# “Assessing the progressivity of the Ukrainian tax system”


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# ASSESSING THE PROGRESSIVITY OF THE UKRAINIAN TAX SYSTEM

## Abstract

Understanding the pre-war structural progressivity of the Ukrainian tax system remains crucial for evaluating its distributional capacity and substantiating the ongoing debate on reintroducing a progressive tax scale in the post-war context. This study aims to assess the progressivity of the Ukrainian tax system. Estimation for 2014–2021 was conducted for the tax system as a whole and for each of the main taxes separately, and the lumped excise taxes, which accounted for 78% of total tax revenue in 2024. The Reynold-Smolensky index assessed the redistributive impact of the taxes in question (i.e., the degree by which they change the actual income inequality), while the Kakwani index was used to show the progressivity of their design (i.e., the impact of taxes on the direction and degree of disproportionality between income and tax burden). The most significant tax is VAT (Reynolds-Smolensky index: –2.54% in 2021), and it is the most regressive by design (Kakwani index: –8.51% in 2021). PIT is the only progressive tax (Kakwani index: 8.72% in 2021), and its redistributive impact is slightly lower than that of VAT (Reynolds-Smolensky index: 1.49%), which is insufficient to counter the latter's regressive impact. As a result, the Ukrainian tax system is estimated to be mildly regressive, with moderately progressive PIT, moderately regressive VAT, and mildly regressive excises. VAT is encouraged to be left unchanged due to its key role in generating tax revenue. To increase tax progressivity, the reintroduction of a progressive PIT scale is recommended.

**Keywords** taxation, inequality, progressivity, regressivity, redistribution, PIT, VAT, excise, Ukraine

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## INTRODUCTION

The majority of EU states use progressive taxation, motivated by a fairer distribution of the tax burden, which reduces population discontent while maintaining tax revenues. This allows for compensating potentially lower tax revenues with lower social spending. And while the recent increase in ageing, ecology, and defense-related spending pushes many of the European states to increase the rates of taxation and widen the application of the flat tax rates, the income taxes still remain overwhelmingly progressive (OECD, 2025a).

The Ukrainian tax system was designed to function differently. Its role is to maximize the state income, which can later be used to finance higher social spending. Higher social spending is supposed to compensate for the adverse effects of regressive taxation on income inequality. Thus, tax rates are universally flat, and regressive taxes such as VAT (Value Added Tax) and excises account for a large share of consolidated budget income. Therefore, whether the Ukrainian tax system is progressive is pointless – it is not – but the question of how regressive it is and whether or not it should be more progressive is increasingly more relevant due to the mounting societal pressure (Shapoval et al., 2022).



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Previous attempts to introduce a progressive personal income tax (PIT) rate failed to achieve the expected results. The first few attempts of 1991–1993 and 1993–2004 introduced a complex system with multiple (up to 11 per tax) tax rates depending on sources and magnitude of income, which were replaced with flat rates in 2004 to harmonize the Ukrainian tax system with its Russian counterpart. Another attempt at introducing progressive taxation was made in 2011–2015, which was ultimately discontinued, citing concerns for the simplification of tax administration. The expected increase in tax revenue did not materialize due to the failure to set the appropriate tax brackets and tax compliance measures. Thus, the semi-progressive tax rate of 15 to 17% was ultimately replaced by a flat 18% tax rate, after which it was further increased by the military tax. Since then, there have been at least four draft laws to reintroduce progressive taxation (three for PIT and one exclusively for the military tax), yet none have had proper substantiation. In light of Ukraine's European integration ambitions and the fact that reintroduction of progressive PIT is stated as a goal in the National Revenue Strategy until 2030 (Ministry of Finance of Ukraine, 2024), assessment of the current progressivity of the tax system in Ukraine once more becomes relevant.

During the war, Ukraine's tax base underwent profound changes due to large-scale population displacement, the destruction of productive capacities, and substantial shifts in the labor market structure. These alterations both affect the composition and size of taxable income and consumption, thereby impacting personal income tax, VAT, and excise revenues. The progressivity of consumption taxes can be ensured by introducing tax incentives that vary mechanically, such as exempting groups of goods or services from consumption taxes or providing tax cost compensation for certain groups of the population (for example, through vouchers). However, all these methods involve a reduction in tax revenues from these taxes, as well as an increase in their administrative costs. Thus, wartime changes highlight the importance of understanding the baseline – the level of tax progressivity.

## 1. LITERATURE REVIEW

The generally accepted argument for tax progressivity is that it allows for mitigating income inequality and the issues that come with it (Eydam & Qualo, 2024), such as the slowing of economic growth (Stiglitz, 2016) and potential political instability (Malikov & Alimov, 2022), aggravated by fairness and social cohesion concerns. The motivation behind the introduction of progressive taxation is ultimately a fairer taxation; however, the definition of what is fair is ultimately subjective, as is shown by a survey experiment by Tarroux (2019). When presented with the after-tax income alone, the respondents consistently chose a regressive tax scheme that maximized the lowest income. However, if the information on average tax rates was provided, the majority switched their choice toward a scheme with more equal tax rates. This implies that the perceived fairness of the tax rules is more important for the taxpayers than the end result.

