

The Role of Chinese Trade in the Economic Stability of Kyrgyzstan and Tajikistan

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Abstract

This study explores the feasibility of forging trade partnerships between Kyrgyzstan and Tajikistan, emphasizing the crucial role of economic stability in determining trade effectiveness considering the significance of the Belt and Road Initiative (BRI) in the region. Using the Morris technique, for measuring economic stability index, the research examines key variables such as inflation rates, unemployment rates, private debt metrics, loans and debt securities relative to gross domestic product (GDP), and government gross debt as a percentage of GDP. Granger Causality analysis has been applied for understanding the relationship between trade partnerships and economic stability index. Spanning from 2000 to 2021, this comprehensive analysis offers valuable insights into economic trends in both nations. The findings reveal similar levels of economic stability on average, with Tajikistan showing slightly higher stability since 2013 due to demographic factors and shifts in trade ratios to GDP. Kyrgyzstan averages a stability score of 63 percent, marginally lower than Tajikistan's 65 percent. The trade partnerships enhance the economic stability of Kyrgyzstan, while there is no significant relationship for the economy of Tajikistan. Therefore, Kyrgyzstan should be keen on following BRI projects for its economic stability.

Keywords: *Economic Stability, Foreign Trade, Morris Imbalance index, Granger Causality*

1. Introduction

The development of healthy trade relationships is crucial for governments that aim to achieve economic growth and stability in the current global landscape. This study investigates the complex dynamics of trade alliances between Kyrgyzstan and Tajikistan, two Central Asian countries situated at the crossroads of regional integration and economic progress.

The cornerstone of this study is to assess the viability of creating trade collaborations between these nations, supported by a comprehensive analysis of their economic stability. This study employs the Morris technique, a sophisticated analytical framework, to examine a wide range of important variables from 2000 to 2021, recognizing economic stability as a crucial factor in the success of trade initiatives. These variables include inflation rates, unemployment rates, private debt indicators, loans, debt securities relative to GDP, and the general government's gross debt as a percentage of GDP. This careful examination aims to provide a detailed understanding of economic trends in Kyrgyzstan and Tajikistan over the past 20 years.

This analysis reveals a complex picture. Despite various demographic considerations, fluctuations in the trade-to-GDP ratio, and differences in economic stability since 2013, a comprehensive study shows that the economic stability indices of both countries are quite comparable. During the period under consideration, Kyrgyzstan had an average economic stability score of 63 percent, compared to Tajikistan's slightly higher score of 65 percent.

Based on these empirical data, this study convincingly argues for the continuation and consolidation of the economic links between Kyrgyzstan and Tajikistan, especially within their current trade nexus with China. This strategic alignment, akin to "killing two birds with one stone," not only promises economic stability for both countries, but also has significant implications for the regional and global economic landscape. A key aspect of this strategy is the expanding role of the renminbi (RMB), China's currency, in the international monetary system (Bastanifar et al, 2024). This includes its inclusion in the Special Drawing Right (SDR) basket and the strengthening of reserves held by central

banks in Asian countries. Implementing such advances is likely to accelerate the effectiveness of BRI projects, ultimately creating a stronger and more integrated global economic environment.

This study contributes to the literature by applying the Economic Stability Index specifically to Kyrgyzstan and Tajikistan, offering tailored economic assessments and providing a policy framework to address challenges such as debt management and environmental sustainability. Additionally, the study provides valuable regional economic insights and identifies areas for future research, including comparative studies with other Central Asian nations to better understand the long-term socioeconomic and environmental impacts of BRI projects. The study employs the Granger Causality test to explore the impact of foreign trade partnerships between Kyrgyzstan, Tajikistan, and China within the context of BRI projects. Due to the absence of a specific index to assess the role of the BRI in trade dependency, the study assumes that the BRI positively influences trade and GDP in China. As a proxy for the foreign trade partnerships, the geometric mean of three trade ratios to GDP data from 2000 to 2021 for Kyrgyzstan, Tajikistan, and China was used. This proxy, combined with the economic stability of Kyrgyzstan and Tajikistan, was applied in the Granger Causality test to determine whether these trade partnerships contribute to the economic stability of Kyrgyzstan and Tajikistan.

This paper is organized into several sections: Introduction, covering the importance of trade for economic stability in Kyrgyzstan and Tajikistan from 2000 to 2021 using the Morris technique and Granger Causality; Literature Review, discussing traditional and evolving economic stability indicators and their relevance to Chinese trade engagement; Method, explaining the Morris imbalance index and Granger Causality; Data Analysis and Results, presenting data sources and comparative stability indices; discussion and interpretation of results in the context of Chinese trade and BRI projects; Conclusion, summarizing findings and suggesting future research on BRI's impacts; and References, listing cited sources.

2. Historical background of Kyrgyzstan and Tajikistan's relationship with the BRI

China introduced an ambitious global infrastructural and economic development project known as the BRI in 2013, with the goal of improving

connectivity and collaboration between Asia, Europe, and Africa (Swaine, 2015). The plan, which focuses on developing trade routes, infrastructure, and economic ties, includes the Silk Road Economic Belt and 21st Century Maritime Silk Road. With their advantageous location along historic trade routes, Kyrgyzstan and Tajikistan, in particular, play a major role in the land-based Silk Road Economic Belt (Ferdinand, 2016).

Central Asia has been a crossroads of civilizations for millennia, historically linked by the old Silk Road, which fostered trade, cultural exchange, and political connections between the East and the West (Frankopan, 2015; Khan et al., 2024). The region's strategic importance has endured in modern times, distinguished by its geographic position and resource potential (Laruelle, 2018; Kuszewska & Khan, 2020). Following the dissolution of the Soviet Union, Kyrgyzstan and Tajikistan became sovereign states that had to negotiate political unrest, economic hardship, and regional dynamics. Both nations have made efforts to take advantage of their locations to promote connectivity and economic growth (Cooley, 2012; Azmi et al., 2024).

