



ISSN: 2543-6821 (online)

Journal homepage: <http://ceej.wne.uw.edu.pl>

Oksana Markina

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To cite this article

Markina, O. (2022). Taxation, Inequality, and Poverty: Evidence from Ukraine. Central European Economic Journal, 9(56), 1-18.

DOI: 10.2478/ceej-2022-0001

 To link to this article: <https://doi.org/10.2478/ceej-2022-0001>

This article was edited by Guest Editor:

Tetiana Paientko

Kyiv National Economic University named after Vadym Hetman, Ukraine

as part of the Special Call on Modern Trends in Taxation in Europe



Oksana Markina 

Kyiv Scientific Research Institute of Forensic Expertise, Ukraine
Kyiv National Economics University named after Vadym Hetman, Ukraine
corresponding author: markina.oksana33@gmail.com

Taxation, Inequality, and Poverty: Evidence from Ukraine

Abstract

The aim of the article is to assess the impact of taxes on poverty and inequality in Ukraine and provide recommendations on how taxation should be used to address problems of inequality and poverty. The research methodology is based on a combination of linear regression and commitment to equity (CEQ) methodology, which was designed by Lustig to analyse the impact of taxation and social spending on inequality and poverty in individual countries. The dataset consists of data from the World Inequality Data Base and data from State Statistic Service of Ukraine.

The analysis shows that income tax reform in Ukraine should not take place in the context of changing tax rates and tax periods but in the context of shifting the tax burden from the poor to the rich and preventing aggressive tax planning. Also, the results of the analysis show that the Ukrainian government's policy of reducing free education and health services may contribute to poverty if the government does not change its redistributive policies.

The article contributes to the academic literature on the impact of taxation on poverty and inequality in developing countries. The practical results obtained in the paper are useful for developing countries' governments to design poverty- and inequality-sensitive tax policies.

Keywords

fiscal policy | inequality | poverty | taxation | well-being | Gini coefficient | Ukraine

JEL Codes

E00, E62, H21, H30, I14, I24

1. Introduction

This article aims to assess the impact of taxes on poverty and inequality in Ukraine and provide recommendations on how taxation should be used to address problems of inequality and poverty. The issue of the impact of taxation on inequality and poverty has been extensively debated by researchers for many years. Many governments have long been grappling with the dilemma of how to increase government taxes without worsening the well-being of their citizens. Two key indicators of citizens' well-being from this perspective would be poverty and inequality. Inequality can take many forms. Income inequality has the strongest possible correlation with the level of taxation. I discuss income inequality in this article. While the negative impact of poverty on the development of any country

is clear (Alesina & Glaeser, 2004), the conclusions regarding inequality are less straightforward (Alesina & Perotti, 1993; Bénabou, 1996). Some scholars believe that inequality, to a certain extent, stimulates individual, business, or national development and is therefore a prerequisite for competition (Barro, 1999; Piketty, 2015). Piketty and Saez (2003) studied inequality in the United States for 1913–1998. The authors argue that current trends in income inequality are partly due to income structure. In France, most of the highest incomes still consist mainly of dividend income, although the concentration of wealth is much lower than a century ago. In the United States, due to exceptionally large wage increases, the share of passive income is being supplanted by income from high wages. The authors believe that such a trend may not last long. They believe that the decline in progressive

taxation seen in the United States since the early 1980s may well cause a resurgence of high concentration of wealth and large capital income over the next few decades.

Drawing on extensive data sets and cutting-edge research, Milanovic (2016) explains the benign and malignant forces that drive inequality. He also shows who globalisation has helped most, who has been held back most, and which policies can tilt the balance toward economic justice. The scholar emphasises that inequality has been fuelled by wars, disease, technological failures, access to education, and policies of income redistribution through taxes at different points in history.

Meanwhile, deepening inequalities can be dangerous, as they can create opportunities for unfair competition. The negative consequences of growing inequalities can be tax evasion (Alstadsæyer, Johannesen, & Zucman, 2019). The authors see tax evasion as one of the causes of rising inequality. The results of their study show that tax evasion increases as the wealthiest households become wealthier; households in the 0.01 percentile are much more likely to hide assets abroad than households in the bottom 1%. Alstadsæyer et al. (2019) believe that public policy has a crucial role to play in reducing tax evasion and inequality.

The other negative consequence of inequality growth is increased risks of opportunistic behaviour (Fedosov & Paientko, 2019), loss of trust in government, and so on. These trends have a negative impact on the country's development prospects. The imbalances caused by inequalities not only have a negative impact on economic development but can also worsen the social situation in a country, for example by contributing to the deterioration of the crime situation (Kelly, 2000). There is a link between income inequality and economic and social development. Many governments are trying to prevent inequality from increasing to the point where its impact becomes solely negative.

In developed economies, fiscal policy offsets about a third of the income inequality before taxes and transfers, commonly referred to as market income inequality, with transfers accounting for 75%. Spending on education and health also affects market income inequality over time, promoting social mobility, including across generations (Cingano, 2014; Hasanov & Izraeli, 2011). In developing countries, the reallocation of fiscal resources is significantly

less extensive, given lower and less progressive taxes and spending (Bucheli et al., 2014). Governments in developed countries can raise more revenue from taxes, distribute some of it to the poor, and thereby reduce inequality. If justice and accountability principles are respected, then government policy will be successful. In developing countries, this approach to reducing inequality does not always work. The reason is not only lower tax revenues but also low government accountability and high corruption risks.

There are many views on the impact of taxation on a country's economic and social development. Piketty (2015) considers taxation as one tool for regulating inequality. He sees merit in a progressive capital tax and argues that a tax on private capital is crucial to combating growing inequality. This tax could also be a useful tool for solving public debt crises, with everyone's contributions commensurate with their wealth.

Kleinbard (2017) proposes a new and fairly accurate flat-rate tax on capital income that achieves integration between corporate and investor income and successfully distinguishes capital from labour income. This type of taxation could help curb the growth of income inequality.

A common assumption in developing countries seems to be that high tax burdens have a negative impact on economic and social development (Paientko & Oparin, 2020). Therefore, to improve the economic environment and reduce inequality and poverty, it is necessary to cut taxes, and this has indeed worked in some Eastern European countries (Bedianashvili, Ivanov, and Paientko, 2019).

