличение социально-экономической дифференциации и неравенства в 2020 г. относительно докризисного периода 2012 г. Ожидаемо, что выявленная статистическая тенденция усиления социального неравенства может найти свое отражение в обострении социально-экономических и политических проблем в обществе.

Ключевые слова: социально-экономическое неравенство, дифференциация доходов, доходные группы, статистические тенденции, коэффициент Джини, асимметрия.

SOCIO-ECONOMIC DIFFERENTIATION OF SOCIETY: STATISTICAL TRENDS

Ivanova M.V.**, Ivanov A.V.

Ukrainian State University of Chemical Technology, Dnipro, Ukraine

***email: 470629.marina@gmail.com**

Ivanova M.V. ORCID: **https://orcid.org/0000-0003-2620-7168**

The purpose of the research was to study the statistical trends of social inequality in Ukrainian society. There are a lot of modern studies devoted to the methodology for quantifying this problem, but almost all of them concern the identification and study of the middle class. In Ukrainian society such a formulation of the problem seems to be debatable due to the small number of these social groups. Therefore, the attention of the authors was focused on the study of facts and dynamics in the distribution of the income of society. For this purpose, official statistical information was used: intervals of distribution of citizens by the level of total income. It is shown that these data do not allow to correctly establishing the pattern of changes in social inequality in long-term dynamics, for example, in the period 2012–2020. Also, for these purposes, it is problematic to use the «Gini's coefficient», since its quantitative values are quite dependent on the boundary values of the extreme intervals of the income distribution series. And they give a controversially dubious result. The study of issues of social inequality is also complicated by the fact of the existence of illegal economic activity in Ukraine and officially unaccounted income of citizens. To solve the problem, we have built a graphical profile of socio-economic differentiation, as the dependence of the number of the «i-th» income group of society not on the amount of income, but on the number of the corresponding ranked interval. Revealing the middle interval (or decile group) makes it easy to identify the asymmetry in the distribution of income. We see the advantage of this approach to the analysis of the set task in two aspects: in the possibility of a reliable and objective assessment of the dynamics of social stratification, and in a simpler method of calculation and visualization. The revealed regularity of increasing asymmetry in the distribution of incomes of society in 2020 confirmed by the calculated values of the asymmetry coefficients: Asμ(2012)=0.95 and Asμ(2020)=1.20. So, in the science work substantiates an increase in socio-economic differentiation and inequality in 2020 relative to the pre-crisis period of 2012. It is expected that the revealed statistical trend of increasing social inequality can be affect in the aggravation of socio-economic and political problems in society.

Keywords: socio-economic inequality, income differentiation, income groups, statistical trends, Gini's coefficient, asymmetry.

REFERENCES

1. Pishnyak, A.I., Goriainova, A.R., Nazarbaeva, E.A., & Khalina, N.V. (2020). Investitsii srednego klassa v chelovecheskiy kapital: potreblenie platnyih uslug v oblasti obrazovaniya i meditsinyi [Middle Class' Investment in Human Capital: Consumption of Paid Services in Education and Medicine]. *Voprosy Ekonomiki*, *11,* 69-85 [in Russian].

2. Baizidi, R. (2019). Paradoxical Class: Paradox of Interest and Political Conservatism in Middle Class. *Asian Journal of Political Science, (3),* 272-285 [in English].

3. Bobkov, V.N., Odintsova, Ye.V., & Kvachev V.G. (2019). O kriterialnoy identifikatsii rossiyskih srednih klassov [Russian Middle Classes Criterial Identification]. *Sotsiologicheskie Issledovaniya – Sociological Studies, (4),* 118-125 [in Russian].

4. Khusnullova, A., Absalyamova, S., Sakhapov, R., & Mukhametgalieva, C. (2017). Impact of telecommunication technologies on the middle class formation. *Conference Paper 6th International Conference on Mathematical Modelling in Physical Sciences (IC-Msquare 2017)* Pafos, Cyprus, 012093 [in English].

5. Anikin, V., & Lezhnina, Yu. (2018). Ekonomicheskaya stratifikatsiya: ob opredelenii granits dohodnyih grupp [Economic Stratification: On Defining the Boundaries of Income Groups]. *Sotsiologicheskoe Obozrenie – Russian Sociological review, 17 (1),* 237-273 [in Russian].

6. Sait derzhavnoi sluzhbi statistiki Ukraini [Site of the State Statistics Service of Ukraine]. *ukrstat.gov.ua.* Retrieved from https://ukrstat.org/uk/operativ/operativ2020/gdvdg/duf/arh_duf_u.htm [in Ukrainian].

7. Yurchik, G.M., & Samolyuk, N.M. (2016). Otsinyuvannya diferentsiatsii dohodiv naselennya Ukraini z urahuvannyam yih tinovoyi komponenti [Assessment of Income Differentiation of the Population of Ukraine, Taking into Account Their Shadow Component]. *Demografiya ta sotsialna ekonomika – Demography and Social Economy, 3 (28),* 133–145 [in Ukrainian].

8. Naumova, M.A. (2018). Diferentssatssya dohodsv naselennya Ukraini: tendentsii i faktori [Differentiation of Incomes of The Population of Ukraine: Tendencies And Factors]. *Naukoviy Poglyad: Ekonomska ta Upravlinnya – Scientific View: Economics and Management, 2(60), 130-141* [in Ukrainian].

9. Kostrobiy, P., Kavalets I., & Gnativ L. (2013). Matematichne modelyuvannya indeksu suspilnoi nerivnosti [Mathematical Modeling of the Index of Social Inequality]. *FIziko-matematichne modelyuvannya ta informatsiyni tehnologii – Physical and Mathematical Modeling and Information Technology, 17,* 81-91 [in Ukrainian].

10. Opalko V.V., & Denisenko V.O. (2018). Nerivnist dohodiv i problema formuvannya serednogo klasu v Ukraini [Income Inequality and The Problem of Middle Class Formation in Ukraine]. *Naukoviy visnik Mizhnarodnogo gumanitarnogo universitetu. Seria: Ekonomika i Menedzhment – Scientific Bulletin of the International Humanities University. Series: Economics and Management, 33,* 28-35 [in Ukrainian].

11. Nagorna A.M., & Nikolenko L.A. (2019). Diferentsiatsiya dohodiv naselennia ta ekonomichne zrostannya v Ukraini [Differentiation of Incomes of Citizens and Economic Growth in Ukraine]. *Infrastruktura Rynku – Market Infrastructure, 35,* 343-350 [in Ukrainian].

12. Sait derzhavnoi sluzhbi statistiki Ukraini [Site of the State Statistics Service of Ukraine]. *ukrstat.gov.ua.* Retrieved from http://www.km.ukrstat.gov.ua/ukr/statinf/vrd/rnssv_r.htm [in Ukrainian].

13. Sait Svitovogo Atlasu Danih [Site of the World Data Atlas]. *knoema.ru/atlas.* Retrieved from https://knoema.ru/atlas/ [in Russian].

14. Grigulich S. M., LIsovska V. P., & Makarenko O. I., et al. (2015). *Matematichna statistika [Mathematical Statistics].* Kiyv: KNEU [in Ukrainian].