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Progressive tax development in the taxation system: a comparative analysis of the EU and Central Asian countries

Desarrollo fiscal progresivo en el sistema tributario: un análisis comparativo de la UE y los países de Asia Central

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Abstract: the study aims to compare the experience of implementing a progressive taxation system in the EU countries with the taxation system in Central Asia to establish the prospects for reforms in this area. The following methodological methods were used: methods of generalisation to analyse theoretical materials, methods of processing statistical results, estimation of the Gini coefficient, and assessment of the progressiveness and redistributive capacity of profitability indicators using economic and mathematical modelling methods were also used. The income tax indicators of such countries as Kazakhstan, Uzbekistan, the Kyrgyz Republic, Tajikistan and Turkmenistan were assessed. The study determined that according to the data on progressiveness and redistributive capacity due to the peculiarities of tax policy implementation, Kazakhstan, the Kyrgyz Republic and Tajikistan have a pronounced progressiveness and redistributive capacity. Turkmenistan and Uzbekistan do not have such indicators. The Gini Index (coefficient), which indicates a high degree of income inequality in these countries, is also very characteristic. On the contrary, the Gini coefficient of the leading European Union countries is higher: Belgium, Denmark, France, Germany, Spain, and Germany are characterised by a high degree of fairness in the tax structure and social sphere. Thus, the need to reform the taxation system to achieve the goals of sustainable development in Central Asian countries is an urgent problem that should be addressed and accounted for at the state level.

Keywords: taxation, system, progressivity, redistributive capacity, reforms, Gini coefficient.

Resumen: el estudio pretende comparar la experiencia de la aplicación de un sistema fiscal progresivo en los países de la UE con el sistema fiscal de Asia Central para establecer las perspectivas de las reformas en este ámbito. Se han utilizado las siguientes metodologías: métodos de generalización para analizar materiales teóricos, métodos de tratamiento de resultados estadísticos, estimación del coeficiente de Gini y evaluación de la progresividad y la capacidad redistributiva de los indicadores de rentabilidad mediante métodos de modelización económica y matemática. Se evaluaron los indicadores de rentabilidad de países como Kazajstán, Uzbekistán, la República Kirguisa, Tayikistán y Turkmenistán. El estudio determinó que, según los datos sobre progresividad y capacidad redistributiva, debido a las peculiaridades de la aplicación de la política fiscal, Kazajstán, la República Kirguisa y Tayikistán tienen una progresividad y una capacidad redistributiva pronunciadas. Turkmenistán y Uzbekistán no disponen de tales indicadores. También es muy característico el índice (coeficiente) de Gini, que indica un alto grado de desigualdad de ingresos en estos países. Por el contrario, el coeficiente de Gini de los principales países de la Unión Europea es más elevado: Alemania, Bélgica, Dinamarca, España y Francia se caracterizan por un alto grado de equidad en la estructura fiscal y en el ámbito social. Así pues, resulta necesario reformar el sistema fiscal para alcanzar los objetivos del desarrollo sostenible en los países de Asia Central.

Palabras clave: fiscalización, sistema, progresividad, capacidad redistributiva, reformas, coeficiente de Gini.

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Introduction

The peculiarity of the progressive tax and the underlying taxation system is the principle that low-income citizens pay taxes at lower rates, and those with high incomes pay higher rates, respectively. The main purpose of introducing such a system is to create a fair attitude in society depending on the income of the population and redistribute the tax burden, as well as to ensure that the state budget receives funds that are then used to cover social programs. Therefore, researchers address the possibility of transitioning developing countries or those seeking to achieve sustainable development goals to this system. Progressive tax reforms can enable developing countries to redistribute revenues and budget financing, while reducing the structure of inequality among the population, providing revenues to the social sector, and mobilizing finance for crisis sectors of the economy. This system will allow funds to be accumulated in favor of lower-income households. Such reforms and the extent of their impact on the growth of indicators reflecting the dynamics of economic development in the European Union directly depend on the taxation structure in each country and the level of implementation of reforms. Each country has different domestic regulations, tax rates and social programs (Yuliia *et al.*, 2025). The above reforms have the potential to become an effective tool for reducing poverty in developing countries. However, the success of their implementation undoubtedly depends on many aspects, including the specific circumstances of each country, the specifics of development, the level of regulation and management of tax and fiscal policy, the quality of governance, and the structure of management.

The study is based on a comparison of the relationship between tax policy and income inequality in the European Union (EU) and Central Asian countries. The study compared data on the countries that are members of the European Union and are quite successful in terms of the level of development, namely: France, Germany, Spain, Denmark and Belgium. The study examines the effects of changes in tax rates (income tax or personal income tax (PIT), social security contributions) and GDP dynamics (Atkinson *et al.*, 2011). The study also noted that there is a marginal tax rate limit, which is the percentage of tax paid for each additional dollar of income. In emerging markets, high tax rates on marginal products are commonly used by governments as a revenue-generating mechanism. However, this could have a negative impact on the national economic development. Reduction of the prospects for sustainable development. Raising tax rates, or rather their upper limits, can discourage investment and entrepreneurship, thereby reducing the revenue side of the budget, which in turn is used to cover the social sphere (Oleksy-Gebczyk and Bilianskyi, 2024; Oleksy-Gebczyk, 2024).