Kyrgyzstan began participating in the BRI shortly after its introduction. Kyrgyzstan, a landlocked nation with substantial infrastructure requirements, viewed the BRI as an opportunity to improve its connectivity and economic prospects (Ferdinand, 2016). Improving the transport system was the primary goal, as it is essential for commerce and economic integration. The China-Kyrgyzstan-Uzbekistan railway, which aims to establish a direct link between China and Uzbekistan through Kyrgyzstan, is one of its major projects. Despite a number of political and technical obstacles, the project has made some headway (Sanghera, 2018). In addition, a number of road projects, such as the renovated Bishkek-Naryn-Torugart road, have begun to enhance connections both inside Kyrgyzstan and with neighboring nations (Blank, 2019). China has additionally invested in Kyrgyzstan's energy industry, including modernizing the country's infrastructure and launching hydroelectric projects. Chinese investments have facilitated the creation of free economic zones (FEZs) with the goals of luring foreign direct investment, promoting industrial growth, and generating employment (Laruelle, 2018).

As a component of its larger plan to integrate into regional and international economic networks, Tajikistan was first involved in the BRI. Tajikistan saw the BRI as a way to address its infrastructure requirements and

steep terrain to overcome economic and physical obstacles (Cooley, 2012). The infrastructure of Tajikistan's roads and tunnels has made significant investment. For example, with Chinese support, the Dushanbe-Chanak highway was rebuilt to improve internal communication and facilitate trade within the region (Peyrouse, 2016). China has contributed to several Tajikistani energy projects, including transmission lines and hydropower dams. The purpose of these projects was to boost Tajikistan's ability to produce energy and supply steady electricity to promote economic expansion. In addition, the establishment of industrial zones funded by Chinese capital is intended to be drawn in the manufacturing and processing sectors, provide employment, and broaden the economy (Peyrouse, 2016). Likewise, the goal of Chinese agricultural and irrigation project investments in Tajikistan has been to raise food security and agricultural productivity there (Sanghera, 2018).

Both Kyrgyzstan and Tajikistan have benefited economically from the BRI with increased trade, investment, and job creation. Nevertheless, it has sparked concerns about the sustainability of debt and its effects on the environment and society (Blank, 2019). To finance BRI-related projects, both nations have taken on large debt, and one of the main challenges is ensuring that this debt is manageable. Large-scale infrastructure projects, including pollution, habitat damage, and deforestation, have environmental impacts that must be properly managed (Swaine, 2015). Furthermore, promoting social stability and inclusive prosperity requires ensuring that the public benefits equally from the BRI.

The future of the BRI in Tajikistan and Kyrgyzstan is both uncertain and full of potential. Sustained expenditures on industry, energy, and infrastructure can promote regional integration and economic progress. However, debt relief, environmental sustainability, and equitable development must be addressed to fully reap the rewards of the BRI (Laruelle, 2018; Khan et al., 2023). The successful execution of the Belt and Road Initiative (BRI) can be aided by increased regional collaboration, particularly through multilateral forums such as the Shanghai Cooperation Organisation (SCO). A favorable environment for sustainable growth can be produced through cooperative efforts in trade, infrastructure, and security (Ferdinand, 2016). To get the most out of the Belt and Road Initiative (BRI), Kyrgyzstan and Tajikistan must diversify their economies and promote innovation. Building robust and dynamic economies

can be facilitated by investing in sustainable sectors, technology, and education (Peyrouse, 2016).

In summary, Kyrgyzstan and Tajikistan have benefited greatly from the Road Initiative, which has created numerous opportunities for regional connectivity and economic growth. However, the project comes with difficulties that call for cautious management and thoughtful preparation. The long-term success and sustainability of Kyrgyzstan and Tajikistan's growth trajectories will depend on their capacity to take advantage of the benefits and mitigate the dangers that come with operating within the BRI framework.

3. Literature Review

Economic stability, a core subject in macroeconomic analysis, is traditionally assessed using indicators such as real GDP growth, unemployment rates, and personal income levels. Mankiw and Scarth (2001) posit that economic stability is characterized by smooth growth of real GDP. However, efforts to maintain this stability have historically led to high inflation rates (Glyfason, 1999). Consequently, economic growth is often seen as essential for maintaining stability, a notion supported by the extensive literature linking these two concepts.

The concept of economic stability has further evolved to include economic resilience, particularly in the context of economic vulnerability due to sanctions, pandemics, and military conflicts. The impacts of these factors have been examined by researchers such as Ceylan, Ozkan, and Mulazimogullari (2020) and Hufbauer and Jung (2020), highlighting their significant effects on regional and global economies. This has led to growing interest in economic resilience, defined as the ability to maintain production levels close to capacity after a shock (Duval & Vogel, 2008).

Guillaumont (2009) and Briguglio (2016) suggested that economic resilience involves the ability to resist and manage threats to growth from various shocks. Briguglio (2016) specifically identifies economic vulnerability as having both social and economic dimensions and proposes an economic stability index that includes inflation, unemployment, private debt, loans, debt securities (as a percentage of GDP), and general government gross debt (as

a percentage of GDP). These factors are particularly important in developing countries (Barrot, Calderón & Servén, 2018; Keefe, 2021; Meierrieks, 2021).

In this study, we applied Briguglio's (2016) economic stability index to evaluate the economic stability of Kyrgyzstan and Tajikistan, particularly in the context of their engagement with Chinese trade. By examining these indicators, this study aims to understand how Chinese trade influences the economic stability of these Central Asian countries. The analysis considers the macroeconomic dimensions of stability, including the effects of external shocks and countries' economic resilience, providing a comprehensive evaluation of their economic conditions amid increasing Chinese trade involvement.

Several studies have explored the relationship between economic stability and trade. Binici et al. (2012) examined the impact of trade openness on inflation in OECD countries and found no significant relationship between the two. Similarly, Munir et al. (2015) found no correlation between trade openness and inflation in nine Asian countries using data from 1976 to 2010. Nguyen et al. (2023) extended this analysis to 20 Asian countries for the period from 2011 to 2019, and their findings also indicated no significant relationship between trade openness and inflation.

4. Methods

4.1 Morris imbalance index

The Morris imbalance index is calculated through the equation 1.

$$Y_{ij} = \frac{X_{i \max} - X_{i \min}}{X_{i \max} - X_{i \min}} \times 100$$

Where Y represents the unbalanced index for the *i*th indicator in the *j*th country. X represents the *i*th variable in the *j*th country, and $X_{i \min}$ indicates the minimum value of the *i*th variable for the two countries. $X_{i \max}$ indicates the maximum value of the *i*th indicator in each country. The coefficient of the Morris index is between zero and 100. The closer it is to 100, the higher the level of the index (Ghaffary Fard, AbuNoori, & Nazari 2022). However, to accurately measure indicators such as inflation, unemployment, and Private and Government debt,

the Morris Imbalanced index must be adjusted. Lower amounts of inflation, unemployment, and debt lead to a more stable economy. Therefore, the authors applied the following indicators.

$$Y_{ij} = \frac{X_{i \max} - X_{i \min}}{X_{i \max} + X_{i \min}}$$

The new adjusted index shows that an economy with lower levels of inflation, unemployment, and debt (both private and government), considered as components of economic stability, experiences economic stability.