It should be noted that tax policies affect economic and social development in different countries in various ways, and hence the effects on inequality and poverty will also be diverse. The results of the fiscal policy impact depend on many factors, including the level of shadow economy (Paientko & Proskura, 2016), transparency of public expenditures, corruption, absence of double standards in tax control (Fedosov & Paientko, 2018), and so forth. For this reason, research into trends in the impact of taxes on inequality and poverty should be not only aggregated, that is, carried out on the basis of information on groups of countries, but also assessed individually, that is, the impact of taxes on poverty and inequality in a specific country should be estimated. In this way, only the mistakes made by a particular government can be easily identified and further mistakes prevented.

I research the impact of taxation on poverty and inequality in Ukraine because this aspect is very poorly researched by Ukrainian scholars and is not studied by foreign economists. One of the most recent fundamental studies was carried out at the end of the last century (Kakwani, 1995). It should be noted that inequality and poverty rates in Ukraine are among the highest in Europe. The Ukrainian government has been very vocal about the need to reduce poverty, including through tax cuts. At the same time there are ideas that taxes have truly little impact on poverty and inequality in Ukraine, which is due, among other things, to the high level of the shadow economy (Sytnik, Stopochkin, & Sytnik, 2017). It should be noted that reducing tax rates in Ukraine may lead to even greater inequality and poverty, as the government will need to reduce spending on the provision of public services. In my view, reducing government spending on education and health care may, on the contrary, contribute to increasing inequality and poverty.

The article contributes to the academic literature on the impact of taxation on poverty and inequality in developing countries. The practical results obtained in the paper are useful for developing countries' governments to design poverty- and inequality-sensitive tax policies.

The article is organised as follows: the literature review of the investigated problem is conducted in the second section. The third section describes the research methodology. The fourth section displays the main results of the study and discussion. The fifth section presents the study's findings, its limitations, and prospects for further research.

2. Literature Review

The problems of inequality and poverty have been studied by many scholars in terms of their impact on economic growth as well as their impact on the middle class (Azevedo et al., 2019; Conard, 2016). However, an important point is missed: that low levels of poverty and moderate inequality contribute to the emergence of a middle class, which is particularly important for developing countries (Kalpana Kochhar, 2015; Kharas, 2010; Stiglitz, 2013). In Ukraine, the development of a middle class has been considerably slowed by high levels of income inequality. Indeed, this problem is common to many developing countries.

Current researchers have taken different approaches to studying the relationship between

taxation, poverty, inequality, and the well-being of a country or a nation. Many researchers study how taxes can contribute to economic growth through a combination of fiscal and regulatory effects to stimulate "hotspots" for economic growth, thereby providing an economic boost (Barro, 2017; Biswas, Indraneel, & Rong, 2017; Kneller, Bleaney, & Gemmell, 1999; Paientko & Oparin, 2020). Encouraging certain sectors of the economy that create jobs quickly and produce high value-added products contributes to poverty reduction. The impact of economic growth on inequality depends on government policies regarding taxation of the rich and the use of tax incentives to support the middle class. For example, in some countries this is done through a flexible system of tax deductions.

Also, many economists do not see high tax burdens as a cause of increased poverty and inequality. A high tax burden on the rich allows a distribution of national wealth to the poor through the provision of public services, such as education and health care (Kneller et al., 1999; Lustig, Pessino, & Scott, 2014; Ostry, Berg, & Tsangarides, 2014). Equal access to quality education and health care helps to reduce inequality and poverty. Raising taxes on the rich could be a solution to the problem of financing certain public services in developing countries, such as education and health care.

The researchers also emphasise that poverty and inequality are not the only causes of socioeconomic tensions in a country. Poverty problems are often exacerbated by unfair distribution and lack of government accountability, which, combined with high tax burdens, lead to dissatisfaction with government policies (Joseph et al., 2015; Perotti, 1996; Rudolph, 2009; Watkins & Brook, 2016).

2.1. Impact of taxation on inequality

The impact of taxation on inequality has been studied by scholars mainly in the context of a shifting of the tax burden from the income of poor taxpayers to the income of rich taxpayers. For example, it is possible to implement this idea by taxing dividends or capital gains at higher rates (Bastani & Waldenström, 2020; Burman & Moynihan, 2011; Gordon, 2020).

According to a number of scholars, optimal income taxation cannot be proportional. Progressive taxation can help to reduce inequality, with the tax rate considering the characteristics of income (Baldini,

2020; Diamond & Saez, 2011; Sala, 2019). Moderate progression promotes equalisation of income with justice, as deep progression can be a demotivating factor for increased productivity.

Jakobsson (1976) and Fellman (1976) prove that progressive taxation reduces income inequality (regardless of the income distribution they are applied to). To prove this statement, the relative Lorenz dominance criterion was used. However, more recent research shows that a progressive tax does not always reduce inequality. Allingham (1979) and Ebert and Moyes (2003, 2007) provided examples of when progressive tax may well increase income inequality.

The idea of raising wealth taxes to finance rising public debt is common in several Organisation for Economic Co-operation and Development (OECD) countries (Brys, Matthews, & Owens, 2011; Fisman et al., 2020). Researchers are assessing the distributions of a one-time capital levy on net personal wealth. They prove that because net wealth is highly concentrated, a wealth tax can generate significant revenue, even if relatively high personal allowances are granted. Meanwhile, many economists emphasise that wealth tax of this kind has low administration costs (Bach, Beznoska, & Steiner, 2014). Introducing this tax would reduce income inequality by redistributing part of the accumulated income through a wealth tax. However, there is an opposing view on the wealth tax (Lavoie, 2014). For example, the idea of a separate wealth tax is not encouraged in the United Kingdom (Glennerster, 2012). Wealth taxation is a discussed issue in developing countries. In many countries, this type of income taxation has never been introduced because it is difficult to administer and may cause more harm than benefit.