The trade-off between economic growth and a fairer income distribution appears to be inherent for progressive taxation. For instance, Li and Sarte (2004) show that a decrease in tax progressivity leads to an increase of the long-term economic growth of 0.12–0.34%, an increase in pre-tax income inequality (i.e. Gini coefficient) of 20–24% and an endogenous increase in the tax share of income despite lower marginal rates, due to shifts in the income distribution. The trade-off between an increase in social cohesion via fairer income redistribution, which also reduces consumption inequality, and the distortion of labor supply and skill investment decisions, which ultimately reduces aggregate output and tax revenue, was also noted by Heathcote et al. (2017). This establishes a utilitarian-fairness dichotomy, ultimately forcing the tax planner to choose one or the other.

In practice, the trade-off between fairer taxation and economic growth is realized through the dichotomy between regressive and progressive taxes. Regressive taxes have a flat tax rate and a higher impact on low-income households due to the inevitability of a minimum consumption level. The rationale for these taxes is that their revenue can be used to finance social spending, thereby offsetting the negative impact of regressive taxation

(Avi-Yonah, 2009). The rationale behind progressive taxation is to equalize the income across all of the income groups, while maintaining the tax revenue, that is, to balance equity with economic efficiency (Diamond & Saez, 2011). Theoretically, for every existing progressive tax scale, there exists a flat tax rate that achieves exactly the same outcome for both budgetary income and stimulating effect on the economy (Davies & Hoy, 2002), which makes the choice between progressive and flat rate neutral for the economy; however, the perceived fairness of taxation remains a concern.

Progressive tax scale increases the perceived fairness of taxation (Ajzenman et al., 2024). However, it also creates the incentive for the higher-income populace to relocate to another tax jurisdiction (Feldstein & Wrobel, 1998). Additionally, the effective tax rate for higher income brackets can reach over 50% (OECD, 2025b), prompting tax evasion and decreased economic activity, thus preventing the expected growth in tax revenues (Nosrati, 2025). Reduction of tax revenue undermines one of the main functions of taxation (Avi-Yonah, 2006), and thus the taxes, which are used primarily to fill the budget, such as excises, value added and sales taxes, are almost universally regressive (Mahler & Jesuit, 2018).

The reduction of tax revenue is a common argument among the critics of tax progressivity. For instance, Thompson et al. (2013) argue that it is inherent to the mechanisms needed to implement it. Such mechanisms include introducing or tuning differential tax rates, additional audit and compliance measures, as well as other tax system tweaks (Sarin et al., 2020), which require initial investment and raise the costs of tax administration. And while increasing tax revenue by implementing more progressive taxation is possible, it requires specific conditions (Wiśniewska-Kuźma, 2025).

Tax progressivity assessment is conducted to present the joint impact of the existing progressive and regressive taxes on economic inequality. The first step of such assessment tends to include the tax structure analysis: the main taxes currently in effect, their rates, usage of progressive tax scales and their relative significance, measured via their contribution to total tax revenue. An example of such an approach is the analysis of the Croatian tax system progressivity by Skalamera-Alilovik and Rubinic (2016). It is based on a comparison of the effective tax rates of the main taxes between Croatia and other EU member states. The findings illustrate the difference between effective tax rates for the same tax base, conducted by rules for both labor and capital income, and argue that tax privilege for capital income results in tax optimization rather than economic growth. Another example of this approach is a study of income inequality in Ukraine by Markina (2022), who assesses the impact of taxation on inequality by tracing the effects of taxes and transfers on households' income throughout different stages, the Commitment to Equity methodology, developed by Lustig (2017). The starting point is market income (i.e., before taxes), which becomes disposable income after direct taxes and subsidies, and then becomes consumable income after indirect taxes and subsidies.

Another often used angle is historical retrospectives for previous taxation reforms. A good illustration for this approach is an article by Troiano (2017), who describes three major tax policy changes concerning the personal income tax (PIT) in the US during the 19th century. The reforms in question were the inception of PIT, implementation of tax withholding bundled with third-party tax reporting, and the introduction of intergovernmental audit sharing between states. The impact of the reforms was measured by changes in the Atkinson, Gini, and Theil indices after each pivotal reform. Historical retrospectives, dedicated to a single tax (Slemrod & Velayudhan, 2022), allow for a more detailed view of the impact of said tax on tax progressivity and highlight the mechanisms of such impact. Another example is a working paper by Slemrod and Bakija (2020), which simply presents the dynamics of the distribution of tax-modified gross income 1991–1997, linking it to the changes in the tax code during those years. Papers focused on historical retrospectives usually employ additional analysis tools, such as cross-country comparisons or modelling, to support their conclusions.

Further estimation of tax progressivity is generally based on calculating the dynamics of distribution indices. The most standard approach is to calculate one or more of the existing indices using existing statistical data. Such estimation is ultimately


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based on the difference between pre- and post-tax household income, and gives the analysis a comparable numerical expression, which can then be used to align the achieved results with other tax systems. For instance, Avi-Yonah (2014) uses the Gini index before taxes and the Gini index after taxes and transfers in the US to argue for the introduction of VAT. A similar approach was used by Caminada et al. (2019) to assess the impact of tax transfers on income inequality. Comparing pre- and post-tax income to measure the impact of taxation, as well as the pre- and post-tax Gini indices, is at the heart of the methodology used by Auten and Splinter (2024). They calculate income based on taxation data rather than taking information from national surveys, which allowed them to account for a wide variety of additional factors, such as corporate income and capital gains. Oishi et al. (2018) estimate tax progressivity based on the difference in tax rates between the highest and the lowest income bracket.

