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Central Asian pension systems: A comparative analysis of achievements, risks and development mechanisms

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Abstract. The purpose of this study was to analyse the pension systems of Central Asian countries to evaluate the effectiveness of pension reforms and identify key challenges impacting their financial sustainability. The study focused on the impact of labour migration, informal employment and demographic changes on the pension systems of these countries. A comparative analysis was conducted to assess the pension systems based on key indicators such as pension

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fund contributions, demographic trends, and the structure of pension models – pay-as-you-go, funded, or hybrid. The results of the study showed significant differences between the pension systems of Central Asian countries. Kazakhstan had introduced a funded pension system, but was facing problems due to low investment returns and public distrust. Uzbekistan, despite efforts to integrate migrant workers into the pension system, still struggles with insufficient contributions from the informal sector. Turkmenistan maintains a public pension system, but a lack of transparency limits the ability to assess its long-term viability. Kyrgyzstan has introduced a hybrid pension system, but labour migration and the informal economy undermine its effectiveness. Tajikistan continues to rely on the traditional pay-as-you-go model, but economic instability and migration pose serious financial challenges. Thus, pension systems in Central Asia share common challenges, especially in managing labour migration and covering informal workers. Ongoing reforms are needed to improve financial management, diversify investments, and expand coverage to ensure the sustainability of pension funds

Keywords: demographic challenges; retirement benefits; social security; financial sustainability; welfare state

Introduction

Pension systems play a crucial role in providing financial security for the elderly after retirement. In Central Asia, these systems have a long history but have faced challenges during the post-Soviet transition. A detailed analysis of pension reforms, demographic shifts, population aging, and financial sustainability is needed to ensure effective pension payments. Comparing the systems in Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan will help identify successes, risks, and strategies for improving social security.

The financial sustainability of Central Asian pension systems faces challenges from economic inequality, limited state budgets, and an aging population. Unequal economic development and resource constraints threaten the efficiency of these systems. Reforms and new funding sources are crucial for long-term sustainability, especially amid global economic changes (Cheberyako & Skulish, 2022). Research on the effectiveness of current strategies, risks, and achievements is vital for academics and policymakers, as pension systems directly affect the quality of life for millions in the region.

Uzbekistan's pension system faces challenges, including a growing number of retirees and low contributions from less than half of the workforce. U.U. Berdiyeva (2022) explored international reforms and suggested involving migrants and informal workers to enhance sustainability. However, more research is needed on ensuring pension fund viability and encouraging long-term participation in social insurance.

Asian pension systems struggle with poor coverage and inadequate benefits due to aging populations and reduced family support. D. Park & G.B. Estrada (2022) noted that only the Philippines provided sufficient pension income, while most countries offered benefits that fell short of a decent living standard. Research gaps include expanding coverage for unorganized sector workers and ensuring the financial sustainability of these systems.

Kazakhstan's pension system, modelled on the Soviet system, faces significant financial challenges due to the economic downturn and difficulties in paying retirees (Khamzin *et al*., 2015). Asian Development Bank (2023) highlighted key issues, such as the need to build public trust, improve fund management, and strengthen capital markets. Gaps for further investigation include mechanisms to ensure minimum pensions and address income redistribution for social justice.

Demographic shifts, such as an aging population and low coverage, have undermined the financial sustainability of Central Asian pension systems. The financial instability of the Kyrgyz Republic's pension system is driven by high labour migration, low pension contributions, and an aging population. D.S. Zholboldueva *et al*. (2024) found that while the funded pension system has reduced the deficit, issues with covering the unorganized sector and labour migrants persist. Key gaps include exploring strategies to attract migrants and ensuring the system's financial stability.

Low pension payments and economic instability brought on by inflation and labour migration are major problems for the aged population in Central Asia. K. Makhanov (2024) highlighted that the region's pensioner provision was negatively impacted by reliance on remittances. The effectiveness of government initiatives to expand social benefits is still quite low. Not enough research has been done on the problems of long-term care for the elderly in light of the drop in remittances.

Asia's pension systems face challenges, particularly low coverage and inadequate benefits, as highlighted by R. Chomik *et al*. (2024), especially in countries with high informal work. They emphasize that low voluntary contributions and informality pose major obstacles. Research gaps include ineffective strategies for raising benefit levels amid demographic changes and integrating informal workers into the system.

The authors identify key challenges in the Kyrgyz Republic's pension system, such as labour migration and low pensioner incomes due to insufficient coverage of unorganized sector workers. Work by House of Commons Foreign Affairs Committee (2024) highlights the system's financial instability caused by inadequate migrant contributions and low pension payments. The primary gap is the need to create strategies for attracting migrants to the pension system and strengthening the legal framework for recognizing their contributions.

The purpose of the study was to identify effective mechanisms for improving the pension systems of Central Asian countries to ensure their financial stability and social protection of the elderly. To achieve this goal, it was necessary to solve the following tasks: first, to analyse existing pension models in Central Asian countries and identify their strengths and weaknesses; second, to study the impact of labour migration on the stability of pension systems and develop recommendations for increasing the coverage of informal sector workers.