4.2 Granger's causality test

To analyze the cause-and-effect relationship between economic stability and foreign trade, the authors employ Granger's causality test. This concept, introduced by Clive W. J. Granger, earned him the Nobel Prize in Economics in 2003 for his significant contributions to the analysis of time series data in macroeconomics (Hendi, 2004).

Equation (3) represents the concept of Granger causality in a bivariate model, where X and Y are the two variables being tested. Each variable consists of time series data over a certain period. The Granger causality test is based on Vector Auto Regression (VAR) estimation, where both X and Y must be stationary time series. The optimal lags of the model (k) can be determined using criteria such as Akaike, Schwarz, and Hannan-Quinn information criteria. In Equation (3), "e" denotes the error term, and "a" represents the coefficients of the model, which are crucial for determining causality. For instance, series Y can be said to Granger-cause series X if and only if a_{xy}^k equals zero for $1 \leq k \leq d$ (Shojare and Fox, 2022).

$$a_{x_t}^0 = \sum_{k=1}^d a_{xx}^k x_{t-k} + \sum_{k=1}^d a_{xy}^k y_{t-k} + e_{t,x} \quad a_{y_t}^0 = \sum_{k=1}^d a_{yy}^k x_{t-k} + \sum_{k=1}^d a_{yx}^k y_{t-k} + e_{t,y}$$

In this paper, the authors employed the above model to analyze the relationship between economic stability (ES) and the trade feasibility or

dependency of Kyrgyzstan and Tajikistan within the context of the BRI and China's trade. To represent trade dependency, a new series was created using the geometric mean of the trade ratio to GDP for Kyrgyzstan, Tajikistan, and China from 2000 to 2021. The geometric mean of the trade ratio to GDP was chosen as a proxy for trade dependency. There are several reasons for applying geometric mean of trade ratio to GDP of Kyrgyzstan and Tajikistan and China as a series of TRGDP. The following paragraph reveals the reasons.

The BRI involves 150 countries, but there is no specific index to calculate the trade dependency of the BRI. A report from the Green Finance & Development Center in December 2023 indicates that that numbers of countries involved in the BRI are 44, 25, 22, 19 and 6 located in Sub-Saharan Africa, Europe & Central Asia, East Asia & Pacific (including China), Latin America & Caribbean, Middle East & North Africa, and South East Asia respectively (Nedopil, 2023). Despite the limitation of not having a direct measure for the BRI's impact on trade partnerships, the trade ratio to GDP of China can still serve as a proxy to indirectly gauge this impact, alongside other trade activities. However, this approach must also consider the trade partnerships of Kyrgyzstan and Tajikistan. To address this, a method is needed to combine the trade ratios to GDP for Kyrgyzstan, Tajikistan, and China into a new time series. The authors opted to use the geometric mean, a method commonly employed in constructing key economic development indexes, such as the Human Development Index (Amirbek et al., 2020).

Finally, Table 1 represents the hypothesis of Granger's causality test. According to Table 1, if the p values are smaller than 0.05, the null hypothesis is rejected. Based on the coefficients in Equation 3, we can identify four situations for relationship between ES and $\frac{TR}{GDP}$ for Kyrgyzstan and Tajikistan.

Situation One: If only $A < .05$, ES is influenced by $\frac{TR}{GDP}$.

Situation Two: If only $B < .05$, $\frac{TR}{GDP}$ is influenced by ES

Situation Three: If Both $A < .05$ and $B < .05$, not only ES is influenced by $\frac{TR}{GDP}$, but $\frac{TR}{GDP}$ is influenced by ESKY.

Situation Four: If Both $A > .05$ and $B > .05$, there is no relationship between the variables.

Table 1. Hypothesis of Granger's Causality Test

Null Hypothesis	Prob
$\frac{TR}{GDP}$ does not Granger Cause ESKY	A
ESKY does not Granger Cause $\frac{TR}{GDP}$	B

Source: Prepared by Authors

5. Data Analysis and Results

Validating hypotheses with Granger's Causality Test requires both time series data and a comprehensive analysis. This section begins with a descriptive analysis of the variables, highlighting how data trends have evolved over time and influenced the variables within the causality model. It concludes with the results of the Granger's Causality Test.

Table 2. The data and the sources as discussed and analyzed in the paper

Variable	Source
Population	World Bank national accounts data, and OECD National Accounts data files.
Population Density	World Bank national accounts data, and OECD National Accounts data files.
GDP, PPP (constant 2017 international \$)	World Bank national accounts data, and OECD National Accounts data files
GDP, PPP (constant 2017 international \$) per capita	Calculation by Authors
Trade Ratio to GDP	World Bank national accounts data, and OECD National Accounts data files.
Inflation, (Percent)	https://fred.stlouisfed.org/series/fpcpitotlzgpaK
Unemployment, (Percent)	https://fred.stlouisfed.org/series/fpcpitotlzgpaK
Private debt, loans and debt securities (Percent of GDP)	https://data.imf.org
General government gross debt (Percent of GDP)	https://data.imf.org
Economic stability Index	Calculation by Authors

Source: Prepared by Authors

As this study aims to measure economic stability based on Briguglio's 2016 framework, we consider four key variables: inflation, unemployment, private debt, loans and debt securities, and general government gross debt. Additionally, the paper investigates the relationship between economic

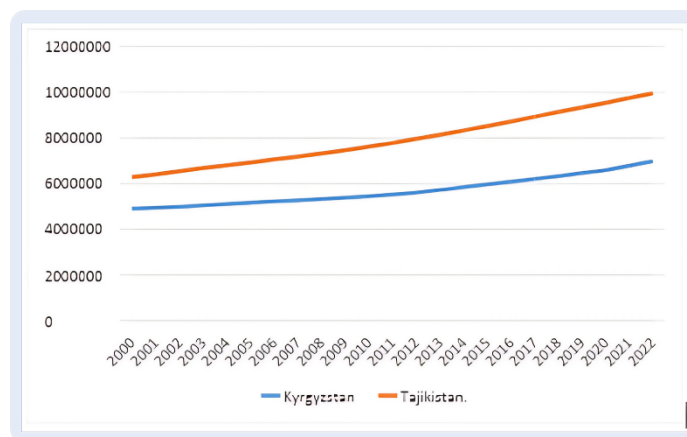
stability and the trade ratio to GDP, introducing this ratio as a crucial variable. Real GDP per capita is also used as an indicator of economic stability for the countries under study (Balavac and Pugh, 2016).