Creation of the author's own metrics for tax system progressivity compensates for the existing indices' shortcomings. For instance, progressivity indicator (PI), proposed by Mian et al. (2025), allows for a more straightforward measurement of tax progressivity using widely available data, which remains universally comparable, and closely correlates to the more common indices. It is to be calculated as a fraction of personal income tax (PIT) income over the value added tax (VAT) income, because PIT is usually progressive, while VAT is regressive, and both taxes tend to be meaningful sources of tax revenue. The inherent flaw of this approach is that it presupposes the progressivity of PIT and the regressiveness of VAT, which are not universally applicable across different countries. For instance, as shown by Braz and Cunha (2009), in Portugal VAT is progressive by design, even though it due to having four different rates, it is progressive relative to expenditure (average tax rate increases with expenditure level) and regressive relative to income (tax burden as a share of income falls as income rises).

Stroup index, introduced by Stroup and Hubbard (2013), incorporates both income and tax revenue from the entire tax base, unlike the other more standard metrics. Additionally, this index is independent of total income and tax revenues, focusing solely on their distributions. They contrast it with the standard Kakwani and Suits metrics. All of these indices are focused on the area difference between the Lorenz curve and tax concentration curve, with the Kakwani index being the direct difference, Suits index being the difference weighted by the slope of the Lorenz curve, and the Stroup index being a ratio of the difference between the Lorenz curve and tax concentration curve divided by the area under the tax concentration curve. The latter normalization brings the possible values of tax progressivity assessment into a 0 to 1 scale, arguably more intuitive and behaving more consistently across the progressivity spectrum. The authors then estimate all three indices for the US in 2003–2007, concluding that while Kakwani and Suits indices show a decline in tax progressivity, their own index shows a general increase in it.

Redistributive efficiency index, proposed by Mantovani (2018), is also independent of tax size and has a fixed 0 to 1 bond. Additionally, it is decomposable into contributions from individual tax or benefit components, and is applicable to the net tax-benefit system in its entirety. It is calculated as the ratio of the actual redistribution (measured by the Reynolds-Smolensky index) to the maximum possible redistribution achievable with the same amount of resources. Maximum possible distribution is a modelled parameter, which is calculated as the ideal tax (or benefit), after which the post-tax (benefit) profit of every individual will be equal, while the tax system retains its historical levels of tax income (social expenditure).

The progressive capacity index, introduced by Gerber et al. (2020), is calculated as the difference between the Lorenz curve based on the simulated income distribution and the same distribution adjusted by existing taxes. Essentially, it is similar to the standard Kakwani index, but calculated based on the modelled income distribution. This means it is not affected by the pre-tax income distribution, which makes it better for cross-country comparisons, and, like the regular Kakwani index, it isolates and quantifies the progressivity built into the country's tax code.

Data generation and modelling are used to compensate for missing or incomplete data. For instance, Vellutini and Benitez (2021) propose a

"transplant-and-compare" method, which consists of emulating a tax base of a country by calibrating the lognormal distribution of its tax revenue based on its Gini index and mean income, and extrapolating it to 1000 "taxpayers", to which the local tax rules are applied. Transplanting each country's simulated tax regime in this way into a standardized common base allows for better comparability of inequality and tax progressivity indices calculated from such distributions. A similar approach is used by Duncan and Peter (2016). They model a tax base by applying local tax rules to a set of 100 "taxpayers" with income, which is calculated as a percentage of the country's average per capita GDP income, adjusted by a set multiplier from 4% to 400%, and use the resulting dataset to calculate average and marginal tax rate progression for each country they examined. Both the average and marginal tax rate progressions are the slope coefficient from two separate regressions of the corresponding indicator against the gross income. Rubolino and Waldenström (2020) use the same average tax rate progression indicator, which they calculate from income data taken from the tax records and the statutory tax rates from the OECD tax database. The average tax rate progression is calculated directly as the difference between average tax rates for higher and lower income brackets divided by the fraction of their respective income levels minus one. At the same time, both studies concluded that a reduction in tax progressivity results in rising income inequality. Rubolino and Waldenström (2020) were able to conclude that this growth of inequality stems mostly from a rise in income of the highest income bracket. Modelling (the synthetic control method) in this study was used to evaluate a potential deviation in income for a scenario in which the tax reform, aimed at increasing tax progressivity, did not occur, i.e., for forecasting rather than compensating for missing data.

All methods based on data generation share a common set of limitations. Firstly, since all of these methods construct their data points from a normative perspective, any deviation in real data creates a significant mismatch between the estimated and practical performance. Measuring such deviation can prove very difficult, since the lack of sufficiently detailed real data is one of the reasons why a data generation-based method is chosen. An obvious source of one such mismatch can be tax evasion by the higher income bracket, which may cause the difference between the official and effective tax rate of up to 10% for certain income brackets, as shown by Alstadsæter et al. (2019). Secondly, the efficiency of these methods strongly deteriorates when faced with tax systems that use mostly flat tax rates, since the modelling calculations result in a lack of difference between tax rates across income brackets – even if the survey data show differences. As far as these methods are concerned, the tax system in question is equitable. Therefore, this set of methods is mostly used as a backup for the main analysis.