The countries of the Central Asian region include Kazakhstan, Uzbekistan, the Kyrgyz Republic, Turkmenistan and Tajikistan. The most promising country in terms of development is Kazakhstan, with its raw material orientation and pace of development. The fiscal policy is dynamic, the tax system is currently flat, and the current personal income tax rate is fixed at 10%, which is not subject to change regardless of income. The progressive tax rate is different – it increases in direct proportion to income (Petersone and Ketners, 2017). Analysing these systems separately from Kazakhstan, the only advantage of the current single tax rate is its simplicity of calculation, which is very convenient for taxpayers in fulfilling their tax obligations. Progressive tax rates cannot have this advantage. The main problems of the region are lack of direct access to the sea, which complicates logistics and transportation of resources; dependence on climate change; high resource dependence with a low level of economic and financial development; imperfect legislation in the field of finance and revenue, and the tax system.

Studies of the tax systems of Central Asian (CA) countries were previously addressed by Kadyrberdieva (2019) and Mayrambekov (2021). The authors noted the peculiarities of regional taxation, addressing the specifics of each country, as well as the peculiarities of financial security. Abdugafarov and Achilov (2023) addressed reforms in Uzbekistan. The country is characterized by

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a high level of commitment to tax reform. Much consideration in terms of assessing the indication of the tax system was devoted by Li *et al*. (2023). International experience and the impact of external factors on the region were compared. Mukhamedyarova and Mozgovoy (2019), and Khamitov *et al*. (2022) also studied the impact of the corruption component on the reform of the tax system.

However, although the issue has been sufficiently studied, the possibility of introducing a progressive taxation system has not been considered in depth. The possibility of using the experience of European countries in the Central Asia region is also not disclosed. Therefore, the following tasks are considered in this study:

- Analyze the peculiarities of the tax system in the Central Asia region in detail, accounting for the goals of sustainable development.
- Examine the advantages and disadvantages of progressive and flat taxation systems.
- Compare the tax systems of the European Union (characteristics) and the countries of Central Asia.
- Identify the main problems of transition to a progressive taxation system.

The results obtained will make it possible to assess the feasibility of introducing a progressive taxation system in the Central Asia region, considering the experience of European countries.

Materials and methods

To conduct research and summarize data on taxation systems, the following analytical studies were conducted using the following methods: theoretical synthesis of materials, methods of summarizing statistical data on tax payments and GDP dynamics, the European Union and the Central Asian region (Quiros-Romero *et al*., 2021; Middle East and Central Asia, 2022). The Poverty and Inequality Platform Methodology Handbook (2024) was also used. For this purpose, the methodology used by the World Bank to calculate global and regional poverty rates was used (Aron *et al*., 2023). The Gini index itself has several disadvantages, which can be levelled out by calculating the progressivity index. Similarly, the progressivity index proposed by Kakwani (1977) is defined as the difference between the Gini coefficient, which also includes the sum of all taxes and fees before they are paid. Thus, an increase in the share of taxes in the volume of income and an increase in the share of the population with a high income will increase the progressivity of the income tax. The relevant scientific contribution of Kakwani's (1977) work is the breakdown of the overall redistributive effect of taxation into its progressivity and the "magnitude" of the factors defined as (1):

$$x = \frac{\sum l_n}{\sum l_m}, \qquad (1)$$

where: $\sum L_n$ - total tax liabilities; $\sum L_m$ - total income before taxes.

This breakdown assumes that progressivity is a necessary but not sufficient condition for effective redistribution. Thus, the total amount of revenues generated by the income tax at 0.001% of GDP, which can be highly progressive. If the rate is concentrated in high-income groups, but since the amount of income tax is small, it will always reach a negligible amount of income redistribution (Reynolds and Smolensky, 1977; Kakwani, 1977). In assessing progressivity, this study calculates the degree of progressivity and redistributive capacity of personal income tax in Central Asian countries, adjusted for the parameters of pre-tax distribution. This approach is based on "transferring" the compared tax regimes to a common base with the same pre-tax distribution parameters, following the approach proposed by Dardanoni and Lambert (2002) and applied by Vellutini and Benitez (2021). These calculations use a microdata model based on the Gini coefficient of pre-tax income (Jarvis *et al*., 2021).

Moreover, the shortfall in tax revenues was estimated using stochastic analysis with time-varying efficiency. It is based on research by Committeri and Pessino (2013) and covers the period from 2000 to 2019 using panel data from Central Asian countries (Verdier *et al.*, 2022). The model is expressed as (2):

$$y_{it} = a + \beta' X_{it} + v_{it} - u_{it}, \quad (2)$$

where: yit=ln (amount of income received from tax levies) for the i-th country in the period under study t; Xit=ln (level of real GDP received per person), ln (level of real GDP per person), the inflation rate in the country, the impact of agricultural development, level of openness to foreign trade, dynamics of foreign direct investment (FDI) inflows, dependence on resource extraction, level of corruption control, for i-th country in the period under study t; β – index of the vector of random parameters of influence of external independent factors; vit – statistical error. Introduced into the model as it is assumed to be part of the normal distribution of the parameters; β'Xit – the boundaries of deterministic and stochastic (v) components, where the possible tax potential is taken as an optimum; uit>0 – reflects the variable that for the i-th country in the studied period t, due to specific, unaccounted factors prevented from achieving the tax optimum and created conditions of inefficiency. In this case, uit reflects a truncated normal distribution; vi and ui are statistical, independent variables that consider the impact on the amount of tax revenue.