Many researchers advocate progressive income taxation because it reduces income inequality. The shares of the highest income earners in total pre-tax income have increased in OECD countries over the past three decades, especially in most English-speaking countries, but also in some Northern European countries (from low levels) and Southern European countries (Cantante, 2020). Researchers estimate that, at the current stage of economic development, the richest 1% receive between 7% of all pre-tax income in Denmark and the Netherlands and almost 20% in the United States. This increase is the result of the top 1% capturing a disproportionate share of total income growth over the last 30 years: some 20%–25% in Australia and the United Kingdom, up to 37% in Canada, and even 47% in the United States (Förster, Llana-Nozal, & Nafilyan, 2014). At the same time, tax

reforms in almost all OECD countries have lowered the top personal income tax rates, as well as the rates of other taxes affecting those with the highest incomes.

Lately, researchers have been actively investigating the link between rising inequality and the growth of capital offshore (Alstadsæyer, Johannesen, & Zucman, 2018). Economists point out that stricter tax rules in this area could reduce income inequality, especially in developing countries.

Consequently, taxation can have an impact on income inequality, but the choice of specific regulatory instruments should consider the economic and institutional characteristics of the particular country.

2.2. Impact of taxation on poverty

The impact of taxes on poverty in the current stage of economic research is considered more from a methodological and empirical perspective. Many economists are working on the development of indicators to assess the impact of taxes on poverty. Enami (2018) has designed two indicators. The first indicator is an efficiency of impact indicator that takes the size of the tax or transfer as a given and compares the actual reduction in poverty achieved with the maximum possible reduction in poverty. The second indicator, expenditure efficiency, takes the reduction in poverty as a given and compares the actual tax or transfer to the minimum tax or transfer needed to achieve the same reduction in poverty. The expenditure efficiency index is also interpreted as an efficiency indicator because it determines how much unnecessary tax (or transfer) is collected (allocated), which, if avoided, would result in less distortion.

Higgins and Lustig (Higgins & Lustig, 2013; Lustig & Higgins, 2016) emphasise that horizontal justice and progressivity measures may fail to capture an important aspect: a large percentage of the poor become poorer (or the nonpoor become poor) because of the tax and transfer system. Economists conducted a study on a sample of 17 countries and found that in 15 countries the tax system contributes to poverty reduction and is progressive, but in 10 of them at least a quarter of the poor pay more in taxes than they receive in transfers. Researchers call this financial impoverishment (Lustig, 2016). It should be noted that financial impoverishment means that in many developing countries a large proportion of the population cannot pay for basic needs, such as food, health care, and education. Lustig (2016) has also

developed a methodology for measuring poverty and inequality that can be adjusted to the analysis of the particular country.

Many publications over the past decade have focused on research on poverty in Africa and Asia. Most of them contain information regarding the actual poverty level collected based on surveys (Arunatilake, Hewawasam, & Gunasekara, 2016). Poverty studies in African countries are an important aspect of scientific research, but it should not be forgotten that after the collapse of the communist bloc, many countries in Europe emerged that have not been able to solve the problem of poverty for decades. Many postcommunist countries in Europe, according to UN statistics, have remarkably high poverty rates; these countries also suffer from the phenomenon of financial impoverishment (United Nations, 2019).

The results of empirical studies show that in many countries tax policies do truly little to reduce inequality and poverty. Steadily low tax revenues are a major limiting factor. Moreover, tax revenues are not only low but regressive and burdensome for the poor (Cabrera et al., 2015; Jellema et al., 2016). These studies are time consuming, as they have to be conducted on statistical data from individual countries and often cannot be aggregated even at the cluster level.

Hassoun and Subramanian (2012) raise the question of the proper estimation of population poverty in terms of whether to focus on the proportion or the absolute number of people in poverty. This observation, in turn, is important for tracking poverty and setting targets for poverty reduction or elimination. This issue is relevant from a methodological point of view because it is extremely difficult to assess the impact of taxes on the absolute level of poverty.

In general, research on the impact of taxes on poverty covers both methodological and empirical aspects. These studies are needed both at the level of clusters of countries and at the level of individual countries to develop recommendations on poverty reduction for a particular government. Therefore, there is a need to supplement existing research with case studies on the example of both individual countries and their groups.

3. Methodology

The research methodology is based on a combination of linear regression and CEQ methodology that was

designed by Lustig (Lustig, 2016; Lustig & Higgins, 2013) to analyse the impact of taxation and social spending on inequality and poverty in individual countries and provide a roadmap for governments, multilateral institutions, and nongovernmental organisations in their efforts to build societies with lower inequality and poverty. It should be noted that the consideration of social expenditures is counted in the equivalent of the cost of services provided. That is, how much would actually be spent by the household if it had to pay for such services.

The CEQ method allocates taxes and transfers from household income or expenditure to produce four concepts of income at the household level: market income, disposable income, consumption income, and final income. Disposable income equals market income less personal income taxes and social security contributions plus transfers. Consumption income is disposable income less indirect taxes plus indirect subsidies. Final income is equal to consumable income plus the monetised value of in-kind transfers in education and health care services at average government costs. Monetised value of in-kind transfers in education and health care services is an important indicator because since 2014 Ukraine's government started decreasing the amount of free of charge educational and health care services provided for citizens. As a result, more and more of the population must pay for these expenses themselves. That might influence inequality and poverty. In this paper I used final income for estimation correlation between taxation, poverty, and inequality. The official published data by the Ukrainian government were used for calculations (Income and expenditures of households in Ukraine, 2020).

For this study accumulated pensions are considered as deferred income and are included in market income. The poverty rate is estimated using the national poverty line as well as the international poverty line using purchasing power parity. Since the household survey is consumption based, I have assumed that consumption equals disposable income and market income. To obtain market income, I deducted direct transfers and value-added tax and personal income tax. I did not consider the unified social contributions, as in Ukraine they are paid by the employer and do not directly affect consumption. The data on personal income tax paid published by the State Treasure Service of Ukraine were used for calculation (Budget reports of Ukraine, 2019). The annual aggregate data on household income is provided in Table 1.

Table 1. Annual aggregated household income in Ukraine in 2010–2019, billion UAH

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Market income	677.43	797.37	915.08	962.35	954.44	1113.13	1351.99	1765.62	2348.51	2964.97
Disposable income	996.58	1151.61	1307.42	1378.01	1369.40	1598.99	1826.58	2416.30	3047.00	3824.08
Consumption income	847.95	988.98	1149.24	1215.46	1151.66	1362.59	1582.29	2008.28	2530.43	3213.65
Final income	1119.29	1335.13	1574.46	1673.19	1554.74	1798.63	2025.34	2570.59	3213.65	3967.25

Source: Calculated by author based on data of the State Statistical Service of Ukraine and the State Treasury Service of Ukraine.