To conclude, the rationale behind improving the progressivity of a tax system is to achieve a social effect while maintaining or increasing tax revenues. The first step in increasing tax progressivity is to assess its current level, which can be done based on available data using a number of techniques. Such an assessment must include a basic analysis of the existing tax system structure, as well as a detailed analysis of its impact on economic inequality. Therefore, this paper aims to assess the progressivity of the Ukrainian tax system in light of its implications for income inequality.

## 2. METHODS

Most of the methods described in the literature review are unusable for the available data sample because most Ukrainian tax rates are flat. Flat tax rates do not provide a difference between pre-tax and post-tax income distribution. Additionally, the available data are not sufficient to calculate such a difference based on the few existing tax exemptions and special regimes. Data availability also severely constrains the historical retrospective. Not only did most of the major changes in taxation occur within a time frame scarcely available for research as of now (since most of the open-access archives only date from 2009 to 2024 or so), but the information, taken from older sources, is often inconsistent due to the methodological changes. Although the study concerns the pre-war period, it remains relevant as it captures the structural features of Ukraine's tax system, providing a benchmark for the design of future post-war tax reforms.


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For assessing tax progressivity in Ukraine, two main sources of data are available:

1) the statistical publication "Household expenditures and resources of Ukraine", published by the State Statistics Service of Ukraine (SSSU). This is the only source for per household data on income and spending available, the latest available period being 2021. When contacted, SSSU could not provide a more recent dataset, quoting the Law of Ukraine "On the protection of the interests of entities submitting reports and other documents during the period of martial law or a state of war" as the reason why. This source provides data on a per-household basis, by decile, by monthly income per household;

2) direct data on tax revenues, provided by both the National Bank of Ukraine (NBU) and the Open Budget Project. These sources provide country-wide aggregated data on a yearly basis, and the data on tax revenues are only available in this format.

Taking into account the data availability, tax progressivity was estimated using Reynolds-Smolensky (RS) and Kakwani indices. Since the data on tax spending, needed to calculate tax burden distribution, are not available on the per household monthly basis, the aggregated data on tax revenues for PIT, VAT, and lumped excises, taken from the tax records, were transformed into monthly data and further divided by the number of households for each corresponding year. The resulting per household per month data were used to calculate tax burden distribution for each of the taxes in question by decile groups by their level of income (i.e., monthly average taxes paid by households of certain income groups denominated in UAH). These data were used to calculate both pre- and post-tax income by decile groups by their level of income, which in turn allowed us to calculate the Gini index for each of the taxes for the period using the standard formula:

$$G = \frac{2\sum_{i=1}^{n} ix_i}{n\sum_{i=1}^{n} x_i} - \frac{n+1}{n}, \quad (1)$$

where $G$ is the Gini index; $n$ is the number of groups; $x_i$ is the income of the $i$ group.

This index allows for assessment of the inequality caused by single tax or the tax system based on the inputs. A higher Gini index means higher inequality and vice versa.

The Reynolds-Smolensky index, as was already mentioned, is the difference between the pre-tax and post-tax Gini coefficients.

$$RS = G_{pre-tax} - G_{post-tax}, \quad (2)$$

where $RS$ – Reynolds-Smolensky index; $G_{pre\text{-}tax}$ – Gini index calculated based on pre-tax income; $G_{post\text{-}tax}$ – Gini index calculated based on post-tax income.

The Reynolds-Smolensky index allows for assessing the redistributive effect of a single tax or the tax system as a whole, based on the inputs. It shows how much inequality changed due to the taxation, i.e., the practical effect of taxation on inequality.

The Reynolds-Smolensky index can be transformed into the Kakwani index using the formula:

$$K = \frac{\overline{Y}}{\overline{T}} \cdot RS, \quad (3)$$

where $RS$ – Reynolds-Smolensky index; $\overline{T}$ – percentage of income that was taken out as tax; $\overline{Y}$ – average income; $K$ – Kakwani index.

The Kakwani index shows the progressivity of the tax structure itself, i.e., how progressive or regressive the tax in question is (if calculated based on pre- and post-tax income that only counts one tax), or the system as a whole (if all taxes are included).

The Reynolds-Smolensky index was calculated for every major tax, for which the data are available (PIT, VAT, and excises). For PIT, a difference in tax distribution was introduced by subtracting non-taxable parts of income (such as pensions and social transfers, which take up a significant part of income, especially for poorer households) from the total monetary income before assessing the post-tax Gini coefficient. For VAT and excises, the amount of tax paid was calculated based on consumption (for VAT it is total consumption, and for excises – the consumption of alcohol and tobacco), and the Gini coefficient for these taxes was counted based on the total household monetary income.

This approach heavily relies on microdata from the household survey, which is not available after 2021. More nuanced calculations are not possible due to the lack of a more detailed breakdown of household income. For instance, for PIT, even the theoretically flat rate has different preferential rates, tied to income source – the rate for dividend income from non-residents is halved (i.e., 9%), and tax rates for dividends from residents who pay profit tax are 5%. Both of these categories were lumped together in the available dataset, and were around 1.3% of total income in 2021, which is the latest available period, for which the data are available, making a more precise estimation both impossible and largely irrelevant.

All of the calculations were conducted for the 2014–2021 timeframe, except for the structural background of the Ukrainian tax system, for which newer data are available (2024). All data used are from open sources, courtesy of the State Statistics Service of Ukraine, National Bank of Ukraine, and the Open Budget Project.