Materials and Methods

This study analysed in depth the pension systems of five Central Asian countries – Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan. Covering the period 2019-2023 years, the study provided an up-to-date and detailed comparison of the pension systems of these countries, with the aim of identifying both good practices and areas for improvement. The analysis took into account the different socio-economic conditions of each country, demographic challenges and peculiarities of employee participation in pension systems, which provided a holistic view of the state of pension systems in Central Asia.

Data for the analysis was meticulously gathered from official government reports, publications by international organizations, and statistics from national agencies across each country. Key sources included detailed, insightful reports from the World Bank (2019) and the Asian Development Bank (2023). This collected data encompassed the structural elements of each pension system, levels of employee contributions, demographic patterns, and key economic indicators, including pension fund performance metrics and trends.

The study used the following main methods of scientific knowledge: analysis and synthesis, which allowed to break down the structure of pension systems into their components and further generalise the data obtained to identify common trends and differences; induction and deduction, which were used to formulate general conclusions based on specific data, as well as to logically justify recommendations for improving pension systems; comparative method, which allowed to identify common and distinctive features of the pension systems of the five countries, and assess the effectiveness of reforms in different socio-economic conditions.

In addition, the descriptive method was used to systematise the characteristics of each pension system, including demographic trends, the level of employee participation in pension systems and economic indicators; the synthesis method helped to develop recommendations for further reforms aimed at improving the financial sustainability of pension funds and expanding the coverage of the population with pension benefits.

A significant focus was placed on assessing the impact of labour migration on pension systems. For each country, data regarding migration rates and the level of migrant participation in pension systems were analysed. This allowed the study to evaluate how migration influences the financial sustainability of pension funds and to assess the effectiveness of policies designed to integrate migrants into social protection frameworks. The research findings were presented through tables and graphs, providing a clear visual comparison of reform outcomes, the scope of pension coverage, and each system's financial resilience. This visualization aided in identifying the most effective strategies and highlighting areas for further development in pension management.

Results

Although the Central Asian nations of Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan inherited Soviet-style pension systems, each of them started enacting its own pension reforms in the post-Soviet era to adjust to the changing circumstances. Although the region's pension systems are still developing, they all deal with the same issues, including shifting demographics, minimal employee engagement in the unorganized sector, and a lack of funding.

After 1998, Kazakhstan's pay-as-you-go pension system was replaced by a funded pension scheme. Employee contributions to pension funds, which are meant to pay benefits upon retirement, are the primary focus. Despite its goal of lessening the strain on the state budget, this system has several problems, such as the public's mistrust of pension funds as a result of corruption and subpar investment results. Furthermore, a sizable section of the working population migrates overseas or works in the unorganized sector, thus the system does not include everyone.

A financed pension system has also been established in Uzbekistan, although there are many obstacles in the way of its complete implementation. Since a sizable section of the populace is employed in the unorganized sector, it is challenging to integrate these individuals into the pension system. This results in a lack of contributions and a restricted capacity to offer a respectable standard of pensions to the whole population. Furthermore, the system is experiencing financial sustainability problems that raise doubts about its long-term efficacy as a result of demographic shifts and economic challenges.

Since Turkmenistan is still a relatively remote nation, it is challenging to obtain reliable data on the success of pension reforms, even with the implementation of financed pillars in the system. Although the state budget still has a significant influence on pension payouts, the lack of transparency makes it challenging to evaluate how well the system can support pensioners' standard of life. Official statistics, however, show a steady level of payments, even if the real situation might be very different.

Kyrgyzstan has decided to use a hybrid pension scheme that incorporates funded and pay-as-you-go components. Through private pension funds, this strategy enables the government to lessen the strain on the state budget to some extent. However, it ignores the fundamental issue of low pension fund contributions brought on by increasing migration and poor participation from workers in the unorganized sector. The high degree of shadow economy in Kyrgyzstan's pension system also severely restricts the country's ability to pay retirees steady pension payouts (World Bank, 2019).

In contrast to its neighbours, Tajikistan still uses the traditional pay-as-you-go pension system, in which current contributions from working people are used to fund pension payouts. However, because of the nation's economic instability, this model – which worked successfully under the Soviet era – is currently having serious financial challenges. This system is susceptible to shifts in the economy because of low earnings, a high number of labour migrants, and insufficient pension fund resources. Because of this, the majority of Tajik retirees receive extremely meagre pensions that fall short of meeting their basic needs.

Financial instability brought on by demographic and economic shifts, low trust in pension funds, and inadequate coverage of workers – particularly in the informal sector – are issues that all Central Asian nations face. This is compelling governments to find new ways to guarantee pension systems' financial viability and enhance post-retirement living standards. To better understand the main achievements and challenges of the pension systems of Central Asian countries, it is worth comparing their models and the results of the reforms implemented. Each country has taken different approaches to addressing the challenges faced by their pension systems, depending on demographic, economic, and social factors. Table 1 presents a comparative analysis of the pension systems of Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan, including major achievements and key challenges.