Each economy is influenced by its own demographic characteristics. This population is potentially a double-edged sword. At one hand, it increases consumption and may lead to a higher demand for products that can result in inflation. On the other hand, it can enhance production, create labor opportunities, and decrease unemployment. Therefore, it is a vital variable that affects the Economic Stability Index.

5.1 Population

Figure 1 and Figure 2 show the annual growth of Tajikistan and Kyrgyzstan from 2000 to 2022 where both countries have an increasing population rate. Figure 1 data further shows that the population of Tajikistan is higher than that of Kyrgyzstan during this period. People in Tajikistan and Kyrgyzstan were at over 6.3 and 4.9 million in 2000, respectively. By 2022, Tajikistan registered a total population of about 10 million while Kyrgyzstan had about 7 million.

Figure 1. Trend of Population for Kyrgyzstan and Tajikistan

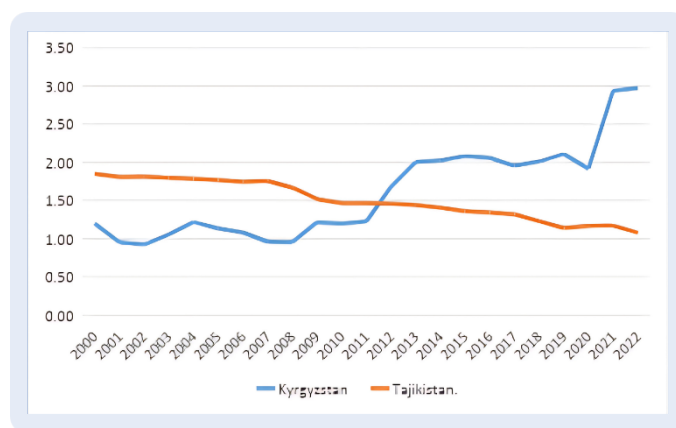


Source: Prepared by Authors

Figure 2 shows that Tajikistan experienced a slight decrease in the population growth rate, while Kyrgyzstan showed an overall increasing trend with some fluctuations.

The findings indicate that the maximum annual average population growth rate for Kyrgyzstan is 2.97 in 2022, compared to 1.85 in 2000 for Tajikistan. The lowest rate was in 2002 for Kyrgyzstan and 1.08 in 2022 for Tajikistan. Despite the varying annual rates during this period, the average rates for both countries are very close. It was 1.65 for Kyrgyzstan and 1.47 for Tajikistan.

Figure 2. Trend of annual Population growth rate for Kyrgyzstan and Tajikistan

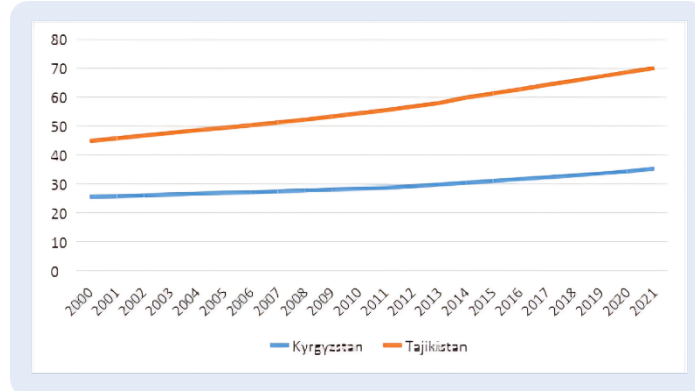


Source: Prepared by Authors

5.2 Population density

Population density was calculated by dividing the population by the total land area (Rosenberg, 2011). Figure 3 illustrates the population density (people per square km. land area) for Kyrgyzstan and Tajikistan from 2000 to 2021. While the trend of population density increased for both countries, Tajikistan had a steeper slope than Kyrgyzstan. In Tajikistan, the population density was 44.8 people per square kilometer in 2000, which increased to 70.25 by 2021. Conversely, Kyrgyzstan also experienced an increasing trend but with a lower slope. In Kyrgyzstan, the population density was 25.5 people per square kilometer in 2000, which increased to 35.3 in 2021.

Figure 3. Trend of population density (people per sq. km of land area) for Kyrgyzstan and Tajikistan



Source: Prepared by Authors

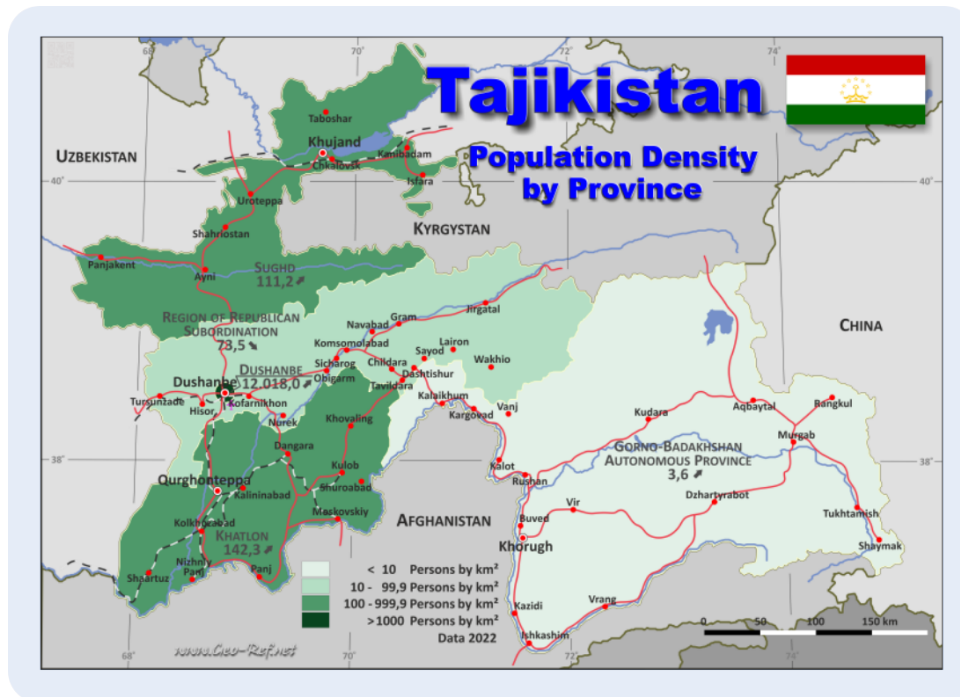
Figure 4 shows a map of population density in Kyrgyzstan. It is evident that the population distribution was uneven. In predominantly mountainous Tajikistan, the population is concentrated in the valleys and plains, particularly around Dushanbe and Khujand. Highland regions have fewer inhabitants owing to the challenging terrain.