Tax efficiency (TEit): defined as the ratio of actual tax revenues to the corresponding marginal random value of tax revenues (3):

$$TE_{it} = \frac{\exp(\alpha + \beta' X_{it} + v_{it} - u_{it})}{\exp(\alpha + \beta' X_{it} + v_{it})} = \exp(-u_{it}). \quad (3)$$

Ln (tax income): represents the total amount of tax revenues established following the laws of the country. However, if a country is an exporter of hydrocarbons, the number of hydrocarbons is not taken into account. Only those that contribute to GDP are addressed. The use of such assessment methods determines the extent to which tax reforms can be implemented to rebalance the equity and use of progressive tax systems in developing countries with higher precision.

Results and discussion

Tax policy is one of the most relevant tools for regulating the state's planned actions aimed at maintaining control over both business and budget revenues. It is based on economic, legal and controlling actions in the taxation system. In line with global practice (e.g., EU countries), the real sector of the economy – industry, services, private sector, agriculture, and raw materials production – is the most affected by structural changes in a dynamically changing environment.

The modern state tax system faces the challenge of not just filling the budget but creating a reserve of funds while maintaining a fair system of taxation of the population depending on their income level. The legal regulation of the tax system of each country is at the discretion of the government, but in practice, it consists of a set of laws and regulations that require constant revision depending on changes in economic conditions and global trends (Gootjes and de Haan, 2022; Panayi, 2021). Thus, with the advent of digital technologies, there is a need for new laws and reforms of tax systems (Mason and Parada, 2020).

This has been a major problem for the last two decades for the Central Asian countries, which include Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. Budget revenues from taxes in these countries did not reach the level of European ones, despite the desire for reforms and the introduction of new digital technologies in the field of taxation (Abdugafarov and Achilov, 2023). The effort is also needed to implement and transition to a progressive taxation system. This will help reduce the negative economic consequences of the impact of the COVID-19 pandemic and the global financial crises, including in the energy sector. Although Central Asian countries differ in their preferences and specifics of development in some areas of the taxation system, they have quite similar strategic development issues. They are united by the structure of their taxation systems concerning the desire to reduce the gap between poverty and inequality and to build a fairer tax collection system. For example, in Kazakhstan, taxation is regulated under the current Constitution, consis-

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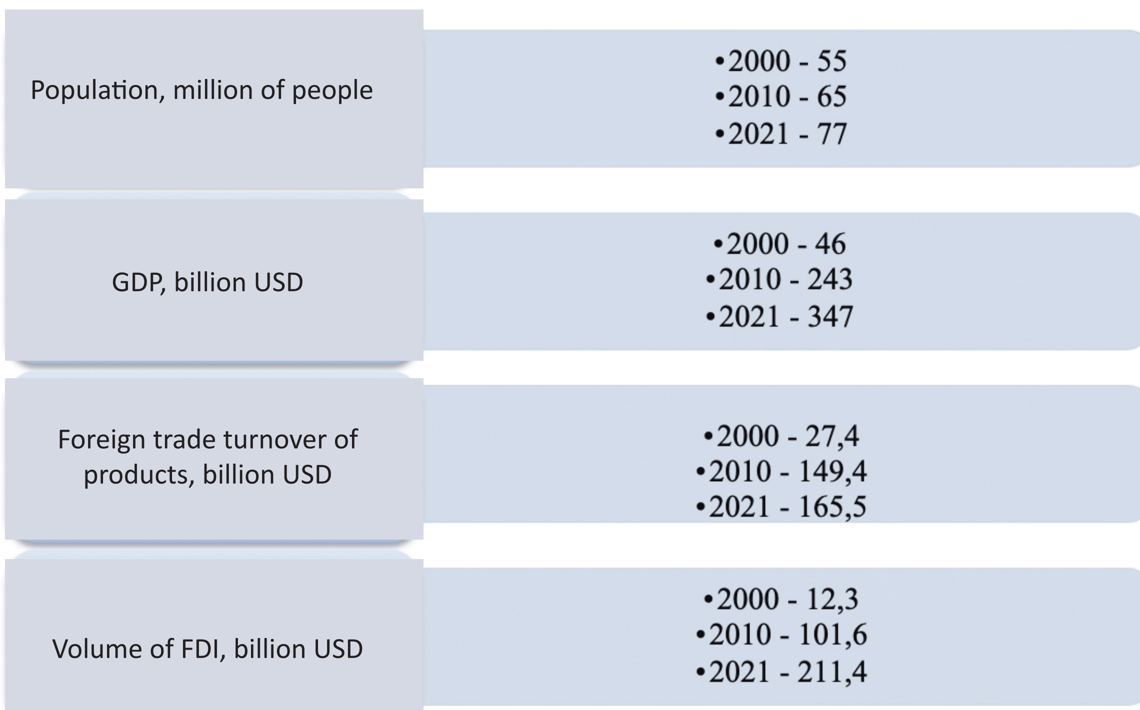
ting of the Tax Code and several regulations. At the same time, all payments are unifiedly controlled by the Ministry of Finance of the Republic of Kazakhstan (Kadyrberdieva, 2019).

This region is distinguished by its prospects in the global economic arena. Over the past 20 years, the aggregate GDP of the Central Asian countries has grown more than sevenfold. In monetary terms, it quadrupled. The foreign trade turnover of goods has increased sixfold, and there is an increase in population, which can be used to predict labor migration in the future. FDI has increased, confirming the region's attractiveness (Middle East and Central Asia, 2022) (Figure 1).

Figure 1

Structural changes in Central Asian countries



Note. Compiled by the authors based on Middle East and Central Asia (2022).