The impact of taxation on income inequality and poverty level were estimated with linear regression. As evidenced by the analysis of the publications cited in the literature review, regression is used by most authors to conduct empirical analyses. It is a reliable method of determining which variables influence the phenomenon of interest. In this case, it is necessary to choose the right control variables to isolate the influence of other factors. It should be noted that regression analysis was made using small sample size data. This means that results can be used for the influence analysis but cannot be used for forecasting purposes.

The dependent variables are the level of poverty and level of inequality. The level of poverty was measured as a share of people whose final income is below the baseline of poverty according to the Ukrainian State Statistic Service and/or the world indicator of poverty. The level of inequality in this paper was measured as national income top 10% share and Gini coefficient. The income inequality indicators included pre-tax national income top 10% share and Gini coefficient. These indicators are publicly available from the World Inequality Data Base (World Inequality Data Base, 2020).

The independent variables are tax burden of personal income tax and tax burden of consumption taxes (value-added tax and excise duties). The tax burden was calculated as a share of taxes paid in the final income. Based on my literature review, the control variables are a share of government expenditures on education (ratio to gross domestic product [GDP]), a share of government expenditures on healthcare (ratio to GDP), GDP per capita growth, and population. GDP per capita was chosen as the control variable to separate the effects of economic growth on inequality and poverty from the effects of taxation. Population number was identified as the control variable because

population growth associated with fertility increases can temporarily increase inequality by increasing the number of dependants in families. The choice of the variables is based on the studies of Cubero and Vladkova Hollar (2010), Cingano, (2014), and Lustig, Pessino, and Scott (2014). All variables were made logarithmic to make the calculations.

The study states two hypotheses.

H_1 : Taxation has a negative impact on income inequality in Ukraine.

H_2 : Taxation has a negative impact on poverty in Ukraine.

Both hypotheses were formulated as negative because according to studied literature the impact of taxation on inequality in developing countries is negative.

The sample consists of Ukrainian data for the years 1996–2019. Annual data were used to estimate the impact of taxes on inequality, and quarterly data were used to estimate the impact of taxes on poverty. The regression results were calculated in R. The function used for building linear models is `lm()`. The quality of the model was checked with t-value, p-value, and F-statistic. The sample size for the first hypothesis consisted of 23 observations because only annual data are available for chosen variables. The data set for the second hypothesis consisted of 92 observations, because data is available on a quarterly basis. Considering small sample size, all data were logarithmically transformed; therefore, they are normally distributed. The small sample size was considered for results interpretation taking into account the findings of Button (2013), Harris (1985), and Green (1991).

Table 2. Gini income inequality index in EU countries and Ukraine in 2003–2016

Year	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
2003	29,5	28,1					25,6	37,2	27,7	31,4	30,3	32,8		32,9
2004	29,8	30,5			30,1	27,5	24,9	33,6	27,9	30,6	30,4	33,6	29,9	33,6
2005	28,7	29,3			30,3	26,9	25,2	33,4	27,6	29,8	32,3	34,6	34,7	33,7
2006	29,6	28,1	35,7		31,1	26,7	25,9	33,7	28	29,7	31,3	35,1	28,3	32,7
2007	30,6	29,2	36,1		31,1	26	26,2	31,2	28,3	32,4	31,3	34	27,9	31,9
2008	30,4	28,4	33,6		31,7	26,3	25,2	31,9	27,8	33	31,2	33,6	27,5	30,9
2009	31,5	28,5	33,8	32,6	32,1	26,2	26,7	31,4	27,5	32,7	30,5	33,6	27	32,7
2010	30,3	28,4	35,7	32,4	31,5	26,6	27,2	32	27,7	33,7	30,2	34,1	29,4	32,3
2011	30,8	28,1	34,3	32,3	32,6	26,4	27,3	32,5	27,6	33,3	30,5	34,8	29,2	32,9
2012	30,5	27,5	36	32,5	34,3	26,1	27,8	32,9	27,1	33,1	31,1	36,2	30,8	33,2
2013	30,8	27,7	36,6	32	37	26,5	28,5	35,1	27,2	32,5	31,7	36,1	31,5	33,5
2014	30,5	28,1	37,4	32,1	35,6	25,9	28,4	34,6	26,8	32,3		35,8	30,9	31,9
2015	30,5	27,7		31,1	34	25,9	28,2	32,7	27,1	32,7		36	30,4	31,8
Year	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Ukraine
2003	34,9			30,2			34,9	38,7				31,8	25,3	28,7
2004	34,3	36,4	37	30,2		29,8	35,4	38,9		27,1	24,8	33,3	26,1	28,9
2005	33,8	39	35,3	30,8		29	34,5	38,5		29,3	24,6	32,4	26,8	29
2006	33,7	35,6	34,4	30,9	28	30	33,7	38,1	39,6	25,8	24,4	33,5	26,4	29,8
2007	32,9	37,5	34,8	31,1	29,2	29,6	33,5	36,7	37,5	24,7	24,4	34,1	27,1	27
2008	33,8	37,2	35,7	32,6	29	29,3	33,7	36,6	36,4	26	23,7	34,2	28,1	26,6
2009	33,8	35,9	37,2	31,2	30,2	27,9	33,6	34,9	35,6	27,2	24,8	34,9	27,3	25,3
2010	34,7	35	33,6	30,5	29	27,8	33,2	35,8	35,5	27,3	24,9	35,2	27,7	24,8
2011	35,1	35,8	32,5	32,1	29,1	27,7	32,8	36,3	35,9	26,5	24,9	35,7	27,6	24,6
2012	35,2	35,2	35,1	34,3	29,4	27,6	32,4	36	36,5	26,1	25,6	35,4	27,6	24,7
2013	34,9	35,5	35,3	32	28,8	28,1	32,5	36,2	36,9	28,1	26,2	36,2	28,8	24,6
2014	34,7	35,1	37,7	31,2	29	28,6	32,1	35,6	36	26,1	25,7	36,1	28,4	24
2015	35,4	34,2	37,4	33,8	29,4	28,2	31,8	35,5	35,9	26,5	25,4	36,2	29,2	25,5
2016							30,8							25

Source: Designed by author based on Eurostat (2020) data.