Figure 4. Population density of Kyrgyzstan, 2022



Source: Geo-ref.net <<http://www.geo-ref.net/ph/kg.htm>>

Figure 5. Population density of Tajikistan, 2022



Source: Geo-ref.net <<http://www.geo-ref.net/ph/kg.htm>>

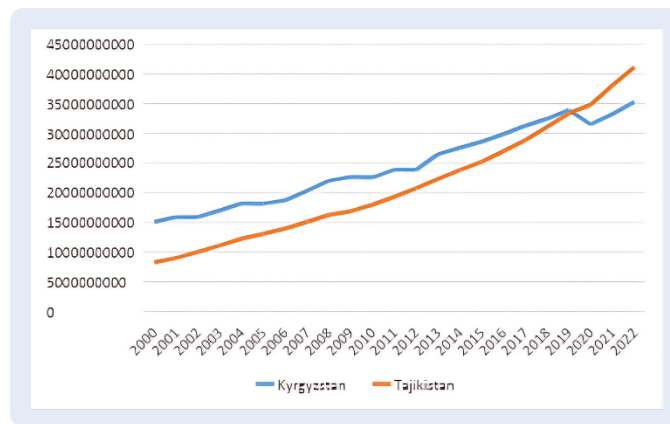
The economic stability of Kyrgyzstan and Tajikistan makes them vulnerable to increasing urban population density, particularly in cities such as Bishkek and Dushanbe. The influx of people strains housing, infrastructure, and services, driving up living costs and inflation, thus complicating economic stability (Smith, 2020; Jones, 2021). Urban density exacerbates income inequality, which benefits wealthier individuals and investors, leading to social tensions as lower-income citizens struggle (Brown & Davis, 2019). Rapid rural-to-urban migration without adequate planning results in overcrowded conditions and informal settlements, further degrading quality of life and escalating health risks and social instability (Green, 2018). Additionally, the need for substantial investments in infrastructure and public services strains government budgets, potentially increasing public debt and limiting the government's capacity to manage economic crises (Williams, 2022). High population density also necessitates a careful monetary policy to control inflation, which, if mismanaged, can hinder economic growth and employment (Taylor, 2020). Addressing these challenges through effective urban planning, infrastructure investment, and balanced economic policies is

crucial for sustainable growth and stability in Kyrgyzstan and Tajikistan (Clark, 2021).

5.3 GDP, PPP (constant 2017 international \$)

Figure 6 shows the trend in real GDP based on the constant 2017 international dollar. It is clear that apart from the sharp decline that occurred between 2019 and 2020 in Kyrgyzstan, real GDP for both countries increased. The real GDP for Kyrgyzstan and Tajikistan was USD 14.3 and USD 6 billion in 2000 but reached USD 35 and USD 41 billion, respectively. According to Figure 5, the average real GDP growth rate for Kyrgyzstan was 4.08, while for Tajikistan it was 7.64 percent. For this reason, even though Kyrgyzstan had a larger real GDP than Tajikistan in 2000, the rapidly growing real GDP rate of Tajikistan has made it a dominant country since 2020.

Figure 6. Trend of GDP, PPP (constant 2017 international \$) for Kyrgyzstan and Tajikistan



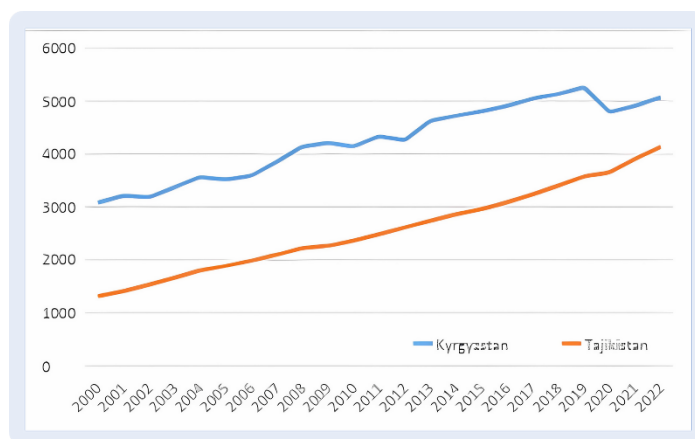
Source: Prepared by Authors

5.4 GDP, PPP (constant 2017 international \$) per capita

Figure 7 indicates how Kirgiz and Tajik's economic power changed between 2000 and 2022. According to the information in the Figure, apart from some slight declines for some years, the purchasing power of people in both countries increased. In 2000, Kirgiz and Tajik bought 3078 and 1312 dollars,

respectively (based on 2017). However, it was completed at 5070 and 4137, respectively. This trend conveys the message that each Kirgiz in 2022 can apply 1.65 goods and services than a Kirgiz in 2000. However, this was significantly greater for Tajik. A Tajik in Tajikistan in 2022 can buy goods and services 3.15 times more than a Tajik who lived in Tajikistan in 2000. According to the information in the Figure, the annual growth rate of real GDP per capita for Kyrgyzstan and Tajikistan was similar, with rates of 9.1 percent and 8.2 percent for Kyrgyzstan and Tajikistan respectively.

Figure 7. Trend of GDP, PPP (constant 2017 international \$) per capita for Kyrgyzstan and Tajikistan

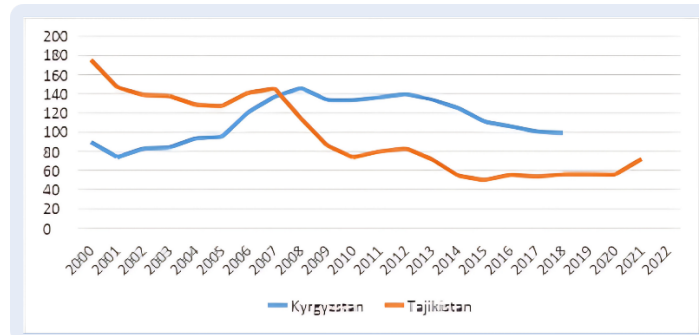


Source: Prepared by Authors

5.5 Trade ratio to GDP

Figure shows that for Tajikistan the ratio decreased during the years. It started from a peak of 175 percent in 2000 and reached at a low of 50 percent in 2015. It began to increase with a slight slope and reached 72 percent in 2021. However, In Kyrgyzstan, it started at 89 percent in 2000. With some highs and downs it experienced the peak of 146 percent in 2008. The trend generally declined and finished at 99 percent in 2018.