Sustaining sustainable growth and reducing poverty and inequality are important for Central Asian countries. Increasingly, studies show that creating the conditions for sustainable growth and inclusiveness requires investment in social services and infrastructure. Investing in social and infrastructure development and promoting inclusiveness are two complementary goals of sustainable development. At the same time, an economic base is required to support growth and political stability (de Mooij *et al.*, 2020).

According to the International Monetary Fund (IMF) research, the average income per person in Central Asian countries has significantly decreased over the past 10 years (2008-2018), while the trend of high unemployment among young people has continued. The availability of quality and affordable public services remains limited, which is detrimental to the achievement of sustainable development goals. The possibility of obtaining reliable information on the level of income of the population is limited, but the analysis of even a small group of CA countries suggests more concentrated information on the income of citizens, which allows us to assess the degree of inequality and unfairness of the taxation system between countries in the region and within each country (Poverty and Inequality..., 2024).

According to research data for the period from 1990 to 2016, the average share of income among wealthier taxpayers in the Central Asian countries was about 64%. Over the same period in the US, for example, this figure was 47% (Gootjes and de Haan, 2022). Government support in the taxation system can significantly reduce income inequality and provide opportunities for further development. According to experts, the additional expenditure required to achieve the five critical Sustainable Development Goals is projected to be an average of 5.3% of GDP annually in these countries by 2030 (Mathai *et al.*, 2020). For the European Union, such costs are projected to increase on a much larger scale (Mason and Parada, 2020).

Following the national conditions in Kazakhstan, the introduction of a progressive tax above 10% will burden employers, necessitating optimization methods that are sometimes not entirely legal. In addition, the overall burden on wage funds, which are already overburdened by social tax payments, mandatory social security contributions to healthcare and de facto mandatory pension contributions, will increase. As a result, employers' costs of hiring highly qualified specialists will increase. Progressive standards were applied in Kazakhstan until 2007. Later, they were cancelled, but the government is considering projects to introduce a progressive system by 2025, in case of a favorable economic situation.

The introduction of progressive tax rates is directly dependent on the introduction of a universal income, as it allows individuals to use certain of their expenses to reduce taxes. For instance, mortgage interest payments and the value of secondary real estate, the level of corruption in the country, and the pace of economic reforms. Kazakhstani main export destinations are the EU (accounting for almost half of its exports) and China (accounting for about 14% of exports). Kazakhstan imports from the EU (17%) and China (17%). Exports declined in 2020 due to the possibility of new contracts with EU countries, while export trade with China increased significantly (Panayi, 2021).

Uzbekistan is the second largest economy in the region, albeit significantly smaller than Kazakhstan, with a GDP per capita of just over USD 1800 (population 33 million). Over the past three years (2017-2019), Uzbekistan has been striving to reform the national economy in all areas to achieve sustainable development goals, which avoided losses, and stagnation zones and showed a 5% growth rate. Such reforms improve national attractiveness to foreign investors, although the state itself remains the main investor. Uzbekistan exports to such countries: as Turkey, Kazakhstan, China, Kyrgyz Republic. Products are imported from such countries as China, Germany, the USA, Korea, Kazakhstan, Germany, and Turkey (Middle East and Central Asia, 2022). The state budget of Uzbekistan has been running a deficit in recent years, and the deficit is financed by increasing the state debt, which has reached 160% of budget revenues. The majority of Uzbekistani public debt is external debt, with 40% being loans from international development banks. Since 2019, Uzbekistan has also been a holder of Eurobonds. The practice of issuing them has continued since 2020. The impact of social and climate factors is also increasing (Mathai *et al.*, 2020; Tabakh *et al.*, 2021; Duenwald *et al.*, 2022).

Kyrgyzstan – with a low rate of economic development of the countries of the region: GDP per capita is only USD 13,100 (the population of the country is 6.3 million). The basis of the economic state of the country is provided by gold mining. The change in the rate of extraction of this metal directly affects the change in the growth rate and dynamics of investment activity (Sayakbaev and Baktybekov, 2020). According to the results of statistical data for the period 2017-2019, the inflation rate was kept at the lower limit of the planned indicator. However, against the background of the COVID-19 pandemic and subsequent crisis phenomena in the economy, it increased to the upper limit of the expected range in 2020. At the same time, the discount rate has been 4-5% since 2017 (Tabakh *et al.*, 2021).

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The state budget of Kyrgyzstan has been in deficit for the last 10 years. It remained a deficit even in the pandemic year of 2020, with an increase to 2.7% of the country's GDP. This was due to an increase in the share of external debts, and assistance from international financial and development institutions. In 2020, the deficit increased, reaching 2.7% of GDP (Sayakbaev and Baktybekov, 2020). Kyrgyzstan is a country that imports goods and resources. The level of imported goods and resources is almost three times higher than the number of exports. The majority is foreign aid from the International Monetary Fund and the World Bank (Tabakh *et al.*, 2021). The years of the COVID-19 pandemic have had an extremely negative impact on Kyrgyzstan's economic performance. In 2020, GDP fell by 11.5%, while investment activity fell by 14.7% over the same period. By the end of 2020, this figure is expected to decline by around 9%. Inflation rose to 10%, the national currency depreciated sharply, and foreign capital fled the country. Kyrgyzstan has received a large amount of foreign investment to be earmarked for the needs related to the fight against the epidemic. Budget support remains at 9.4% of GDP. Despite the increase in benchmark interest rates, the National Bank took measures to support liquidity.