Table 1. Comparative table of pension systems in Central Asia

Country	Pension system type	Main achievement	Main challenge
Kazakhstan	Accumulation	Individualized pension payments, reduced budget load	Lack of trust in pension funds, limited informal sector coverage
Uzbekistan	Accumulation	Stabilization efforts, partial coverage of informal sector	Low contributions from informal sector, limited financial resources
Turkmenistan	Mixed	State-backed stability with elements of accumulation	Lack of transparency, economic isolation
Kyrgyzstan	Mixed	Balanced burden between state and private funds	High migration, low contributions from informal sector
Tajikistan	Distribution	Stable payouts based on current contributions	Economic instability, low pension payouts

Source: developed by the authors based on World Bank (2019; 2020) and the Asian Development Bank (2023)

The overall analysis shows that each of the Central Asian countries has made unique progress in reforming their pension systems. However, common challenges include the lack of coverage of informal sector workers, problems with trust in pension funds, and economic instability. Further reforms and improvements to pension fund management systems in each country are needed to ensure long-term financial stability and social protection.

One important aspect influencing the stability of Central Asian pension systems is labour migration. The majority of economically active people in the majority of the region's countries work overseas, which has a big impact on pension fund contributions and the systems' overall financial soundness. Even though Kazakhstan is the most economically developed nation in the region, migration has an impact on the pension system because some of the population migrates abroad for work, which lowers pension fund contributions. However, because of the country's stable economy and thriving domestic sector, this impact is less severe than in other nations.

Since a sizable portion of the economically active population in Uzbekistan works abroad, migration has a greater effect on the pension system there. This results in fewer contributions to the pension fund and a major financial shortfall. Labour migration has less of an effect on Turkmenistan's pension system because of the nation's relative isolation, while the government works to keep the system stable with local funding. One of the biggest problems facing Kyrgyzstan's pension system is migration, since a sizable portion of the country's economically active population works abroad, which results in a sizable deficit in pension fund contributions.

The majority of migrants do not make contributions to pension systems in their home countries, the migration of labour abroad causes a significant shortfall of financial resources in the pension system in Tajikistan, just as it does in Kyrgyzstan. Migration reduces pension fund contributions, which threatens the financial stability of all Central Asian nations. Kyrgyzstan and Tajikistan are particularly affected, as a sizable section of their populations work abroad and do not make contributions to national pension systems, endangering the ability to provide adequate pensions in the future and necessitating the creation of new mechanisms by governments to include migrant workers in pension programs.

Pension reforms are significantly impacted by migration, particularly in nations with high labour migration rates, such those in Central Asia (Alishli *et al.*, 2024). Since a significant portion of the economically active population works outside and does not participate to the national pension system, one of the primary effects of migration is a decline in the number of pension fund contributions. This results in a deficit in pension funds and makes it challenging to pay pensioners, necessitating adjustments to the pension system's financial model. Furthermore, because migrants do not make contributions, the burden is placed on those who stay in the nation, resulting in an unequal distribution of the economic burden. Another significant factor is changes in the demographic composition, as young people's movement lowers the number of persons in working age and raises the number of retirees. The pension system is under more strain as a result, and changes are needed to discover new financing sources.

Since it is hard to foresee how many migrants will return home and whether they will make contributions to the pension system, migration further complicates long-term planning for pension reforms. This necessitates adaptability in reforms and the pursuit of novel ways to involve migrants in national pension schemes. Remittances from overseas can support pensioners and their families to some extent, but they are not a sustainable source of funding for the pension system. The necessity of reaching international agreements that would let migrants to make contributions to their home country's pension system while they are overseas is another crucial element (Gazilas, 2024). In nations with significant migratory populations, this could contribute to the financial stability of pension funds. Given the demographic and economic difficulties brought on by labour outflows, labour migration is a significant element that necessitates those nations, particularly those in Central Asia, revaluate their approaches to pension reforms.

In nations with significant labour migration rates, as those in Central Asia, donations from migrants are crucial to the establishment of pension systems. However, the majority of the time, foreign workers do not make contributions to their home nations' national pension plans. This is because many nations lack the systems necessary to include these workers into domestic pension plans. The financial stability of pension funds is weakened as a result of the large revenue losses.

The social insurance system, which is the primary source of pension money, is not used by migrants because the majority of them labour outside of the official national economy. Because fewer active employees are contributing to the system on a regular basis, this condition results in shortfalls in pension funds. This is particularly true in nations like Kyrgyzstan and Tajikistan where a sizable portion of the populace migrates in search of employment.

Due to their failure to make payments, migrants are also at a disadvantage when it comes time for them to retire because they have not accrued pensionable service in their home countries. In order to engage migrants in national pension systems, governments must create new policies and mechanisms. For example, they may establish opportunities for voluntary contributions or reach international agreements that permit migrants to make contributions to the system in their home country while working overseas.

So, migrant contributions have a lot of potential to sustain pension funds, but national pension systems face serious financial difficulties if they stop coming. To ensure the financial sustainability of pension funds, countries need to integrate migrant workers into the social insurance and pension contribution system, which will help strengthen the financial base of the systems and ensure adequate pension benefits in the future.

As the biggest economy in Central Asia, Kazakhstan has implemented major pension changes to strengthen the system's financial stability and adjust it to the current economic climate. The implementation of a funded pension system in the early 2000s was one of the crucial phases. Employees are required to make individual payments to private pension funds under this scheme. The reform's primary objectives were to guarantee reliable pension payment financing and lessen the pension system's reliance on the state budget (Schiff *et al*., 2001).

Official data indicates that the funded system's implementation has greatly improved pension funds' accountability and transparency. The expansion of pension assets is facilitated by their investments in different economic areas. Nevertheless, there have been several obstacles to this reform's efficacy. The public's lack of trust in private pension funds as a result of corruption and poor investment efficiency was one of the issues. As a result, several people preferred unofficial savings to pension fund contributions.