4. Results and Discussion

4.1. Taxation, poverty, and inequality in Ukraine

The most obvious form of economic inequality is income inequality, which can (and usually does) entail inequality of access to basic social goods (e.g., quality

health care, quality education, comfortable life) and to the fulfilment of their basic rights in general (e.g., rights to health, life, security). Income inequality is also one of the causes of poverty. Profound inequality has a deeply negative impact on opportunities for economic growth. Low living standards often result in high levels of disease and low levels of education, which undoubtedly reduce the economic activity of the corresponding population groups, affect the aggregate

labour potential of the country, and consequently contribute to the slowdown of economic growth in general. One of the many indicators of any country's economic success is the shortest distance between the richest and poorest segments of the population, which is measured by the so-called Gini coefficient. The larger the coefficient, the deeper the chasm: 1% means that the country has complete income equality in all population groups, and 100% means that all income in the country belongs to one person. For comparative analysis, data on European Union countries were used, as Ukraine seeks membership in the EU and is adapting its legislation in accordance with the Association Agreement with the EU. The comparative data on Gini coefficient in the EU and Ukraine is presented in Table 2. According to Eurostat (2020) data, Ukraine, with an income distribution of about 25%, is among the European leaders by this indicator. In other words, Ukraine can be considered a country with a low level of income inequality. Even more, from 2003 to 2016 Ukraine has improved its Gini coefficient from 28.7 to 25.0. Among EU countries, the higher equality is in Finland only. All postcommunist EU member states have a higher level of income inequality compared to Ukraine.

The same trend can be seen from Table 3, where the percentage income earned by the top 10% of earners in the EU and Ukraine is presented. As seen in Table 3, Ukraine ranks similarly to Sweden and Belgium in terms of the level of income belonging to the 10% of the population, while statistically the situation with income inequality is worse, for example, in Germany, the Netherlands, and Luxembourg. Even in Poland, with which Ukraine is traditionally compared, the level of income inequality is higher than in Ukraine. Also, the percentage income earned by the top 10% of earners is higher in the postcommunist EU member states.

However, this contradicts other ratings. For example, according to World happiness report 2017, which is based on indicators of GDP per capita, level of social support, life expectancy, freedom of citizens to make vital decisions, generosity, and attitude to corruption, Ukraine in 2017 ranked 132 out of 135, and in 2019 ranked 133 out of 135 (World happiness report, 2020). In my opinion, there are two explanations for this situation. First, Ukraine has practically no middle class and most of the Ukrainian population is equally poor. This is evident from the world ranking of the average income of the population (Average income around the world, 2020). According to this ranking,

Ukraine ranks 62nd out of 80 countries. Ukraine is far behind its European neighbours in terms of income. For example, one of the poorest countries in the European Union, Bulgaria, ranks 45th in terms of income. The second explanation is that Ukraine is a country with a high level of shadow economy: often rich taxpayers do not declare their income offshore. Information about such incomes does not appear in the official statistics because some Ukrainians are quite wealthy and ranked in semi-official rankings (List of Ukrainians by net worth, 2021). In addition, the dynamics of poverty indicators does not testify in favour of an equal distribution of income in Ukraine (Table 4).

As can be seen from the data presented in Table 4, the poverty level in Ukraine is higher than in other European countries. It should be noted that the poverty level in Ukraine significantly exceeds the poverty level in many postcommunist countries, for example Poland, Slovakia, Czechia, and Hungary.

In Ukraine, the tax burden is often mentioned as one of the negative factors of economic development. The level of tax burden as tax to GDP ratio is presented in Table 5.

As can be seen from Table 5, tax burden in Ukraine has increased from 13.67% to 20.14%, and it is close to the average tax burden in EU countries. It should be noted that many postcommunist EU member states (Czechia, Lithuania, Poland, Romania, Slovakia, and Slovenia) have lower tax burdens than Ukraine. Bulgaria, Latvia, Estonia, and Croatia have about that same tax burden as Ukraine, and Hungary has a bit higher tax burden among the mentioned countries. The tax burden in old EU member states vary from 18% to 26% and depends on the dominant fiscal policy of a country. The variety of tax burdens makes analysis of tax burden influence on inequality and poverty interesting and important, especially as a case study of a particular country.

4.2. Results of hypothesis testing

The results for the hypothesis 1 test are shown in Table 6.

As can be seen from Table 6, tax burden on personal income has low effects on indicators of income inequality. The negative correlation between variables shows that increase in 1% in the tax burden of personal income tax causes a decrease in income

Table 3. Percentage income earned by the top 10% of earners in EU countries and Ukraine in 2003–2017