Tajikistan is one of the five countries with a low level of economic development in the Central Asian region. Its main potential is its population and the possibility of labor migration. GDP per capita is estimated at no more than USD 800. The population is reported to be about 9.1 million. At the same time, its economic growth rate is quite high, and the country is quite promising. Important parts of the economy are the agricultural sector, mining, and the provision of timber. Traditional for this region are cotton production and metallurgy. In recent years, investments have been directed to projects related to the development of the energy complex. There is stagnation (stagnation) in lending, which changed slightly towards growth in 2020 due to credit support measures, and the share of problem loans is increasing (Verdier *et al.*, 2022). In 2017, the National Bank of Tajikistan announced the implementation of an inflation-targeting policy, but the exchange rate system cannot be called fully floating. The inflation targets for 2018-2020 fluctuated in the corridor of 7-9 per cent, and from 2021 it decreased to the level of 6-8%. In 2020, there was a spike in inflation to a level of 9.4%. Starting in spring 2020, the Central Bank of Tajikistan implemented a policy of reducing refinancing interest rates and increasing the money supply. Tajikistan's state budget has been in deficit in recent years, but there is a trend towards consolidation. The increase in public debt was due to the receipt of aid and external loans for pandemic support from the IMF and development banks.

Tajikistan imports far more goods and resources than it exports. The ratio is one to three. The main export commodities are cotton and electricity. As in neighboring countries, negative foreign trade balances are offset by individual transfers. Foreign direct investment in Tajikistan does not show an increase from 2019. This is due to the lack of large projects and developed infrastructure. The main investments are concentrated in mining and manufacturing, from China. China provides more than half of the countryєs foreign investment. Important partners of Tajikistan are the UK, France, Turkey and Switzerland. Turkmenistan is one of the most closed countries in the region. Now, all data on the country are summarized only by the fact that the tax system is also based on a flat system, with fixed rates that do not depend on income. The standard of living is low, and reforms are carried out very rarely. The introduction of a progressive taxation system has not been discussed (Verdier *et al.*, 2022).

Achieving sustainable growth goals also requires providing funds to meet future expenditures without accumulating debt. Some countries have lent funds to cover their expenditures and budget deficits (Ciuła *et al.*, 2024). This has reduced fiscal space, while projections show that increased spending is needed to support developing economies in the years of recovery from the shocks of the pandemic, global crises, ongoing hostilities, increased competition over commodity markets and resource reallocation, rising oil prices, changing needs and fluctuating migration patterns, rising unemployment both within and between countries, and growing social inequalities (Verdier *et al.*, 2022). High debt levels and increased financing needs have led to increased vulnerability and sensitivity of countries to tighter financial conditions. Reducing debt to pre-pandemic levels will require sustained increases in fiscal spending over a decade or more.

Increasing public resources through domestic revenue generation will contribute to the sustained pursuit of sustainable and equitable growth. Before the pandemic, raising tax revenues to stimulate economic growth was a priority in Central Asian countries. Revenue generation was considered necessary to replenish fiscal reserves after several unfavorable reform scenarios (Tabakh *et al.*, 2021). Increasing tax revenues became an urgent policy priority as oil-exporting countries transitioned to a post-oil economy. In low-income countries, especially those that are fragile or dependent to varying degrees on external conflicts, revenue generation is crucial to cover the emerging additional cash resources needed to cover projects aimed at development related to UN programs, namely the Sustainable Development Goals (SDGs) (Verdier *et al.*, 2022).

The reorientation of Central Asian countries towards climate change is projected to require additional public expenditure measures and the allocation of a minimum of 3.3% of GDP annually from 2023 up to and including 2033 (Middle East and Central Asia, 2022; Duenwald *et al.*, 2022). Due to the impact of the pandemic and hostility towards vulnerable households, a more balanced approach is now needed to achieve an optimal balance of efficiency in income generation and distribution. While this equilibrium is different for each country, several universal principles should be considered. It is observed that consumption taxes have a high capacity to generate revenue and promote economic development. Conversely, income taxes are more equitable (Verdier *et al.*, 2022).

In improving the tax system, should move to a balance between efficiency and fairness that will promote economic growth more effectively than raising the tax rate. Similarly, income tax can be structured so that it does not hinder economic growth. It should be noted th*et al*l reforms of tax systems to achieve equity and efficiency are achieved only after assessing the impact of taxes on economic growth and other stimulus measures, as well as the benefits of financing growth-enhancing expenditures. Despite all efforts, Central Asian countries have earned less revenue than other emerging market countries and more developed EU countries (Committeri and Pessino, 2013).

Between 2000 and 2014, the average total government revenue in Central Asian countries was 29.9% of GDP, which was much higher than in other regions due to the sector's hydrocarbon revenues. However, since 2012, there has been a decline in the average revenue level in Central Asia, which is most possibly due to the falling prices of oil and other exported resources. By 2019, the average revenue of the Central Asian countries (26.5% of their GDP) will be less than the 2008 level. Currently, domestic tax revenue mobilization in many Central Asian countries has declined. In 2019, the average percentage of tax revenues to gross domestic product in the countries was only 12.7% of GDP (Sissenova and Zharylkassyn, 2020). Countries such as Kazakhstan (commodity market) and Uzbekistan (investment-attractive market) were particularly affected by the fall in oil prices. Tajikistan and Kyrgyzstan were more affected by the pandemic years due to the reduced demand for cheap labor and the opportunity for labor migration (Piketty *et al.*, 2014). Addressing the characteristic features of the taxation systems of Central Asian countries (Table 1), the following is true:

- All domestic and foreign organizations are taxpayers.
- Income tax rates are quite high and mostly fixed.
- Rather high social tax payments.
- A flat rate of personal income tax (except in Uzbekistan).
- Tax incentives for the social sphere are envisaged.