However, by enacting new laws meant to increase oversight of pension fund operations, the Kazakh government has attempted to increase the effectiveness of the financed system. There are now additional criteria for investment transparency and asset management. Although the number of contributions to the funds is still less than anticipated, this did help to some degree to rebuild public confidence.

The goal of Uzbekistan has been to gradually modernize its pension system. The shift to a financed system with social insurance components was the primary change carried out by the government in the early 2000s. The goal of this concept was to balance the public and private financing of pensions by combining the ideas of a pay-as-you-go system with personal savings (World Bank, 2020).

The progressive expansion of social security for the populace, especially for public sector workers, was one of the reform's primary accomplishments. The government established more incentives for workers in the unorganized sector to contribute to the system, and pension payments were stabilized. The capacity of the pension system is constrained by the fact that a sizable section of the population of Uzbekistan still works in the unorganized sector.

However, the financed system has come under fire for providing pension funds with little investment options. Pension assets are primarily invested in domestic government bonds due to the lack of developed financial markets in the nation, which restricts their returns. Expanding investment opportunities overseas is one way the government is attempting to solve this issue, but complete integration into international financial markets will take time.

Reforms to the pension system have been more conservative in Turkmenistan. The underlying paradigm has remained pay-as-you-go, with pensions paid by current contributions from working persons, even if the government has adopted some aspects of a funded system. Because Turkmenistan has a robust state economy and no access to international markets, the government still has authority over the pension system.

This model's effectiveness is in the government's ability to maintain a steady level of pension payments for the populace in spite of changes in the economy. The issue is that it is challenging to evaluate the system's actual effectiveness due to the opaqueness of pension fund financing. Public trust in the system is weakened by the absence of information on the income and investments made by pension funds.

Furthermore, the development of financial markets and investment options that could raise the return on pension assets are constrained by the nation's economic isolation. Reforms in this sector must be implemented in order to increase the system's efficiency, but the nation is not in a rush to alter the current model because of the political climate.

In an effort to increase the system's financial sustainability, Kyrgyzstan, one of the region's poorest nations, has enacted a number of pension reforms. The primary action was the switch to a mixed pension scheme, which incorporates aspects of funded and pay-as-you-go plans. By using this strategy, the government has been able to draw in private pension funds to finance pensions while also lessening the strain on the public budget (Organisation for Economic Co-operation and Development, 2015).

The changes have encountered difficulties in spite of certain achievements. One of the biggest threats to the pension system's financial stability is the high rate of worker migration. Contributions to pension funds are restricted since a sizable portion of the working-age population is employed abroad. Furthermore, a sizable portion of the economy is still unorganized, which lowers employee involvement in the pension system. As a result, the Kyrgyz government has implemented several policies to promote pension fund payments, such as tax breaks for business owners and unorganized sector employees. The country's economic situation prevents the pension system from fully covering the population, therefore the effectiveness of these measures is still restricted.

The conventional pay-as-you-go pension system, which is funded by current contributions from working residents, has been maintained in Tajikistan. The primary goals of the reforms were to raise the population's degree of social protection and enhance the way pension payments were administered. Although the government has taken steps to improve pension fund management, the primary issue is still a lack of adequate funding. Tajikistan's pension system is significantly impacted by labour migration as well. The majority of people in their working years are employed overseas and do not make contributions to national pension schemes. As a result, there are insufficient funds available to pay pensions. By developing pensioner support programs and luring in foreign aid, the Tajik government is attempting to address this issue.

Due to a weak economic foundation and high labour mobility, Tajikistan's pension system reforms have not been very successful despite these attempts. The government must to be searching for fresh approaches to funding the pension system, such as potential.

Pension reforms in Central Asian countries have become an important step towards ensuring social protection in the face of economic and demographic instability. Faced with a number of challenges, such as an aging population, high labour migration, and dependence on the informal sector, governments in these countries have implemented various reform models aimed at strengthening their pension systems. Each country has taken its own approach to modernizing the pension system, which is reflected in the outcomes of the reforms and their impact on the sustainability of benefits. Table 2 compares the main reforms, their positive and negative aspects, and their impact on the sustainability of pension benefits in Central Asia.

Table 2. Comparing the outcomes of reforms and their effects on Central Asia's pension benefit sustainability

Country	Key reform	Positive impact	Negative impact	Overall pension stability
Kazakhstan	Introduction of funded system	Increased transparency, investment opportunities	Distrust in pension funds, low fund profitability	Relative stability, pension growth
Uzbekistan	Funded system with social insurance elements	Improved social protection level	High informal economy, limited investment opportunities	Partial stability, dependence on state budget
Turkmenistan	State distribution system	Stability of payments through state support	Lack of transparency, limited investments	Stability, lack of data on long-term prospects
Kyrgyzstan	Mixed system (funded + distribution)	Reduced budget pressure, involvement of private funds	High labour migration, informal sector	Instability due to low contributions, reliance on private funds
Tajikistan	Preservation of distribution system	Administrative reforms, support for the pension fund	Lack of financial resources, labour migration	Low stability, dependence on external factors

Source: developed by the authors developed by the authors based on World Bank (2019; 2020) and the Asian Development Bank (2023)

Although Kazakhstan has implemented a funded system, it has faced a number of challenges related to the effective management of pension funds and low levels of public trust. However, analysing 2019-2023 years, it is worth noting that the state has gradually begun to use pension assets more actively to support strategic sectors of the economy, such as energy and transportation. This helped to strengthen national reserves and ensure economic growth during the COVID-19 pandemic. Although this has increased risks, as investments in public projects reduce the level of asset diversification, the effectiveness of such decisions can only be assessed in the long run. Reforms have also contributed to the introduction of new digital mechanisms that allow citizens to track their pension assets online, which has increased transparency.