Year	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
2003	23,5	22,3					21,4	28,4	23	25,2	24	24,6		25,9
2004	23,8	25,1			24,3	23,1	20,6	25,9	23,2	24,5	24,2	25,5	24,2	26,6
2005	22,8	23,9			24,9	22,9	21	26,2	23	23,9	25,5	26,3	28,1	26,9
2006	23,7	22,4	26,6		26	22,6	21,8	26,9	23	23,5	24,9	26,7	22,8	25,6
2007	23,9	23,5	28		25,5	22,3	22,1	24	23,3	26,2	25,2	26	22,3	25,5
2008	24,1	22,7	25,7		26,2	22,9	21	24,9	23	26,7	24,8	26,1	22,1	24,6
2009	24,7	22,7	25,7	24,3	26,2	22,4	21,8	24,4	22,6	26,1	24,1	26	21,5	25,6
2010	23,6	22,7	26,9	23,9	25,7	22,5	22,5	24,3	22,6	27,1	24	25,6	23,1	24,9
2011	23,7	22,4	26	23,7	26,7	22,2	22,7	24,8	22,8	26,9	24,3	25,6	23,2	25,5
2012	23,5	21,9	27,4	23,9	28	22,2	23,1	25,2	22,3	26,9	24,6	26,6	23,9	25,9
2013	24,3	21,8	27,6	23,7	30,9	22,6	23,7	26,6	22,3	26,4	24,8	26,4	24,4	26,1
2014	24,1	22,4	28,8	24	28,8	22,1	23,6	26,3	22	26,1	24,6	26,1	24	24,9
2015	23,8	22,2	28,7	23,2	27,5	22,1	23,8	24,4	22,4	26,6	24,6	26,2	23,8	25,4
2016	23,9	22,2	31,4	23,2	26,8	21,9	23,7	23,1	22,4	25,9	24,6	25,9	23,8	25,9
2017	23	21,9	31,9	22,8	25,5	21,5	24	22,5	22,6	25,8	24,6	25,9	23,9	
Year	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Ukraine
2003	26,7			23,7				30,2				24	20,1	23,4
2004	26,3	28,5	27,9	23,7		23,7	28,2	30,8		22,1	20,6	24,9	21,1	23,1
2005	25,5	30	27,2	24,3		23,4	26,8	30,6		24,9	20,6	24,3	21,1	23,2
2006	25,6	26,8	26,8	24,3	22,1	24,7	26,4	29,7	29	21,8	20,4	24,9	21,1	24,1
2007	24,9	28,3	26,8	25,1	22,6	24,1	26,4	28,9	27,4	20,8	20,4	25,6	21,6	22,1
2008	25,7	27,7	27,6	25,8	22,5	23,7	26,1	28,9	26,5	21,4	20,1	25,6	22,4	21,9
2009	25,4	26,9	27,6	24,2	23,8	22,4	25,8	27,5	25,7	21,8	20,6	25,9	21,4	21,1
2010	26,2	26,2	24,8	23,7	22,7	22,5	25,8	28,3	25	21,9	20,7	26	21,8	21
2011	26,4	27,3	24,5	24,4	23,2	22,6	25,5	28,7	24,9	21	20,8	25,9	21,6	20,8
2012	26,4	26,6	26,8	26,4	23,4	22,5	25,3	27,8	25,5	20,5	21,1	25,8	21,6	20,8
2013	25,9	26,8	27,1	24,2	23,1	22,8	25,4	27,5	25,4	22,2	21,4	25,9	22,2	21,1
2014	25,5	26,6	28,9	24,3	23,3	23,3	25,2	27,4	24,5	20,3	21,2	26	22,2	20,6
2015	25,8	26,2	28,6	25,4	23,6	23	24,2	27,3	24,8	20,9	21,1	26,2	22,9	21,6
2016	26	25,8	29,6	24,7	23,1	22,9	24,6	27,6	23,7	19,9	20,6	25,9	23,3	21,2
2017	26,7	26,9	28,4	25,8	23,3	23,3	23,5	26,7	24,9		20,4	25,4	22,3	21,7

Source: Designed by author based on Eurostat (2020) data.

Table 4. Poverty, percentage of population in EU countries and Ukraine in 2003–2018

Year	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
2003	13	14,3					10,9					19,9		20,9
2004	12,6	14,8			16,1	10,4	11,8	18,3	11,7	13		19,6	13,5	19,7
2005	12,6	14,7			15,6	9,8	11,7	18,3	12,6	13,2	12,5	20,5	15,9	18,5
2006	12	15,2			15,5	9,6	11,7	19,4	13	13,1	15,2	20,3	12,3	17,2
2007	15,2	14,7			15,9	9	11,8	19,5	13,6	12,5	15,2	20,1	12,4	15,5
2008	14,5	14,6			15,8	8,6	13,1	19,7	13,8	12,9	15,5	19,7	12,4	15
2009	14,7	14,6		20,6	15,6	9	13,3	15,8	13,1	13,3	15,6	20,1	12,3	15,2
2010	14,5	15,3		20,9	14,8	9,8	12,1	17,5	13,7	14	15,8	21,4	14,1	15,2
2011	14,4	15,3		20,4	14,7	9,6	12	17,5	13,2	14,1	16,1	23,1	14,3	16,3
2012	14,4	15,1		19,5	15,3	8,6	11,9	18,6	11,8	13,7	16,1	23,1	15	15,7
2013	14,1	15,5		19,4	14,4	9,7	12,1	21,8	12,8	13,3	16,7	22,1	15	16,4
2014	13,9	14,9		20	16,2	9,7	12,2	21,6	12,4	13,6	16,7	21,4	14,9	16,2
2015	14,1	15,5	22,9	19,5	16,1	9,7	11,9	21,7	11,6	13,6	16,5	21,2	14,5	16,8
2016	14,4	15,9	23,4	20	15,7	9,1	12,4	21	11,5	13,2	16,1	20,2	13,4	15,6
2017	14,3	16,4	22	19,3	15,4	9,6	12,7	21,9	12	13,4	16	18,5	12,8	14,9
2018	13,3		22,6	18,3	14,7	10,1	12,5	21,7	11,6			17,9	12,3	

Year	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Ukraine
2003														76,2
2004	19,2	19,4	20,5			20,5	19,4		13,3	12,2	20,1			65,6
2005	19,3	23,5	20		14,2	19,1	18,5		11,6	11,6	20,3			55,3
2006	19,5	21,2	19,1		15,1	17,3	18,1	24,6	10,6	11,5	19,7			49,7
2007	18,9	25,9	20,9		15,3	16,9	18,5	23,6	10,9	12,3	19,8	13,5		22,7
2008	18,4	26,4	20,3		14,9	17,1	17,9	22,1	11	11,3	20,4	14,4		27,1
2009	18,7	20,9	20,5		15,5	17,6	17,9	21,6	12	12,7	20,7	14,8		25,8
2010	19,8	19	19,2		15,6	17,7	18	22,3	13	13,6	20,6	15,4		28,6
2011	19,5	19,2	18,6		15,1	17,1	17,9	22,9	13,2	13,5	20,8	15,2		27,8
2012	19,3	19,4	20,6		15,8	17,3	18,7	23	12,8	14,5	20,4	16		29
2013	19,4	21,2	19,1		15,8	17	19,5	25,1	12,6	14,5	22,2	15,6		28,3
2014	19,9	22,5	22,2		16,6	17,6	19,5	25,4	12,3	14,3	22,1	16,3		28,6
2015	20,6	21,8	21,9	16,5	16,5	12,7	17,3	19	25,3	12,7	13,9	22,3	16,2	26,4
2016	20,3	22,1	22,9	18,7	16,7	13,2	15	18,3	23,6	12,4	13,3	21,6	15,8	23,8
2017	20,3	23,3	22,9	18,3	16,8	13,3	14,8	17,3	23,5	12,2	13,3	21,5	16,4	22,4
2018		22,9	20,6		17,1	13,2	15,4	17,2	23,8		12	20,7	17,1	21,3

Source: Designed by author based on Eurostat (2020) data.