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Table 1

Features of the tax system in Central Asia

Type of tax	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Income tax (legal entities)	10 % agriculture; 20% other	10%	25% – communal banks, telecommunication services; 15% – others	8% – domestic companies; 20% – other	9% – standard; 15% – communal banks; 35% – auctions, concerts, public events
Dividend tax	none	Equal to income tax	Equal to income tax	+15%	+10%
Value added tax (VAT)	12%	12%	18%	15%	20%
VAT non-residents	+	-	+	+	+
Sales tax	-	1-3%	3%	-	-
Social tax and pension accruals	11% – social tax + 5% to the Social Insurance Fund	17.25% for employees; 3% – for non-residents	25%	20% for legal entities; individuals and individual entrepreneurs4 for others 2% to 10%	25%
Excise duty	+	+	+	+	+
Property tax	+	+	+	+	+
Land tax	+	+	+	-	+
Income tax	10% – standard; 10-20% – non-residents	10%	8-13% – standard; 25% for non-residents	10%	Progressive rate from 9% to 22% depending on the size of the minimum wage

Notably, Kazakhstan and Uzbekistan have the greatest potential in the Central Asian region. The Republic of Kazakhstan – due to a more developed financial system and the desire to develop digitalization and become one of the thirty most developed countries. And Uzbekistan – due to rapidly developing reforms and the availability of cheap labor (Tabakh *et al.*, 2021). During the pandemic and the crisis years of 2021-2022, when the situation in commodity markets deteriorated, all countries in the region experienced a shortfall in budget revenues. This was primarily due to a reduction in tax revenues. As can be seen from the structure above, only a few countries in the region are implementing progressive taxation practices aimed at reducing the gap between poverty and wealth. In general, progressive taxation assumes that the higher the income of taxpayers, the higher the tax amount. This makes it possible to reduce the burden on the poorer segments of the population and to observe the principle of fairness.

The issue of progressivity in the taxation system has been under consideration for quite some time. For instance, a study of tax reforms in the twentieth century in the United States and Europe showed that the use of progressive taxes, such as personal income tax and property tax, significantly reduced inequality in society and had a positive impact on the overall trend in tax payments (Piketty *et al.*, 2014; Tynaliev *et al.*, 2024). At the same time, when considering the relationship between the progressive system and income inequality in developed European countries (France, Spain, Sweden, etc.), it was found that the use of this reform reduces income inequality (Duenwald *et al.*, 2022; Mohammadi *et al.*, 2025). Countries switching to a progressive taxation system reduced income inequality.

To assess the effectiveness of tax systems in different countries, indicators of progressiveness and redistributive capacity are used. As a rule, the Gini coefficient is used as the main estimation value (Poverty and Inequality, 2024). The redistributive capacity is estimated using the Kakwani (1977) index, adjusted for modelling data with pre- and post-tax distributional parameters (Table 2). The progressivity indicator is defined as the difference between the value of the Gini coefficient before and after taxes. Thus, an increase in the concentration of high incomes will lead to an increase in the progressivity index.

Table 2

Estimated indicators of progressiveness and redistributive capacity of Central Asian countries

Country	Top tax rate	Progressive indicator	Average tax rate	Redistributive capacity
Kazakhstan	10	3.8	14	0.6
Kyrgyz Republic	10	2.9	12.5	0.4
Tajikistan	13	3.8	16.2	0.7
Turkmenistan	10	0	12.9	0
Uzbekistan	12	0	15.3	0

Note. Compiled by the authors based on Verdier *et al.* (2022).

Analyzing the Gini coefficient, its value of 20-30% indicates the level of optimal income distribution between different segments of the population. This is the situation in European countries. For instance, the Czech Republic – 25%, Slovenia – 24.6%, Iceland – 26.1%, Belgium – 27.2%. The advantages of Gini coefficient estimation are the accessibility and general familiarity of the methodology (Figure 2). Using the stochastic frontier analysis method (Verdier *et al.*, 2022) described in the methodology, the following indicators were calculated for hydrocarbon importers and exporters in Central Asia (Table 3).

Table 3

Stochastic boundary analysis: efficiency of tax collection measures, tax potential and tax revenue shortfall

Country	Year	Tax income	Efficiency of tax collection measures	Tax potential	Underpayment of taxes
Hydrocarbon exporting countries					
Kazakhstan	2019	13.2	0.9	14	0.8
Countries importing hydrocarbons					
Tajikistan	2016	18.2	0.6	29	10.8
Kyrgyz Republic	2018	20.2	0.6	34.9	14.7

Note. Compiled by the authors based on Verdier *et al.* (2022).

As can be concluded from the Table 3, Kazakhstan has the greatest tax potential and the highest tax collection efficiency. At the same time, the share of tax shortfalls in the budget is the lowest. In contrast, the situation in Tajikistan and Kyrgyzstan is difficult. Additional goals are needed to regulate tax systems and the import-export balance of the raw material base.