Uzbekistan has begun to expand international investment opportunities to improve the returns of pension funds. New arrangements with foreign investors and the implementation of a number of financial sector reforms have enabled the government to gradually increase the amount of foreign investment invested in pension assets. These steps are important for the long-term sustainability of the pension system. In addition, Uzbekistan has begun to enter into bilateral agreements with other countries to ensure that migrant workers are eligible for pensions even when they work abroad. This process is aimed at reducing losses to the pension system due to labour migration, as many workers do not contribute to national pension funds while working abroad.

Because of the state's strong economic impact, pension payments in Turkmenistan remain stable. Turkmenistan is not in a rush to change its pension system, nevertheless, in contrast to its neighbours. It's crucial to remember that Turkmenistan's state control over energy exports enables it to generate steady income for the national budget, which in turn enables it to fund pensions. At the same time, the pension system has few prospects for growth and long-term stability because of the opaqueness of pension fund financing and the nation's economic isolation. There are very few reforms intended to improve the efficiency of pension asset investments.

Stabilizing the pension system has proven to be extremely difficult for Kyrgyzstan. Because of the high rate of informal work, a sizable portion of the population is still not covered by social insurance, even after the implementation of a hybrid pension system. Additionally, labour migration is one of the main issues. By developing digital platforms that enable migrant workers to make pension payments from overseas, the government has been implementing new initiatives in recent years to draw migrants to the pension system. Since many migrants lack steady jobs and are unable to contribute on a regular basis, these programs' efficacy is still low.

Tajikistan's national pension system is vulnerable since it still depends on remittances from labour migrants. Although the government has made a number of reforms in recent years to enhance the management of the pension system, a significant obstacle still exists in the shape of an unreliable source of money. In order to guarantee payments to the national pension system, the administration is also thinking about negotiating bilateral agreements with the nations where Tajiks emigrate. However, this problem is challenging to address because a sizable portion of the populace lacks access to the formal employment sector.

Therefore, depending on the degree of economic development, access to global financial markets, and the efficiency of local institutions, the outcomes of pension reforms in Central Asian nations exhibit notable variations. Although Kazakhstan has stabilized its pension system the most through a funded approach, issues with investment performance and credibility still exist. The sustainability of their pension systems is impacted by fundamental problems that other nations, like as Kyrgyzstan and Uzbekistan, are still facing. Both Tajikistan and Turkmenistan continue to use conventional methods for paying pension payments, but they both struggle with a lack of transparency and few long-term investment options.

Discussion

Comparing the results of this study with A. Tolymbek (2022), both agree that Kazakhstan's funded pension system faces serious challenges, including low returns on assets and the impact of inflation on real benefits. Both studies highlight that the system does not generate enough revenue to sustain adequate future pensions. Issues with pension asset investment and weak regulation are also noted as key concerns. Author suggested additional income sources through private investments and group programmes, aligning with this study's emphasis on diversifying pension sources. Differences arose in the solutions: A. Tolymbek (2022) proposed using Canada's three-pillar pension model, while this study focused more on the unique challenges in Central Asia, like migration and informal employment, which limited the adoption of such models. Both studies stress the need for stronger regulation and increasing trust in pension funds, though this analysis is more region-specific, while A. Tolymbek's offers broader, international approaches.

A. Bekbossinova *et al.* (2023) analysed the impact of economic, social, and investment factors on retirement savings in Kazakhstan, emphasizing, like this study, the importance of contributions as key to pension savings. Both studies highlight those contributions significantly impact asset accumulation, and both recognize inflation's negative effect on real pension benefits, reducing purchasing power. However, the focus differs: A. Bekbossinova *et al.* (2023) study paid more attention to social factors, like average wages and the number of pension participants, which drove asset growth. In contrast, this study focused more on demographic issues like labour migration, which affected contributions. The scientists also considered investment income less important, while this study gave more weight to investment efficiency and financial stability. While both studies agreed on the importance of contributions and inflation, A. Bekbossinova *et al.* (2023) study leaned toward social aspects, whereas this study emphasised economic factors, investment risks, and demographic challenges.

In the study by G.A. Junusbekova & M.D. Zhaumitova (2020), it was analysed the efficiency of Kazakhstan's pension system with a focus on the impact of macroeconomic factors on its functioning. As in this study, the authors emphasized the importance of balancing the pay-as-you-go and funded components of the pension system. They noted that the efficiency of the system was achieved through a combination of state, pay-as-you-go, and funded elements, which was consistent with the findings of this study on the importance of a multi-pillar approach to pension provision. At the same time, their study paid special attention to the impact of the labour market on the pension system, which was not the main focus of this analysis. In addition, they emphasized specific performance indicators such as replacement rates and growth rates of real and nominal pensions, while this study focused more on socioeconomic factors, including inflation and demographic changes. However, both studies agreed that a funded system was key to reducing the burden on the state budget in the context of an aging population. The differences were that the G.A. Junusbekova & M.D. Zhaumitova (2020) study focused more on the technical aspects of pension asset management and forecasting system performance based on market indicators, while the present study focused on migration and social inequality.