## 3. RESULTS

As of 2021, internal tax revenue, which accounted for 1,107 billion UAH, formed 85% of total consolidated budget revenues. The majority (63%) of the tax revenues was formed by the VAT (49%) and excise payments (14%). Another 26% was made up of corporate income tax (13%) and PIT (13%). Thus, before the full-scale war, PIT, VAT, and lumped excise payments accounted for 90 % of total tax revenues or 76% of total consolidated budget revenues.

During the full-scale war, as of 2024, the total tax revenue of 1,647 billion UAH accounted for 58% of total consolidated budget revenue. This apparent decrease in the share of taxes in the total consolidated budget revenue is due to the roughly 3 times increase in total consolidated budget revenues, which was financed by 5 times increase in non-tax budget revenues (for a total of 799 bln UAH), a 48% increase in tax revenues (for a total of 540 bln UAH) and the aid from EU, foreign governments and international financial organizations (for a total of 474 bln UAH).

During the full-scale war, the structure of tax revenue remained largely unchanged, with VAT still being the predominant source of tax revenue (45%). The PIT became the second-biggest source of tax revenue (20%), as a result of introducing new income tax categories, as well as increasing the tax base by increasing the army size. In fact, starting from 2024, the total PIT revenue on military pay represented 25% of total PIT revenue as opposed to only 5% in 2021, which represents both an increase in the number of soldiers and their above-average pay. Corporate profit tax accounted for 16% of total tax revenue in 2024, making it the third-biggest source of tax income, and the lumped excises accounted for 13% of total tax revenue (Figure 1).

As of 2024, PIT, VAT, and lumped excises accounted for 78% of tax revenue, as opposed to 90% in 2021. Due to the wartime increase in total consolidated budget revenues and the disproportionately high growth of non-tax revenues, the overall significance of tax revenues from PIT, VAT, and lumped excises decreased from 76% of total con-

Source: Own compilation based on State web portal of budget for citizens (n.d).

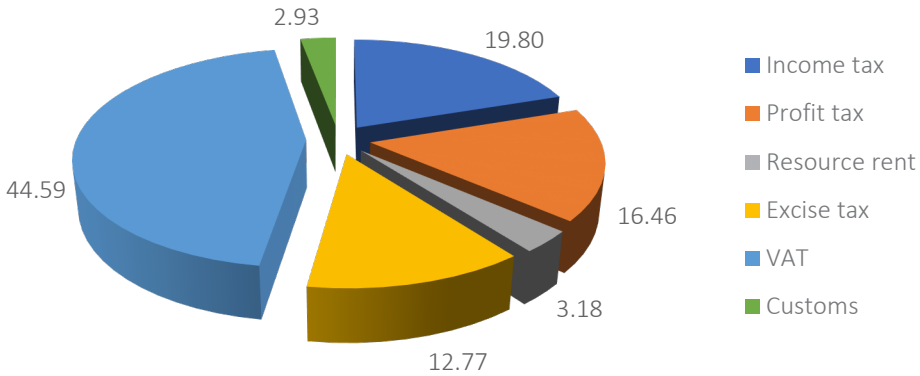


**Figure 1.** Structure of tax revenue in Ukraine in 2024, %


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solidated budget revenues in 2021 to 41% in 2024. Accounting for 90% of total tax revenue and 76% of the consolidated budget revenue makes the calculations based on PIT, VAT, and lumped excises highly representative for 2021, and remains representative for 2024, given the comparatively mild change in the structure of tax revenue in 2024 (i.e., the same three taxes still accounting for 78% of total tax revenue, while the total tax revenue maintains broadly similar structure). The only notable wartime change is the relative increase in PIT impact, which is likely caused by the increase in the number of soldiers, who are state employees and, therefore, receive transparently taxed income, which is higher than the official average income in the country. Since the RS and Kakwani indices are calculated based on the pre- and post-tax Gini index, corporate profit tax does not impact the end result, because the households do not pay it. This makes the corporate profit tax the biggest omitted tax.

The most noteworthy aspects of pre-war income distribution were the relatively higher (6,3K UAH) gap between the IX and X deciles, as well as the accelerated growth of gaps from the VII decile onward. In relative terms, the biggest gap was between I and II decile, with the gap between IX and X one being the second (Figure 2). This indicates a highly polarized income structure pre-war, with extreme tail values, – a common occurrence in an unaugmented income distribution, which was the case for Ukraine, since it did not have a progressive tax scale for income. This pre-war feature indicates the potential for increase in tax progressivity by implementing a top-heavy progressive tax scale for PIT in Ukraine. However, the prior experiment of implementing a progressive rate for PIT (15% for the general public, 17% for the high earners) ended in 2016 with a failure. Since then, the progressive tax rate was replaced with a flat tax rate, which was higher than the "elevated" tax rate before it (18%). It brought the effective tax rate for the highest income decile from 14% to 17.5%, which shows that the highest income bracket has the sufficient ability for tax optimization to keep its own effective tax rate to the possible minimum.

From the dynamics of the effective tax rates alone, the regressive impact of both the VAT and excises can be observed – since these rates go down as the income goes up. The only currently progressive tax is PIT, which is caused by the calculation methodology. Since a wide variety of income is not subject to PIT (such as pensions, stipends, and financial aid from relatives), but is still included in the money income, the overall distribution effect of this tax is progressive. The dynamic of taxes as part of income on average per household is presented as follows (Figure 3).