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Such indicators of income distribution are attributed to the successful implementation of progressive taxation in European countries. Another example is Denmark, where the income tax rate ranges from 8 to 56%. The tax system there began to develop in the last century and reforms began to be implemented in 1903. The country was characterized by a high rate of personal income tax (50%). After the introduction of a progressive taxation system, the share of taxes in Denmark's GDP is about 45%. In the period from 2018 to the present, it has been among the leaders in tax charges, along with France, Belgium and Germany. However, there is the problem of the shadow economy and the need to combat it (Jarvis *et al.*, 2021). Also, until 2005, a progressive scale was introduced in Romania, where the income tax ranged from 18 to 40%. However, the experiment was not very successful and slowed down the implementation of reforms and investment inflows. In 2005, a flat income tax system was introduced with a rate of 16%. In 2018, it was reduced to 10%. This also affected the change in the Gini coefficient, which after 2018 rose from 30% to almost 40%, showing a change in economic inequality in society.

In Spain, the income tax rate varies depending on income from 21 to 52%, in France it is 5.5% to 49%, in Germany 15 to 45%, in Belgium 25 to 50%, and in Italy 23 to 43%. All EU countries use a progressive taxation system. A comparison of the taxation systems of the EU and the CA region (Table 4) reveals the following patterns:

- More developed countries use the EU progressive system.
- GDP per capita in the EU is higher.
- The mobilization of tax payments in the EU is quite high.
- The higher the percentage of socially disadvantaged people in the Central Asian region, the less fair the taxation system.

Table 4

Comparison of taxation systems in the EU and Central Asia

Characteristic	European Union	Central Asia
Taxation system	More often progressive	Often flat
Personal income tax rate	Depends on income level	Fixed
Wealth tax	Present in most cases	None
Level of corruption	Downward trend	Upward trend or stagnation
Financial sustainability	High	Low

Note. Compiled by the authors based on Mathai *et al.* (2020), Sayakbaev and Baktybekov (2020), and Tabakh *et al.* (2021).

The successful use of the progressive system also depends on the extent to which high-income taxpayers are willing to pay their taxes fairly. As soon as reforms in this area cause the opposite effect, namely tax evasion, reduced investment activity, and the transfer of assets to the shadow economy, all the expected results are not achieved. Another disadvantage of this system is the fact that its assessment using existing methods, such as the Gini coefficient, is inaccurate, as it does not address several aspects, such as the source of income, the use of tax breaks, holidays, the specifics of the country's development, etc.

The transition to a progressive taxation system could be positive for the economic growth of the Central Asia region. Such a taxation system will help to reduce inequality in the level of tax payments among different segments of the population, those with lower and higher incomes. It will help to raise funds for the state budget and allocate additional resources for spending in the most critically needed sectors: social facilities, infrastructure, education, unemployment funds, healthcare, etc. In turn, this will ensure the creation of new jobs and an increase in labor productivity, as well as replenish the budget with additional revenues from the newly created money supply while implementing new projects. All of this contributes to the achievement of the Sustainable Development Goals. However, the experience of developed European countries shows that raising tax rates for wealthier segments of the population often serves as a destabilizing factor in investment and savings, contributing to the outflow of capital from countries to offshore and shadow areas (Tryhuba *et al.*, 2022). Moreover, in countries with very low overall living standards and high levels of corruption, such reforms may not have the expected effect.

By implementing progressive tax reforms, developed countries can increase tax revenues from the better-off and redistribute these revenues in favor of the poor (Rexhepi, 2023). Such reforms allow, first, to reduce inequality in society, preserve social justice, and attract additional funds to the most critical areas for the state: social, infrastructural, construction, health care, etc. Such state programs often mobilize funds, which then contribute to the mobilization of funds, which are then used to finance the development of the state. Such government programs also often contribute to the mobilization of funds, which are then used to subsidize the most vulnerable segments of the population.

It is also necessary to regulate the amount of concentration of wealth among the population, the gap between strata of the population, and the formation of the so-called "middle class" layer. When there are not only impoverished and destitute, but a confident "middle class". When there is a progressive system of taxation, then there is greater stability in the amount of revenues to the budget and greater confidence in the financing of government programs and development projects (Rexhepi *et al.*, 2024).

However, such a system has negative sides. As the study shows, people with high incomes often try to avoid paying their taxes at an "increased" rate. There is a desire to circumvent the system, to hide income, take it offshore. Investment activity decreases. The research has also shown that within the EU and Central Asia, there are countries which, although close in many respects (cultural, religious), are quite different. They have many differences in their structures and preferences, specifics of development, economic level, export-import opportunities, level of reforms, regulation of tax and fiscal policy. All this should be considered when developing further recommendations on the implementation of a tax system based on a progressive tax structure.

As shown by the assessment of the Gini index, progressivity indicators, as well as by the stochastic frontier analysis model, the most promising countries from the Central Asian region for the introduction of a progressive tax are Kazakhstan and Uzbekistan. Moreover, these countries have already made attempts to implement such a system earlier (Verdier *et al.*, 2022; Tabakh *et al.*, 2021). However, at that time, society and the financial and banking systems themselves were not ready for such changes. Following Abdugafarov and Achilov (2023), most taxes in Uzbekistan are burdensome for the population and inhibit such processes as investment and, the introduction of new technologies, which cannot but affect the reforms in the state. This requires immediate intervention and transition to new progressive methods in this area.

In Kazakhstan, the most developed and dynamic country in the region, whose goal is to become one of the 30 most developed countries in the world, reforms are also very important. Including the reform of the tax sphere. Sissenova and Zharylkassyn (2020) also noted that such reforms first provide financial security for the state, because tax deductions and mobilised funds create a "safety cushion" for subsequent financial shocks and are a kind of indicator of the current situation. In the regulation of the tax system in Kazakhstan, all Tax legislation is subject to the Tax Code, which is based on the Constitution. Everything is built on a system of unified principles and mechanisms and is regulated strictly vertically and subordinated to the Ministry of Finance of the Republic of Kazakhstan and its

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representative offices. Everything is strictly regulated and controlled.