E. Palmer (2007) analysed Kazakhstan's pension reform, in particular its transition to a funded system, which had been introduced in 1998. He drew attention to the problems of the old pay-as-you-go system, where pensions were calculated on the basis of salary and length of service, and noted that this system became financially unstable after the collapse of the Union of Soviet Socialist Republics. His research showed that the pension reform was intended to reduce pressure on the state budget and encourage citizens to save. The study confirmed that the reform of Kazakhstan's pension system had a positive impact on the stability of the system, particularly through the introduction of the funded pillar. However, like findings by E. Palmer (2007), this analysis also emphasized that insufficient coverage of the informally employed and low pension contributions remained a serious problem. The differences were that The differences were that study by Palmer (2007) focused more on the macroeconomic impact of the reform and structural changes in the financial system, while this analysis focused more on social aspects, such as the impact on social protection and the welfare of pensioners.

S. Mirzoev (2022) analysed Tajikistan's pension system, particularly the financial difficulties due to insufficient contributions and high levels of informal employment. As in the present study, S. Mirzoev (2022) emphasized the need to expand the coverage of the social security system and make changes to improve its financial sustainability. The studies agreed on the problems of low pension contributions and insufficient coverage of informal workers. However, S. Mirzoev (2022) focused more on macroeconomic aspects, such as public expenditure management, while this analysis focused on the impact of demographic change and migration. The differences were that S. Mirzoev (2022) proposed structural reforms to improve fiscal management, while this analysis focused more on attracting additional sources of financing, such as migrant contributions.

D.S. Zholboldueva *et al.* (2024) analysed the pension system of Kyrgyzstan, in particular the impact of labour migration on its financial stability. Their findings, similar to those of this study, emphasise that high levels of migration lead to insufficient contributions to the pension fund, which weakens the system. The main difference was that D.S. Zholboldueva *et al.* (2024) analysed in detail the three-pillar pension system and funded elements, while the present study focused on social aspects and coverage of informal workers.

The World Bank (2014) analysis of the Kyrgyz pension system highlights several key points that align and contrast with the findings in this study. Both reports identify financial instability within the pension system due to low contributions and high dependency rates, emphasizing that the current pay-as-you-go system cannot be sustained without reform. The World Bank document stresses the rapid aging of the population and the shrinking base of contributors, which leads to an increasing burden on the pension fund, a trend that matches the conclusions of this research. In terms of differences, the World Bank focuses more on fiscal sustainability and suggests reforms such as indexing contributions to wage growth and raising the retirement age. In contrast, this analysis places greater emphasis on the social aspects of pension reform, particularly the need for better coverage of informal sector workers and labour migrants. While both analyses agree on the necessity of reform, the World Bank places more weight on macroeconomic policy adjustments, while this study highlights the importance of social protections and inclusivity in pension reforms.

U.U. Achilov (2023) analysed the pension system of Uzbekistan, proposing a three-pillar model with state, mandatory funded, and private contributions. As in the present study, he emphasized the importance of balancing these approaches for financial stability and the problem of under-contribution due to the high share of informal employment. The main difference was that U.U. Achilov (2023) focused more on the implementation of the three-pillar system, while this study focused on the impact of migration on the sustainability of the pension fund.

S. Salimov (2018) analysed the development of Uzbekistan's pension system through the prism of the experience of the European Union. He emphasized the importance of reforming Uzbekistan's pension system, particularly by introducing additional savings and insurance mechanisms to help ensure the financial stability of the system. Comparing the findings of this study with those of the present study, there were some similarities. Both studies recognized the importance of reforming the pension system, especially in the context of increasing life expectancy and demographic challenges. In addition, both the present study and the paper by S. Salimov (2018) emphasized the need to increase the coverage of the pension system, especially for informal workers. However, there were some differences. S. Salimov (2018) focused more on borrowing from the experience of European countries and introducing funded elements, while this study placed more emphasis on internal demographic and social aspects, such as the impact of labour migration on the sustainability of pension funds.

Z. Beknazarov & D. Rustamov (2021) analysed pension systems with a focus on a multi-pillar model that combines pay-as-you-go and funded elements. This coincided with the findings of this study, which also emphasized the need for a balance between different approaches for financial sustainability. Both studies recognized the importance of reforms to accommodate the rising retirement age and the need to cover the informal sector. The differences lay in the fact that Z. Beknazarov & D. Rustamov (2021) focused more on international comparisons, while this study focused on specific regional challenges, such as labour migration.

G.A. Junusbekova & M.D. Zhaumitova (2020) analysed Kazakhstan's pension system, emphasising the importance of balancing funded and pay-as-you-go elements for sustainability, which was consistent with the findings of this study. Both studies recognised the demographic challenges and the need for reforms to improve pension financing and coverage of the informal sector. The differences lay in the fact that G.A. Junusbekova & M.D. Zhaumitova (2020) focused more on macroeconomic analysis and modelling, while this study focused on the impact of migration and the social aspects of reforms.