Table 5. Tax to GDP ratio in EU countries and Ukraine in 2003–2018

Year	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
2003	26,65	25,08	19,77	21,31	37,61	14,99	30,14	19,82	22,06	22,12	11	19,71	20,66	24,16
2004	26,31	25,54	21,05	20,53	37,3	15,41	31,29	20,24	21,81	22,16	10,43	19,13	20,39	25,09
2005	25,51	25,47	20,31	20,57	39,59	14,48	33,07	19,11	21,79	22,3	10,66	20,33	19,94	25,48
2006	25,05	25,29	20,96	20,9	41,54	14,22	31,86	19,97	21,42	22,58	10,85	19,98	19,83	26,81
2007	25,39	24,79	22,89	20,76	48,56	14,61	35,09	20,23	21,07	22,12	11,33	20,24	21,42	25,92
2008	26,08	25,25	22,17	20,55	46,05	13,67	33,42	19,28	20,49	22,01	11,47	20,21	23,29	23,75
2009	25,23	23,78	18,98	19,67	23,25	13,57	33,18	21,4	18,88	20,7	11,61	19,78	23,35	21,99
2010	25,28	24,47	18,53	19,74	23,11	13,65	32,74	19,66	18,6	21,95	11,19	20,21	22,63	21,8
2011	25,43	24,94	17,75	19,18	23,21	14,52	32,75	19,07	20,02	21,82	11,48	22,07	21,07	21,97
2012	25,93	25,82	18,97	19,73	23,4	14,93	33,45	19,8	20,14	22,53	11,62	23,91	22,93	22,53
2013	26,42	26,19	20	20,27	23,58	15,08	33,82	20,04	20,64	23,21	11,61	24,02	22,91	22,88
2014	26,42	26,13	19,59	19,94	24,79	14,43	36,5	20,61	20,63	23,16	11,48	24,67	23,06	23,15
2015	26,83	24,35	20,29	20,85	24,13	14,77	33,92	21,51	20,47	23,2	11,48	24,76	23,25	18,78
2016	25,42	22,84	20,26	21,35	23,62	14,91	33,3	21,59	20,81	23,06	11,3	26,37	23,09	18,94
2017	25,42	23,45	20,1	21,5	24,06	15,01	33,4	20,92	20,77	23,63	11,44	25,97	22,91	18,29
2018	25,43	23,99	20,17	21,83	24,32	14,84	32,17	20,95	20,84	24,2	11,49	26,19	22,56	18,24
Year	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Ukraine
2003	22,76	20,24	19,06	24,67	54,07	20,35	16,72	19,88	17,77	17,68	20,67	26,89	13,67	
2004	22,22	20,38	19,36	24,26	55,02	20,17	15,69	19,98	17,42	17,29	20,63	27,25	13,29	
2005	21,96	21,5	19,75	25,55	58,82	21,23	16,47	20,58	17,47	18,01	21,15	28,56	17,14	
2006	23,33	22,18	20,48	24,19	60,03	21,6	17,16	21,13	17,95	16,8	20,89	28,56	17,76	
2007	23,76	21,64	20,37	24,68	62,5	21,6	18,09	21,35	17,54	16,75	20,07	28,51	16,5	
2008	23,49	20,74	20,48	24,71	25,81	21,14	18,27	21,05	16,79	16,45	19,41	27,47	17,88	
2009	23,74	18,74	17,04	25,17	26,01	20,94	16,05	19,06	15,27	15,52	18	27,23	16,39	
2010	23,68	19,73	15,96	25,13	25,31	20,99	16,48	19,64	16,61	15,13	18,06	27,4	15,57	
2011	23,65	19,95	15,48	24,63	25,81	20,23	16,66	21,13	18,09	16,08	17,84	26,63	18,52	
2012	24,95	20,96	15,53	25,76	25,69	19,41	15,99	20,77	18,01	15,53	17,87	26,3	18,32	
2013	25,14	21,58	15,6	25,92	25,74	19,69	15,59	22,66	17,67	16,7	17,9	26,47	17,56	
2014	24,84	22,05	15,84	25,72	25,99	20,64	15,62	22,65	17,92	17,46	18,17	26,51	17,29	
2015	24,74	22,38	16,69	24,15	24,34	21,16	15,69	22,79	18,94	18,19	18,49	27,14	20,45	
2016	25,07	23,5	16,93	24,33	25,24	21,91	16,23	22,33	16,85	18,14	18,61	28,12	19,63	
2017	24,68	23,49	16,63	25,01	25,7	23,09	16,79	22,37	15,47	18,6	18,35	13,72	28,13	20,03
2018	24,24	22,82	16,77	26,79	25,97	23,06	17,4	22,65	14,49	18,59	18,53	14,22	27,91	20,14

Source: Designed by author based on Eurostat (2020) data.

Table 6. Regression statistic for the assessment of taxation impact on income inequality in Ukraine

a. Variables	National income top 10% share	Gini coefficient
Tax burden of personal income tax (log)	-0.113* (0.045)	-0.118* (0.056)
Government expenditures on education (ratio to GDP) (log)	0.112** (0.06)	0.122** (0.06)
Share of government expenditures on healthcare (ratio to GDP) (log)	0.022 (0.045)	0.024* (0.041)
GDP per capita growth (log)	0.017 (0.063)	0.018* (0.052)
Population (log)	-0.001 (0.113)	-0.002 (0.116)
Observations	23	23
R ²	0.588	0.599

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1.

inequality by 0.113% and Gini coefficient by 0.118%. The obtained result can be explained both by the small sample size and the high level of the shadow economy in Ukraine. Many businesses in Ukraine pay income to employees half-legally, without paying income tax (Paientko & Proskura, 2016). Such income is not recorded in the national statistics system. Therefore, indicators of income inequality in Ukraine can be significantly biased.