Before the full-scale war, the increase in average households' monthly money income from 4160 UAH in 2014 to 13,616 UAH in 2021 coincided with the increase in VAT share from 19% to 22% (Figure 3). It is noteworthy that the effective tax rate for VAT exceeded its statutory rate, with lower income deciles having a stronger effect – this

Source: Own estimations based on State web portal of budget for citizens (n.d) and State Statistics Service of Ukraine (2022).

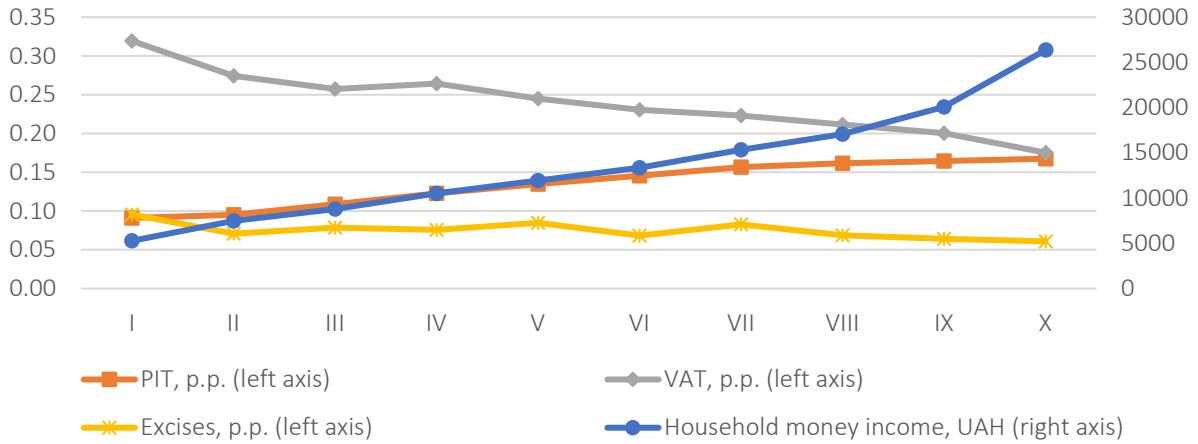


**Figure 2.** Household money income and effective tax rates in Ukraine in 2021

Source: Own estimations based on State web portal of budget for citizens (n.d), State Statistics Service of Ukraine (2022), NBU (n.d.).

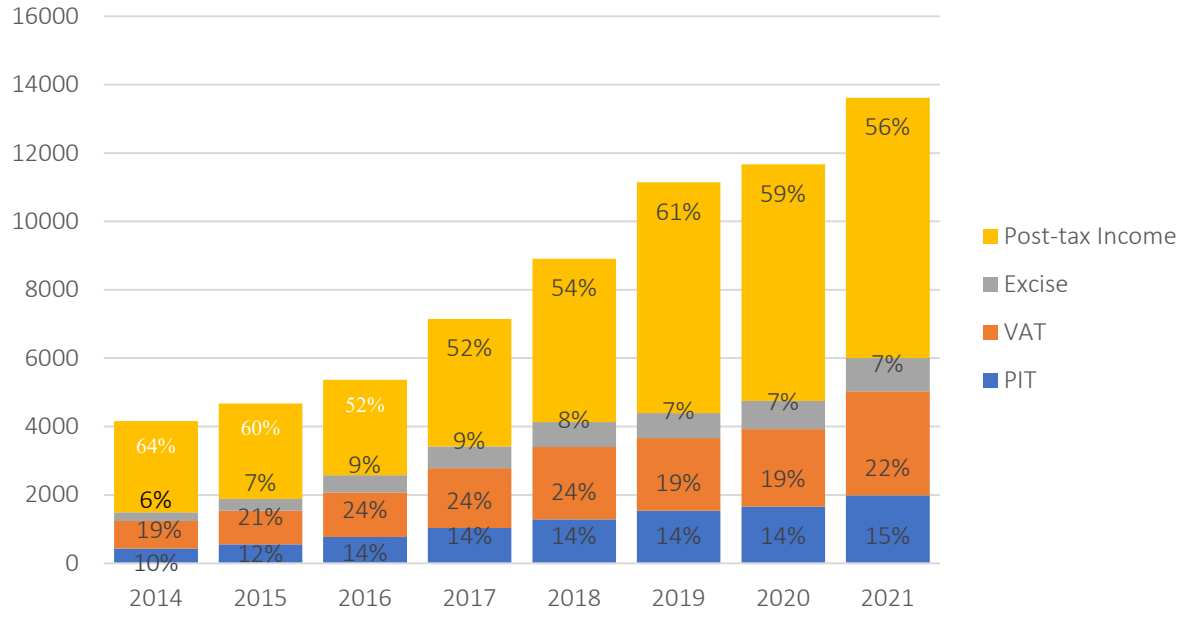


**Figure 3.** Structure of households' monthly money income in 2014–2021, UAH

is due to the minimum consumption level, which cannot be reduced below subsistence levels but increases as income rises. Generally, only the highest income deciles (starting from VI) throughout 2014–2021 got to achieve income levels at which effective VAT decreases past its statutory rate, although even the X decile had two years when the effective VAT rate was over 20%. The effective tax rate for PIT also increased during this period, while the effective excise tax rate decreased. This is linked to rising income and a decrease in alcohol and tobacco consumption, since only these two constituents account for excises in the calculations, as fuel consumption is not included in the survey.