The study by G.G. Urinboev (2023) and the current research have some similarities and differences. Both emphasize the need for pension system reform in Uzbekistan and focus on demographic challenges such as population aging. Both analyses highlight the issue of insufficient contributions and weak regulation, which undermine the financial stability of the system. However, G.G. Urinboev (2023) placed more emphasis on technical aspects, such as the automation of payments, while the current study focuses more on labour migration and its impact on the pension system.

The study by S.A. Shermukhamedova (2023) and the current research share some common points, both emphasizing the need for pension system improvements in Uzbekistan and highlighting financial challenges due to an aging population. S.A. Shermukhamedova (2023) focused more on the rise in pension recipients and the financial management of the Pension Fund, particularly regarding income sources and insurance premium policies. In contrast, the current research emphasizes labour migration and informal employment's impact on pension contributions, which S.A. Shermukhamedova (2023) discusses less. Both agree on the need for financial reforms but differ in their proposed solutions, with the current study focusing more on investment diversification.

The comparison between Central Asia's pension systems and Sweden's, as outlined by the European Union, shows significant differences (Government of Sweden, 2020). Central Asia faces challenges like low coverage, insufficient contributions, and financial instability, particularly among informal workers. In contrast, Sweden has a well-established system with universal coverage and sustainable funding, with mechanisms like income indexation to protect against inflation (Gutium *et al*., 2023). Labour migration weakens pension systems in Central Asia, whereas Sweden manages migration without financial strain. Sweden's adaptable pension model ensures long-term stability, while Central Asia is still working on reforms to address structural issues like informal employment and funding gaps.

The Federal Ministry of Labour and Social Affairs of Germany (2023) emphasizes long-term sustainability and demographic challenges in Germany's pension system, highlighting the need for balanced financing and reforms such as raising the retirement age. This aligns with the data, as both recognize the need for reforms to ensure stability and address aging populations. The key difference is that Germany's system focuses on a well-established three-pillar approach (statutory, occupational, and private), while the Central Asian systems focus more on incorporating informal sector workers and addressing financial instability. Germany's pension reforms are more advanced, while Central Asia is still expanding coverage.

The Ministry of Economy and Finance of France (2023) report on France's pension system highlights the importance of reforms, sustainability, and addressing demographic challenges, much like the findings in this research. Both emphasize the need for raising the retirement age, enhancing fund management, and ensuring sufficient contributions to maintain financial stability, especially in the context of an aging population. However, the differences lie in the complexity and focus of the issues. The French system is more advanced, focusing on supplementary pension schemes and robust fiscal management (Ketners, 2024). In contrast, this research on Central Asia deals with more fundamental challenges such as the inclusion of informal workers, the impact of labour migration on pension contributions, and the broader financial instability of pension funds, which are still in the process of development and reform.

J. Stachura's analysis of Poland's pension system focuses on sustainability amid demographic challenges like aging populations and declining birth rates (Ministry of Finance of Poland, 2023). Both her report and this research emphasize the importance of reforms to maintain financial stability and address dependency ratios. The main difference lies in focus: J. Stachura discusses Poland's mature system, addressing issues like retirement age and contributory periods, while this research highlights the earlier stages of reform in Central Asia, particularly challenges like labour migration, the informal sector, and economic instability.

The comparison of pension systems in Central Asia and Denmark reveals significant differences and some similarities. Both regions recognize the need for effective pension frameworks to ensure financial security for aging populations. Denmark's system, as outlined by the European Union, features a multi-pillar approach, including universal state pensions and mandatory occupational plans, ensuring adequate support for retirees (Ministry of Finance of Denmark, 2023). In contrast, Central Asian countries rely on pay-as-you-go systems, resulting in lower benefits that often fail to meet basic needs. Denmark employs effective investment strategies that enhance pension growth, while

Central Asia struggles with low returns and insufficient regulations, threatening the stability of their pension systems. Additionally, Denmark effectively manages its aging population, while Central Asia faces challenges from both aging and high labour migration, reducing pension contributions. In summary, Denmark's comprehensive and adaptable pension system leads to better financial outcomes for retirees, whereas Central Asia's reliance on pay-as-you-go models highlights the urgent need for reforms. Learning from Denmark's approach, particularly in diversifying pension sources and enhancing regulations, is essential for strengthening Central Asian pension systems.

Comparing the pension systems of Central Asia and Switzerland highlights key similarities and differences. Both regions face challenges from aging populations, with Switzerland's over-65 demographic projected to reach 41.2% by 2030, similar to trends in Central Asia. Both recognize the need for reform to address fiscal pressures related to these demographics. Switzerland's implementation of a 13th pension month, as noted by Fitch Ratings, exemplifies proactive reform, while Central Asian countries aim to enhance pension coverage and contributions from informal workers. However, Switzerland's multi-pillar pension system is backed by a strong economy and low debt levels, whereas Central Asia relies on state-funded models with low contributions. Fitch Ratings indicates that Switzerland's pension reform will not affect its creditworthiness, while Central Asian countries face financial instability and vulnerability to pension spending changes (Switzerland's pension increases…, 2024). According to Fitch Ratings, Switzerland's reform was enacted through a popular initiative, reflecting public engagement, while Central Asian reforms often lack this participation. Ultimately, while both regions share the need for pension reforms, Switzerland's established system stands in stark contrast to the urgent needs of Central Asia's pension systems.