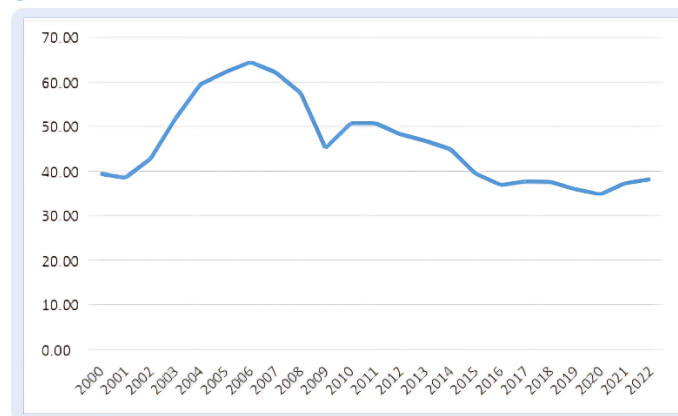
Figure 8. Trend of Trade Ratio to GDP for Kyrgyzstan and Tajikistan



Source: Prepared by Authors

Figure 9 shows China's trade ratio with GDP. Between 2000 and 2006, this ratio increased dramatically. However, this trend began to decrease between 2007 and 2022. During the period from 2000 to 2022, the highest ratio was 64.48 percent in 2006, while it reached its lowest point at 34.75 percent in 2020. According to the information in the Figure, this ratio has remained stable since 2015. The ratio was 39.46 percent in 2015, and with some slight fluctuations, it reached 38.14 percent in 2022. This stability coincided with the inclusion of the Yuan or Renminbi (RMB) in the Special Drawing Right (SDR) by the International Monetary Fund (IMF), solidifying China's status as an emerging international currency (Pearson, 2016).

Figure 9. Trend of Trade Ratio to GDP for China



Source: Prepared by Authors

China began the process of internationalizing the RMB after Global Financial Crisis (GFC) of 2007-2008—order to reduce its dependence on the US dollar (Harrison and Xiao, 2019, p:4). According to the 2016 International Monetary Fund (IMF), there are two conditions for a currency to be in the SDR basket, which is a major trading country with freedom of use. Therefore, not only did China have to increase exports, but it also had to deepen the financial market by enhancing international transaction payments, such as swap agreements and facilitating credits for the Asian Infrastructure Investment Bank, offering emergency financial support to other governments (IMF, 2016). These international financial strategies will not only increase China's ratio of trade to GDP but also enhance the role of the RMB in achieving the goal of RMB internationalization.

Chinese authorities have taken measures to internationalize their currencies. Swap agreements were established by the Bank of China (Economic Intelligence Unit, 2018). These agreements aim to support bilateral trade between China and the concerned countries (Zhang et al. 2017). Although China's international financial strategy depends on the extent of liberalization and it is uncertain how far China's liberalization will go (Franle, 2012 & Prasad, 2018), increased trade with some Central Asian countries, such as Tajikistan and Kyrgyzstan, will enable the Chinese government to progress more quickly with financial liberalization.

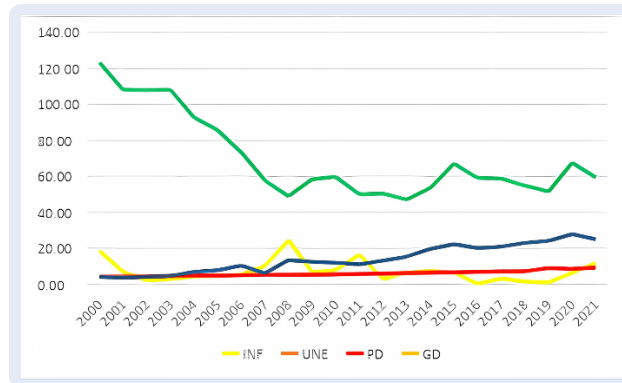
Bilateral trade between China and Tajikistan, as well as between China and Kyrgyzstan, has increased. According to the OECD website, China exported USD 2.15 billion to Tajikistan in 2022. The main items that were exported to Tajikistan by China were Rubber Footwear (USD 109 million), Coated Flat-Rolled Iron (USD 90.4 million), and Motor vehicles; parts and accessories (codes 8701 to 8705) (USD 85.5 million). Over the last 27 years, China's exports to Tajikistan have increased at an annualized rate of 20.3 percent, from USD 14.6 million in 1995 to USD 2.15 billion in 2022. (OEC, n.d.-a). Regarding China and Kyrgyzstan bilateral trade, in 2022, China exported USD 13.5 billion to Kyrgyzstan. The main demands for Chinas' good exported to Kyrgyzstan were Non-Knit Women's Coats (USD 1.11 billion), Rubber Footwear (USD 968 million), and Non-Knit Women's Suits (USD 870 million). Over the last 27 years, China's exports to Kyrgyzstan have increased at an annual rate of 19.7 percent, from USD 106 million in 1995 to USD 13.5 billion in 2022. In

spite of goods, China did not export any services to Kyrgyzstan in 2022. In 2022, Kyrgyzstan exported USD 86.7million to China. The main exported products of Kyrgyzstan to China were Precious Metal Ore (USD 31.9 million), Gold (USD 19.6million), and Refined Petroleum (USD 14.2 million). However, this is not a significant selling point for Kyrgyzstan's exports to China. The trend of Kyrgyzstan's exports to China has decreased. Over the last 27 years, Kyrgyzstan's exports to China have decreased at an annual rate of 0.98 percent, from USD 113 million in 1995 to USD 86.7 million in 2022. (OEC, n.d.-b).