The influence of the tax burden on consumption was not estimated, because those taxes do not affect income directly. However, for countries with high levels of income tax evasion, estimating consumption inequality as well as estimating the correlation between the tax burden of consumption taxes and consumption inequality may show more relevant results.

Control variables do not have a significant effect on income inequality except for government expenditures on education. This result is to be expected, as most education in Ukraine is still provided through public funding.

Although the correlation is significant, it is based on 23 observations (only annual data are available), which does not allow unambiguous conclusions to be drawn. The number of observations will be increased for future studies. Therefore, the first hypothesis cannot be confirmed. Taxation does not have a significant impact on income inequality in Ukraine.

The results for the hypothesis 2 test are shown in the Table 7.

As Table 7 shows, the tax burden, which is generated by taxes on income, has a negative impact on poverty. The positive correlation between variables shows that the increase in tax burden by 1% will increase the level of poverty by 0.103% (national indicator of poverty in Ukraine) and will increase the level of poverty according to the United Nations Development Programme by 0.121%. As the tax burden of income taxes rises, the poverty rate rises. The tax burden generated by consumption taxes has an even greater impact on poverty. The reason for this is that Ukraine has a high rate of value-added tax (VAT) on daily consumption goods; in fact, the share of VAT in the expenditure of poor

households is higher than in the expenditure of rich households.

It should be noted that the impact of public expenditure on health care contributes to poverty reduction. I believe that this aspect should be considered by the Ukrainian government when carrying out further reforms in the health care sector. The other variables, as shown in Table 7, do not have a significant impact on poverty. The number of observations of the sample is 92, because I used quarterly data for the calculations. The robustness tests showed that the model is robust, although the coefficient of determination is not high. In other words, the obtained relationship can be used to explain the impact of the tax burden on poverty in Ukraine, but it cannot be the key predictor. Therefore, the second hypothesis can be confirmed. Taxation has a significant negative impact on poverty: an increase in the tax burden increases poverty. This result can be

Table 7. Regression statistic for the assessment of taxation impact on poverty in Ukraine

a. Variables	Poverty level (National indicator, according to the State Statistic Service of Ukraine)	Poverty level (International indicator according to UNDP)
Tax burden of personal income tax (log)	0.103** (0.048)	0.121** (0.056)
Tax burden of taxes on consumption (log)	0.138*** (0.058)	0.127*** (0.076)
Government expenditures on education (ratio to GDP) (log)	0.112 (0.088)	0.122 (0.091)
Share of government expenditures on healthcare (ratio to GDP) (log)	-0.023** (0.039)	-0.024* (0.049)
GDP per capita growth (log)	0.019* (0.073)	0.021* (0.062)
Population (log)	-0.003 (0.118)	-0.004 (0.136)
Observations	92	92
R ²	0.558	0.499

Notes: UNDP = United Nations Development Programme. *** p < 0.01, ** p < 0.05, * p < 0.1.

explained by the fact that in Ukraine the distribution of taxes through the system of public funding of public services is characterised by a lack of efficiency and accountability. This is partly proved by Ukraine's position in world rankings of economic freedom (Bedianashvili et al., 2019; Paientko & Oparin, 2020).

5. Conclusion

The relevance of studying the impact of tax burden on inequality and poverty in specific countries stems from the need to adjust individual countries' tax policies to consider the sensitivity of poverty and inequality to tax instruments. The results of the analysis of the dynamics of income inequality in Ukraine and EU countries showed that according to official statistics, Ukraine is one of the European countries with the lowest level of income inequality. However, such results contradict the happiness rating, according to which the citizens of Ukraine are among the most unhappy in the world. In addition, Ukrainian citizens have the lowest incomes in Europe and a high proportion of poor citizens.

The first hypothesis, that taxation has a negative impact on income inequality in Ukraine, was not confirmed. This result does not indicate that

taxation in Ukraine is effective in terms of regulating inequality. This result indicates that there is no middle class in Ukraine and most of the population that declares official income is poor. In addition, a small fraction of wealthy people successfully hides their income from declaring and paying taxes. As a result, the government does not receive all tax revenues, and the fact of income concealment also distorts statistics regarding income inequality. In fact, the current system of income taxation in Ukraine is not effective in terms of administration and distribution. Since income taxes are mainly paid by the poor part of the population, which receives income in the form of wages. Therefore, reforming income taxation in Ukraine should take place, not in the context of changing tax rates and tax periods but in the context of shifting the tax burden from the poor to the rich, as well as preventing aggressive tax planning. The results suggest that corruption, accountability, and social justice need to be considered in research for Ukraine. In addition, inequality should be assessed based on consumption statistics rather than on income.

The second hypothesis that taxation has a negative impact on poverty in Ukraine was confirmed. The results of the analysis showed that taxation in Ukraine contributes to the growth of poverty. At the same time taxes on consumption have a stronger negative impact than taxes on income. This indicates that the

tax burden, which is formed by taxes on consumption, is also transferred to the poor population. Also, the results of the analysis showed that reducing the share of public spending on education and health will contribute to an increase in poverty. In other words, the policy of the Ukrainian government regarding the reduction of free educational and medical services may contribute to the growth of poverty if the government does not change the policy of redistribution. These changes should include the transfer of part of the tax burden to the wealthy population, also through indirect taxes, for example, by introducing differentiated rates of VAT.

The study has several limitations. The first limitation is the time period, which is limited by the availability of statistics. The second limitation is the choice of independent variables, as not all variables can be accounted for simultaneously when dealing with a sample that is limited to a short period. Notwithstanding its limitations, the study opens up several prospects for further research. First, a methodology for estimating consumption inequality should be developed for developing countries with economies similar to Ukraine. Second, it is necessary to develop mechanisms for developing countries to redistribute the tax burden from the poor to the rich to reduce poverty.

The article contributes to the academic literature on the impact of taxation on poverty and inequality in developing countries. The practical results obtained in the paper are useful for developing countries' governments to design poverty- and inequality-sensitive tax policies.

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