In comparing the results of this study with others, there are notable similarities and differences across various analyses of pension systems. Common themes include the challenges of low returns, inflation, and the importance of pension contributions in maintaining system stability. Several studies emphasize the need for reforms, such as raising the retirement age, improving fund management, and balancing funded and pay-as-you-go components to ensure sustainability. Key differences arise in the approaches to solving these issues. While some analyses focus on adopting multi-pillar pension systems and borrowing from international models, this study emphasizes the specific challenges faced by Central Asia, such as labour migration, informal employment, and broader economic instability. These factors significantly affect pension contributions and system sustainability in the region. Additionally, while more advanced pension systems, such as those in Europe, prioritize fiscal management and supplementary schemes, Central Asian countries are still grappling with fundamental reforms to expand coverage and stabilize pension funds.

Conclusions

Important successes and difficulties are shown by the study of Central Asian pension systems. Financial sustainability is nevertheless threatened by enduring problems like inadequate pension payments, substantial labour migration, and widespread informal employment, notwithstanding measures that have been put in place to address demographic and economic changes. Although Kazakhstan has made significant strides toward creating a funded pension system, ineffective investment management has kept public trust low. This study and others emphasize how crucial it is to diversify pension funds and enhance governance in order to ensure sustainability. Although there is promise in Kazakhstan's use of pension assets for economic development, these investments need to be carefully watched to minimize risks.

Similar issues with limited informal worker contributions exist in Uzbekistan, although attempts to engage migrant workers through international agreements have showed potential. This strategy might lessen the financial gaps brought on by labour migration. The absence of investment opportunities and transparency in Turkmenistan's state-run pension system raises questions about its long-term viability. Informal employment and labour migration are problems for Kyrgyzstan's hybrid system, and digital attempts to integrate migrants into the system have not been very successful. Due to its weak economic foundation and reliance on remittances, Tajikistan's pay-as-you-go system is extremely unstable and urgently needs to be reformed in order to stabilize its pension fund.

Overall, the study concludes that the pension systems in Central Asia have similar difficulties, especially when it comes to obtaining adequate contributions and dealing with migration. The stability of the pension system depends on ongoing reforms in fund administration, investment diversification, and the inclusion of informal workers.

This study has a number of shortcomings, chief among them being the dependability and accessibility of the data, especially from opaque nations like Turkmenistan. It has been challenging to thoroughly evaluate the effects of pension reforms and conduct a thorough comparison of systems throughout Central Asia due to a lack of trustworthy data. Furthermore, some of the tendencies found in this study may change over time due to the dynamic nature of the demographic and economic factors affecting pension systems; however, this was outside the purview of this analysis.

Future studies should focus on enhancing data collection techniques to guarantee more precise evaluations and comparisons throughout Central Asia. Additionally, it's critical to investigate how international collaboration might improve pension system stability, especially in relation to labour migration. Additionally, there are chances to boost financial management throughout the region, boost participation, and enhance transparency through the use of digital technology in pension administration. Pension systems in Central Asia must change in tandem with the region's economies in order to adequately protect the elderly while maintaining their financial viability.

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Conflict of Interest

None.

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Пенсійні системи Центральної Азії: порівняльний аналіз досягнень, ризиків та механізмів розвитку

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Анотація. Метою цього дослідження був аналіз пенсійних систем країн Центральної Азії для оцінки ефективності пенсійних реформ та визначення ключових викликів, що впливають на їхню фінансову стійкість. Дослідження зосереджувалось на впливі трудової міграції, неформальної зайнятості та демографічних змін на пенсійні системи цих країн. Було проведено порівняльний аналіз для оцінки пенсійних систем на основі таких ключових показників, як внески до пенсійного фонду, демографічні тенденції та структура пенсійних моделей – солідарної, накопичувальної чи змішаної. Результати дослідження свідчили про значні відмінності між пенсійними системами країн Центральної Азії. Казахстан запровадив накопичувальну пенсійну систему, але стикається з проблемами через низьку прибутковість інвестицій та недовіру населення. Узбекистан, незважаючи на зусилля з інтеграції трудових мігрантів у пенсійну систему, все ще бореться з недостатніми внесками з неформального сектору. Туркменістан зберігає державну пенсійну систему, але брак прозорості обмежує можливість оцінити її довгострокову життєздатність. Киргизстан запровадив змішану пенсійну систему, але трудова міграція та неформальна економіка підривають її ефективність. Таджикистан продовжує покладатися на традиційну солідарну модель, але економічна нестабільність і міграція створюють серйозні фінансові проблеми. Таким чином, пенсійні системи в Центральній Азії мають спільні проблеми, особливо в управлінні трудовою міграцією та охопленні неформальних працівників. Для забезпечення стійкості пенсійних фондів необхідні постійні реформи, спрямовані на поліпшення фінансового управління, диверсифікацію інвестицій і розширення охоплення

Ключові слова: демографічні виклики; пенсійні виплати; соціальне забезпечення; фінансова стійкість; соціальна держава