Before the full-scale war, Ukraine's tax system (based on the three taxes that account for 78% of tax revenue) was overall regressive, mostly due to the influence of the consumption taxes (Table 1). It has steadily regressed since 2014, mostly due to the increase in VAT's regressiveness, which is both the most influential (RS index) and the most regressive (Kakwani index) tax in the group. The excises are mostly inconsequential, while the PIT is progressive, which is not enough to compensate for the effect of VAT. The tax system has become more regressive overall since 2014, with income growth being compensated by high inflation, and tax burden growing mostly due to the increase in the effective VAT tax rate, which in turn is linked to the increase in the cost of living and the existence of an irreducible consumption minimum. The larger half of the VAT, however, is paid on imported goods, which in Ukraine means cars, consumer electronics, and machinery, which may point to volunteer movements and non-state materiel procurement.

The only notable wartime change in the rules of taxation for PIT, VAT, and lumped excises during 2021–2024 timeframe is the increase in military tax, which is flatly added to the PIT rate, from 1.5% to 5%. This change is irrelevant for this research because no household income data are available after 2021 (when it was 1.5%), and because the overall household monthly income structure indicates low employment levels across at least five of the ten income deciles. Specifically, the average monthly income per person in a household was less than the minimum wage for deciles I to V, while these same deciles had up to 41% (decile I) of their monthly money income classified as social transfers (which are mostly old age pensions). It is not possible to plausibly predict the new income distribution for 2024, since the main factor of change would be the increase in the number of people who receive military wages. This category of people is likely to be situated in the lower income deciles; however, people from the lowest in-


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**Table 1.** Tax system progressivity analysis

Source: Our estimations based on State web portal of budget for citizens (n.d.) and State Statistics Service of Ukraine (2022).

| Year | Reynolds-Smolensky index, % | | | | Kakwani index, % | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | PIT | VAT | Excise | Total | PIT | VAT | Excise |
| 2014 | –0.83 | 0.82 | –1.31 | –0.22 | –1.49 | 7.03 | –5.48 | –3.36 |
| 2015 | –1.48 | 1.02 | –1.79 | –0.40 | –2.19 | 7.62 | –6.68 | –5.02 |
| 2016 | –1.12 | 1.48 | –1.79 | –0.55 | –1.22 | 8.83 | –5.56 | –5.34 |
| 2017 | –0.68 | 1.59 | –1.93 | –0.29 | –0.74 | 9.44 | –5.97 | –2.89 |
| 2018 | –0.55 | 1.46 | –2.05 | 0.02 | –0.63 | 8.70 | –6.57 | 0.19 |
| 2019 | –0.37 | 1.44 | –1.76 | –0.05 | –0.57 | 8.99 | –7.47 | –0.71 |
| 2020 | –1.22 | 1.51 | –2.06 | –0.39 | –1.78 | 9.10 | –8.60 | –5.07 |
| 2021 | –1.81 | 1.49 | –2.45 | –0.41 | –2.29 | 8.72 | –8.51 | –5.28 |

come deciles are unlikely to be eligible for service. Social spending in the budget did not grow since 2021 to compensate for inflation; therefore, the overall regressive impact of consumption taxes likely grew, while the effect of the income tax remains hard to predict.

## 4. DISCUSSION

The data clearly show that the overall impact of the three major taxes, which account for 78% of total tax revenue (which in turn corresponds to 45% of total consolidated budget revenue), was regressive in 2021. This conclusion was to be expected based on both the structure of these taxes, specifically the flat tax rates and narrow tax exemptions, and the heavy reliance on indirect taxes for tax revenues. It also aligns with the conclusions of other authors whose research focused on Ukraine. Specifically, Markina (2020) concluded that the tax system in Ukraine has a negative impact on poverty, which means it redistributes wealth from the poor to the wealthy, which is the textbook definition of a regressive tax system. With the increase in the military tax rate and the slow decline in social spending due to the shift in financing priorities, the overall regressive impact of the Ukrainian tax system likely only increased after 2021.

In the past, the regressive impact of the tax system was compensated for by increasing the minimum wage and social spending. However, starting in 2014, attempts were made to increase taxation due to the growing defense spending. During 2014–2021, nominal household income increased threefold, while the overall tax burden increased by 8%, with the PIT growing by 5% and VAT by 3%, while excises remained largely unchanged. The most regressive tax was VAT, with its effective tax rate routinely exceeding its statutory rate for the lower income deciles, reaching up to 39% for the I decile in 2018. Its dynamic reflected the consumption pattern during 2014–2021, with it being over 20% only for the first four deciles in 2014, and reaching over 20% for the first eight deciles in 2015, as the higher income brackets were forced to maintain their minimal consumption under the stress of increasing inflation, i.e., decrease of the real income levels. A similar situation was observed in 2021, after two years of income normalization. That means that the households spent nearly all of their income on consumption. In other words, nine of the 10 income deciles, shown in the survey, existed within a very thin income margin, and the 10–20% inflation pushed them toward the subsistence level. This indicates that in 2021 there was no potential for any further increase in tax revenue. This aligns with the conclusions of Shapoval et al. (2022), who link an increase in poverty of the population in Ukraine to the effects of war, as well as to the insufficient levels of financial depth. Data from 2024 indicate that a further increase in minimum wages and mass recruitment for military service (which technically has an above-average wage) succeeded in further increasing tax revenues; however, without proper household income distribution, it is impossible to tell how it affected the PIT progressivity.