Cardinal differences in the system of collecting taxes from individuals and legal entities are also noted by Sun *et al*. (2022). A comprehensive analysis of the differentiation of existing tax systems was carried out and the nature of the influence of international organizations on the formation of tax and fiscal policy in the states of the Central Asian region was determined. Particular attention in the context of the study was paid to transformational processes in the implementation of environmentally friendly energy, decentralization reforms and environmental investments. It was noted that on the one hand, the attraction of external capital, especially in the form of foreign direct investment stimulates economic development and provides great support in the years of the pandemic. However, on the other hand, it creates credit debts that will need to be compensated, and this is not always possible given the flat tax system of the state (Saez *et al.*, 2020).

The issue of Central Asian countries is also the heterogeneity of its constituent countries. The study once again proves that both economically culturally and religiously the countries are at different stages of development and have different opportunities. Kazakhstan and Uzbekistan are the leaders in terms of economic and investment development potential, followed by the Kyrgyz Republic, which is confirmed by the results of the Gini index and calculated progressivity indicators. Tajikistan lags in all indicators due to a very low level of economic development and potential for investment attractiveness. Turkmenistan is the most closed country in the region, with almost no data available.

Thus, the introduction of a taxation system based on a progressive system according to a single unified scheme in Central Asian countries cannot be realized. It should address the specifics of each country separately, in fact, in the EU countries. Where the system of progressive taxation considers the peculiarities of each country. This problem was covered by Baiardi *et al.* (2019), who noted that, despite the desire to move to a fair system and the introduction of a progressive system, it is still necessary to address the specifics of each state and use variants of this system of taxation. The same idea is supported by Dourado (2022), who compared the experience of implementing a progressive system with that of the United States. Roland and Römgens (2022) relate the process of implementing a progressive tax system to the process of politicisation that was caused by changing times and industrial progress. A progressive system also helps not only to reduce the gap between rich and poor but incentivize a shift to more environmentally friendly production (Kapeller *et al.*, 2023; Saez and Zucman, 2019). One way or another, the views of all authors, including the current study, is that compared to a flat system, a tax system based on a progressive tax has several advantages:

- Reducing the gap between the richer and poorer segments of the population.
- Stimulating the creation of a sustainable middle class.
- Mobilization of financial revenues to the state budget.
- A more transparent tax assessment system.
- Reducing the tax burden on socially vulnerable groups.
- Creation of budgetary reserves to achieve the country's sustainable development goals.

However, following Khamitov *et al.* (2022), noted the introduction of comprehensive measures to combat corruption, as wealthier citizens may try to avoid paying the increased tax rate in every possible way, which is a widespread problem in Central Asian countries. From this point of view, Uzbekistan is the only leader. Its investment attractiveness increases due to projects that involve investments in mining and metallurgy, as well as agriculture. The impact of climate on the motivation and activity of the population and how this further affects labour productivity and the possibility of implementing tax reforms was investigated by Duenwald *et al.* (2022) (Hix, 2022; Batrancea *et al.*, 2022). To account for the unpreparedness of the legislative framework and the managerial apparatus itself for global changes in the structure of tax and fiscal policy of the republics, the application of the experience of other countries (Nielsen *et al.*, 2021; Garbinti *et al.*, 2020; Alexandri *et al.*, 2024). Thus, the study has shown that the issue of reforming the tax system of Central Asian countries is acute and urgent in the framework of achieving development goals. Mobilizing domestic reserves through tax revenues will enable the region to increase its attractiveness in the international market.

Conclusions

The transition to a progressive taxation system proves its effectiveness by the positive experience of its use in the EU and other developed countries. This system allows to achieve a more equitable distribution of the tax burden between those who receive lower incomes and those who receive higher incomes. The study concludes that the Central Asian countries are currently quite undervalued in the world and many of them, such as Kazakhstan and Uzbekistan, have quite high potential for achieving sustainable development goals.

The years of post-pandemic development and global conflicts have intensified the struggle for energy resources, which, of course, has also affected the need to mobilize domestic reserves. This entails the need to revise approaches to the tax system. Today, most of the economies of Central Asian countries are based on the principles of fixed tax rates of personal income tax and high percentages of contributions to social funds, which places a high burden, especially on unprotected segments of the population. This, of course, affects the formation of the overall situation in the country, budget financing, and the level of social security of citizens. This is especially noticeable in countries such as Tajikistan, where the standard of living is already quite low.

The process of reforming the tax system may be negatively affected by the level of corruption in the countries, the specifics of the development of each country separately, government support, the lack of readiness of society, the change in the level of the tax burden on the richer segments of the population may reduce their investment activity. This may lead to an imbalance in the creation of new jobs and overall economic growth.

Some of the issues related to the stages of reform and smooth transition to a progressive system remained outside the scope of this study. Thus, due to insufficient data, it is impossible to address the taxation system of Turkmenistan and the possibility of applying the experience of EU countries to the introduction of progressive taxes in this region. There is also limited consideration of the environmental components and their role in the tax structure system during the reform of the system, tax rates and the most acceptable option for the whole Central Asian region. The experience of such countries as Italy and France can serve as a model and the methodologies applied there can serve as a basis for further research in this direction.

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