5.5 Components of economic stability Index

Figure 10 indicates the trend of inflation, unemployment, private debt, loans, debt securities (Percent of GDP), and general government gross debt (Percent of GDP) between 2000 and 2021 for Kyrgyzstan. According to the information in the Figure, government debt (GD) decreased dramatically. It fell from a peak of 123.30 percent in 2000 to a minimum of 49 percent in 2008. It began to fluctuate between 2009 and 2021. The percentage of government gross debt (Percent of GDP) was 59.47 in 2021, which is generally two times lower than the debt in 2000. However, private debt (PD) and unemployment (UNE) in Kyrgyzstan increased. Private debt and unemployment started at 4.1 percent of GDP and 3.76 percent in 2000, and finished at 25.09 percent and 9.16 percent in 2021, respectively. Despite the increasing trends of private debt (PD) and unemployment (UNE) in Kyrgyzstan, inflation has fluctuated considerably. It fell from a high of 18.7 percent in 2000 to a low of 6.07 percent in 2007 and then increased to its highest percent at 24.52 in 2008. Then, with some fluctuations, it decreased to its lowest percent of 0.39 in 2016. Since then, it has increased slightly and is expected to reach 9.16 percent by 2021.

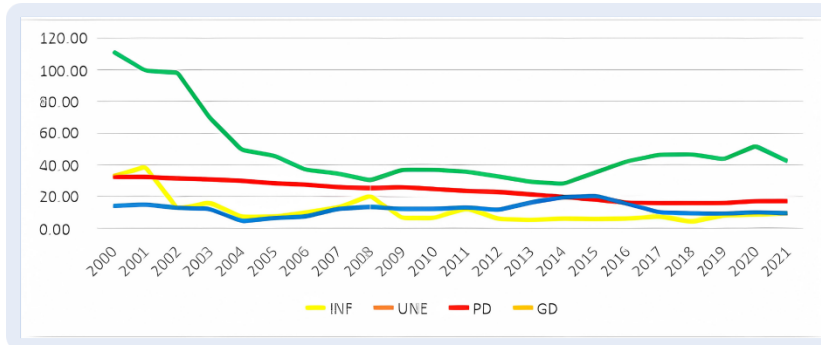
Figure 10. Trend of Economic stability components of Kyrgyzstan



Source: Prepared by Authors

Figure 11 indicates the trend of inflation, unemployment, private debt, loans, debt securities (Percent of GDP), and general government gross debt (Percent of GDP) between 2000 and 2021 for Tajikistan. In general, all the components decreased. According to the information in the Figure, as in Kyrgyzstan, the government debt (GD) in Tajikistan decreased dramatically. It started at 111.4 percent in 2000 and ended at 42.30 percent in 2021. The lowest percentage of government gross debt (Percent of GDP) was 27.90 in 2014, while the highest percentage was 111.40 percent in 2000. In contrast to Kyrgyzstan, private debt (PD) and unemployment (UNE) in Tajikistan decreased. Private debt and unemployment started at 14.5 percent of GDP and 32.34 percent in 2000, and finished at 9.39 percent and 17.01 in 2021, respectively. Similar to Kyrgyzstan, Tajikistan experienced a decrease in inflation rates, albeit with minimal fluctuations. Tajikistan experienced a 32.34 inflation rate in 2000. This increased by 6.25 percent in 2001. Consequently, Tajikistan experienced the highest inflation rate (38.59 percent) in 2001. It decreased from 38.59 percent in 2001 to 4.34 percent in 2004. It then started to increase, reaching 25.33 percent in 2007. Since then, inflation has generally decreased with a slight decline and finished at 9.39 in 2021.

Figure 11. Trend of Economic stability components in Tajikistan



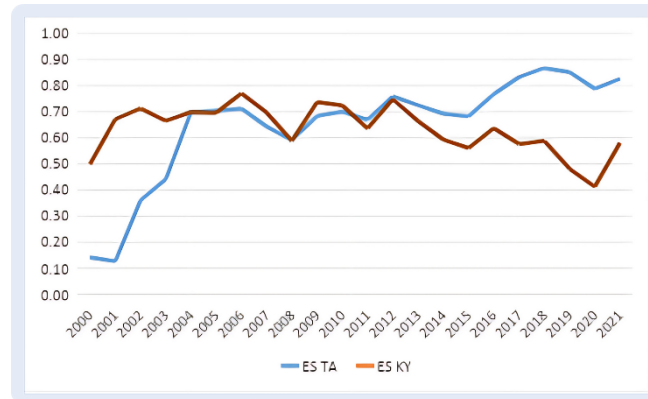
Source: Prepared by Authors

5.6 Economic stability index

Figure 12 shows the trend of the Economic Stability Index for both the countries. The Figure displays the average inflation rate, unemployment rate, private debt, loans, and debt securities (as a percentage of GDP) as well as the general government gross debt (also as a percentage of GDP) calculated using equation 2 for the years 2000 to 2021.

According to the information in the Figure, the Economic Stability Index for Tajikistan (ES TA) increased significantly. It started at 0.14 percent in 2000, and finished at 0.83 in 2021. However, although the index in Kyrgyzstan (ES KY) was significantly greater than that in Tajikistan in 2000, it did not improve significantly. It started at 50 percent in 2000 and ended at 58 in 2021. According to the Figure, the average rates of the index were 63 and 65 percent for Kyrgyzstan and Tajikistan, respectively. Although Kyrgyzstan had a more stable economy than Tajikistan from 2000 to 2003, both countries generally experienced the same fluctuations and a similar index score between 2004 and 2012. However, since 2013, the sky-rocketing improvement in the index for Tajikistan has led to a significant gap between the two countries.

Figure 12. Trend of Economic Stability Index for Kyrgyzstan and Tajikistan



Source: Prepared by Authors

5.7 Granger's causality results

According to the data in Table 3, the absolute values of the Augmented Dickey-Fuller (ADF) test statistic are greater than the critical values at the 1 percent, 5 percent, and 10 percent levels. This indicates that the variables in the table follow a stationary process when taking the first difference.

Table 3. Results of Unit root results

Variable	ADF-Test Statistic	Prob	Critical value of ADF-Test Statistic at 1 %	Critical value of ADF-Test Statistic at 5 %	Critical value of ADF-Test Statistic at 10 %
ESKY	-5.66	0.0002	-3.83	-3.02	-2.65
ESTA	-4.21	0.0042			
$\frac{TR}{GDP}$	-4.26	0.0038			

Source: Prepared by Authors

Authors applied Vector Autoregressions (VAR) to determine the optimal lags. Following the standard VAR estimation, Eviews 10 recommended a lag length of one based on various criteria such as Akaike, Schwarz, and Hannan-Quinn information criteria. The Granger's causality test was then performed based on one lag and the results are presented in Table4. According to the

information in Table 4, since the p value (prob) of the hypothesis stating “ $\frac{TR}{GDP}$ does not Granger Cause ESKY” is 0.016, which is less than 0.05, so, the hypothesis has been rejected.