The latest available data allow us to conclude that in 2021, the only progressive tax was the PIT, and its progressivity stemmed not from progressive tax rates, but rather from the categories of income it did not apply to, namely pensions and stipends. The fact that the I decile by income showed the effective tax rate below 10% for each year except for

2016, while the X decile by income had the effective tax rate of around 17%, indicates that the I decile mostly relied on pensions and stipends as their sources of income. It is also noteworthy that even the highest income bracket did not effectively pay the statutory tax rate of 19.5%, which means that even at the highest income bracket, non-taxable income was significant. Overall, this indicates a tax system that relied on regressive taxes like VAT to generate enough tax revenue to finance social spending, which was crucial for lower-income brackets to survive at the subsistence level. This did not work out, since the people in the upper VI decile by income were still dependent on social payments. After 2022, when the social spending was switched to funding by the residual principle in order to maintain the increasing defense spending, this approach can no longer work.

The tax progressivity analysis, conducted using Reynolds-Smolensky and Kakwani indices, allows us to point out that the most impactful tax is VAT (the biggest negative RS index), and currently it is also the most regressive by design (the biggest negative Kakwani index). It is noteworthy, however, that both VAT and excises were regressive, although the impact of the excises was much less pronounced. The fact that the excises were estimated as progressive in 2018 seems to be a fluke in the consumption structure. The only progressive tax was PIT, and its impact was comparable to that of VAT, but weaker, which results in tax system progressivity being characterized as "weakly regressive" (less than –5% RS and Kakwani indices) rather than "moderately regressive" (–5% to –10% RS and Kakwani indices). For comparison, Mantovani (2018), based on 2012 calculations of the progressivity of different tax systems, found that of the 27 European countries included in the calculations, none appear to have a negative RS or Kakwani index, with values below 7% considered low.

Newer sources indicate that tax system progressivity on average has been steadily increasing since 2012. For instance, Kakwani index calculations provided by the EC (n.d.) indicate that among the 27 European countries for which data are available, there is no country with a general tax system Kakwani index below 12% as of 2024, with the average being 44%. The last time the overall Kakwani index was less than zero was in 2010 in Ireland (–53%). Thomas (2020) provides estimations for both the RS and Kakwani indices specifically for VAT in 2020, for 26% countries. Only Chile, Hungary, Lithuania, and New Zealand have negative RS and Kakwani index for VAT, with the average being 3.2% for RS and 0.3% for Kakwani index. This allows us to conclude that negative RS and Kakwani indices are extremely uncommon among European countries, in which even the most traditionally regressive taxes, like VAT, still provide a mild redistributive effect from rich to poor.

## CONCLUSION

The analysis shows that Ukraine's pre-war tax system was regressive and did not contribute to reducing income inequality. The Ukrainian tax system was weakly regressive in 2021, due to the joint influence of a moderately progressive PIT, a moderately regressive VAT, and weakly regressive excises. Low values of the Kakwani index indicated that all taxes except PIT are not progressive by design, while low values of the RS index indicated that the tax system overall is regressive, i.e., it redistributes wealth from the poor to the rich. PIT was not designed to be progressive either, with a flat tax rate and no major exemptions; however, it was still progressive due to a significant portion of average households' monthly income (social transfers) that was not subject to PIT. Thus, the progressivity of PIT resulted from the redistributive effect of social transfers, which were exempt from PIT and were financed by regressive taxation. Conducted estimation of Ukrainian tax system progressivity places it among the least progressive in Europe in 2021. The decrease in social spending and further increase in tax revenue in 2024 imply that the progressivity of the Ukrainian tax system was decreasing during 2021–2024.

This study relies heavily on microdata on households' income in Ukraine, not available after 2021, and the aggregated data were transformed into microdata using a somewhat crude approach. This means that the resulting assessment can only be used as an approximation. It is, however, the only possible es-


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timate of the progressivity of the Ukrainian tax system at the moment. Introduction of actual progressive scales for the main taxes, along with proper statistical documentation, will allow for more accurate estimations and the use of the now-unavailable estimation methods.

While it is technically possible to increase the tax progressivity of VAT using targeted tax exemptions and/or implementing targeted compensations for certain categories of people, it usually results in a decrease in VAT tax revenues and an increase in its administration costs. Due to its key role in tax revenues, any VAT changes are not advised. Both the PIT and the excises are less important as a tax revenue source. For excises it is the norm, since their main goal is to be as a governing tool to control consumption. For the PIT, the existing level of tax revenue is comparably low, and potentially can be increased by reintroducing the progressive scale.

This leaves PIT as the prime candidate for any attempts at increasing Ukraine's tax system progressivity. Extreme tail values for income distribution indicate that the highest income decile has the potential to pay higher PIT, and the difference between its effective PIT rate and its statutory rate confirms this conclusion. Further research prospects include designing a progressive PIT scale and the general taxation rules, with a focus on increasing compliance.

## AUTHOR CONTRIBUTIONS

Conceptualization: Pavlo Kerimov.
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Formal analysis: Pavlo Kerimov.
Investigation: Pavlo Kerimov.
Methodology: Pavlo Kerimov.
Resources: Pavlo Kerimov.
Visualization: Pavlo Kerimov.
Writing – original draft: Pavlo Kerimov.
Writing – review & editing: Pavlo Kerimov.

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