The Pearson correlation coefficient between the ESKY and $\frac{TR}{GDP}$ is also 71 percent. Therefore, the results of the Granger test and Pearson correlation indicate that $\frac{TR}{GDP}$ has a positive impact on ESKY. This finding supports the work by Kong et al. (2021) that trade openness enhances economic stability for China. However, since the p values of other null hypotheses are more than 0.05, we have to reject them as well. This means that for Tajikistan, there is no significant relationship between ES and $\frac{TR}{GDP}$. This finding supports the study by Nguyen et al (2022) that proved the impact of trade openness on non-significant decreasing inflation, which is one of vital factors affecting economic stability in Vietnam.

Table 4. Results of Granger's Hypotheses

Null Hypothesis	F-Statistic	Prob
$\frac{TR}{GDP}$ does not Granger Cause ESKY	7.06	0.016
ESKY does not Granger Cause $\frac{TR}{GDP}$	1.75	0.20
$\frac{TR}{GDP}$ does not Granger Cause ESTA	0.40	0.54
ESTA does not Granger Cause $\frac{TR}{GDP}$	0.87	0.36

Source: Prepared by Authors

6. Discussions and Conclusion

Based on the findings presented in Table 3 and the Granger's Causality Test, it is evident that Kyrgyzstan corresponds to Situation One, while Tajikistan corresponds to Situation Four. This indicates that Kyrgyzstan's economic stability is significantly influenced by its trade relationships with Tajikistan and China. In contrast, the analysis reveals that Tajikistan does not exhibit a linear correlation between its trade dependency on these two nations and its economic stability index. Unlike Kyrgyzstan, which sees improvements in

economic stability through trade expansion with Tajikistan and China, Tajikistan requires additional factors, such as a broader range of trading partners, to enhance its economic stability effectively.

Figure 10 shows that both Kyrgyzstan and Tajikistan maintained similar average Economic Stability Index scores from 2000 to 2021. However, since 2014, Tajikistan has made notable progress in this index, largely due to stable or declining metrics such as private debt, unemployment, and inflation, despite a slight rise in government debt (as shown in Figure 9). Conversely, the indicators affecting Kyrgyzstan's economic stability have generally increased, suggesting a slower pace of improvement in comparison to Tajikistan. From 2014 to 2021, while Tajikistan's Economic Stability Index showed improvement, its trade-to-GDP ratio remained stable, averaging 55 percent with a standard deviation of 2.18 percent (refer to Figure 6). This stability reflects Tajikistan's commitment to strengthening its macroeconomic stabilization policies, although it alone may not suffice for enduring economic stability.

The authors emphasize the importance of enhancing trade with China for Kyrgyzstan. Establishing bilateral trade agreements, particularly through swap agreements, could stabilize Kyrgyzstan's exchange rate and shield its economy from currency fluctuations and global economic shocks. Such strategies may lead to greater inflation control and improved economic stability for Kyrgyzstan. Since the renminbi (RMB) was included in the Special Drawing Rights (SDR) basket in 2016, it now serves as a viable alternative foreign reserve amid fluctuations of the US dollar and euro. This diversification of foreign reserves will empower Kyrgyzstan's monetary authority to manage exchange rate volatility effectively. By employing a robust exchange rate policy with a diverse array of foreign reserves, Kyrgyzstan can successfully manage its foreign debts and inflation, key indicators of economic stability.

Furthermore, trade dynamics between China and Tajikistan can influence inflation, unemployment, and both private and public debt levels in Kyrgyzstan, ultimately contributing to its economic stability. Streamlining import and export processes between Kyrgyzstan and China could bolster the resilience of Kyrgyzstan's small economy against regional political and economic disturbances. Expanding the variety of traded goods and services can enhance the trade balance, making inflation-targeting policies more effective. Increased trade relations with China and Tajikistan can also create

new job opportunities in Kyrgyzstan, which is particularly beneficial given its rising population. A stronger trade relationship correlates with higher job creation, as enhanced international trade increases revenues for private firms and tax revenues for the government, thereby reducing both private and public debt. Lower debt levels are closely associated with a more stable economy.

Regarding population dynamics, the economic indicators discussed in this study suggest that demographic factors can impact economic stability in two significant ways: through unemployment and inflation. Tajikistan's larger population, which has been growing at a slower pace since 2007, may pose challenges to its economy as an aging population could negatively affect employment rates. As populations age, unemployment rates are likely to rise. Conversely, Kyrgyzstan has experienced significant population growth, which may alleviate potential economic instabilities related to retirement issues. Nevertheless, Kyrgyzstan must prioritize employment policies and job creation strategies. Participation in initiatives like the INSTC and BRI offers valuable investment and job creation opportunities that should not be overlooked.

An increase in population density in both countries could lead to heightened living costs, inflation, and unemployment. Thus, both Kyrgyzstan and Tajikistan need to identify new residential areas to sustain economic stability and maintain purchasing power. Developing strong trade relationships and maintaining openness with INSTC members, such as Iran, could provide critical access to energy resources and infrastructure.

This study highlights the significance of economic stability in fostering effective trade partnerships between Kyrgyzstan and Tajikistan. While both nations exhibited similar stability levels from 2000 to 2021, this gap has widened since 2014. The BRI has played a pivotal role in shaping their economic landscapes through infrastructure investments, improved connectivity, job creation, and overall growth. However, challenges like debt sustainability and environmental impacts necessitate the implementation of robust policies. Strengthening trade relations with China remains essential, leveraging the RMB's growing international presence to secure resources and market access. Kyrgyzstan should focus on sound fiscal policies, investing in human capital, and promoting sustainable development to ensure long-term economic stability and growth. Future research should investigate the long-term

socioeconomic effects and environmental implications of BRI projects while also conducting comparative analyses with other Central Asian nations to derive deeper insights into regional economic dynamics.

Conflict of Interest

There is no declared conflict of interests among authors.

Notes

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Kashif Hasan Khan: Formal analysis, Investigation, Resources, writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

Abdulmelik Alkan: Formal analysis, Investigation, Resources, Writing – original draft

Availability data

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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