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The effect of COVID-19 restrictions (lockdown) on GDP growth in CIS countries

Relevance. Global economy has suffered significant economic consequences as a result of the COVID-19. The impact of the pandemic crisis had generally been felt around the world. However, developing economies, with their many institutional constraints, have been much more affected by the crisis. This prompted governments to devise stringent policies to limit its destructiveness, with the goal of saving the populace while minimizing economic damage.
Research objective. We investigate the effect of government's stringent policies on economic growth and the influence of stringent policies and inflation on economic growth in CIS's countries.
Data and methods. Our analysis is conducted using quantile regression, which is an extension of the Johnson-Neumann interval OLS, and a simple slope analysis for the period from 1 March 2020 to 17 September 2021.
Results. Our findings show that the government's stringent policies have a negative effect on economy, reducing GDP growth by 4.9% in the mean model. Excessively stringent policies have a negative impact on the economy and the consequent decline in living conditions.
Conclusions. The findings of this study reveal that policymakers should take a targeted approach to COVID policies, considering the varying effects of stringency across different levels of economic growth and taking into account the potential interaction with inflation rates. By implementing policies that balance the need for public health and economic growth, policymakers can mitigate the negative impacts of COVID restrictions on the economy and minimize the risk of stagnation traps.

KEYWORDS
GDP growth, COVID-19, stringency index, inflation rate, CIS country, quantile regression.

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Воздействие ограничительных мер в условиях COVID-19 на рост ВВП в странах СНГ

Актуальность. Мировая экономика понесла значительные потери в результате COVID-19. Воздействие пандемического кризиса в целом ощущалось во всем мире. Однако развивающиеся экономики с их многочисленными институциональными ограничениями пострадали от кризиса в большей степени. В связи с этим правительствам пришлось разрабатывать жесткую политику, направленную на ограничение разрушительных последствий пандемии с целью спасения населения и минимизации экономического ущерба.
Цель исследования. Мы исследуем влияние жесткой политики правительства на экономический рост, а также влияние жесткой политики и инфляции на экономический рост в странах СНГ.
Данные и методы. Анализ проводится с использованием квантильной регрессии, которая является расширением интервального метода наи-

КЛЮЧЕВЫЕ СЛОВА
Рост ВВП, COVID-19, индекс правительственных ограничений, уровень инфляции, страны СНГ, квантильная регрессия

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меньших квадратов Джонсона-Неймана и простого наклонного анализа для периода с 1 марта 2020 года по 17 сентября 2021 года.
Результаты. Результаты исследования показывают, что правительственные ограничения оказывают негативное влияние на экономику, снижая рост ВВП на 4,9% в средней модели. Проведение излишне жесткой политики оказывает негативное влияние на состояние экономики и, как следствие, снижает уровень жизни.
Выводы. Результаты данного исследования показывают, что политикам следует применять целенаправленный подход к разработке политики противодействия COVID, с учетом различного воздействия ограничительных мер в зависимости от уровня экономического роста страны и с учетом потенциального взаимодействия с инфляционным показателем. Проводя политику, обеспечивающую баланс между потребностями здоровья населения и экономическим ростом, государственные органы могут смягчить негативное влияние ограничений COVID на экономику и минимизировать риск возникновения ловушек стагнации.

ДЛЯ ЦИТИРОВАНИЯ
Джураева, З., Окрах, Д. и Назири, Г. Н. (2023). Воздействие ограничительных мер в условиях COVID-19 на рост ВВП в странах СНГ. *R-Economy*, 9(4), 422–436. doi: 10.15826/recon.2023.9.4.026

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期间的限制性措施对独联体国家国内生产总值增长的影响

现实性：COVID-19 给世界经济造成了重大损失。全世界普遍感受到了这一疫情危机的影响。然而，一些发展中经济体由于存在许多体制限制，受危机的影响更为严重。因此，各国政府必须制定严格的政策来限制疫情的破坏性影响，以拯救民众和最大限度地减少经济损失。
研究目标：我们研究了政府紧缩政策对经济增长的影响，以及紧缩政策和通货膨胀对独联体国家经济增长的影响。
数据与方法：分析采用了分位数回归，该方法的基础是Johnson-Neyman（JN）的最小二乘法；以及简单斜率分析法，分析期为 2020 年 3 月 1 日至 2021 年 9 月 17 日。
研究结果：研究结果表明，政府的限制措施对经济产生了负面影响，在平均模式下，国内生产总值的增长率降低了 4.9%。实施过于严格的政策会对经济状况产生负面影响，从而降低生活水平。
结论：本研究结果表明，政策制定者在制定应对 COVID 的政策时应采取有针对性的方法，考虑到限制性措施因国家经济增长水平不同而产生的不同影响，并考虑到通货膨胀率的潜在作用。通过实施兼顾公共卫生需求与经济增长的政策，政府当局可以减轻 COVID 限制措施对经济的负面影响，最大限度地降低陷入停滞陷阱的风险。

关键字
GDP 增长、COVID-19、政府限制指数、通货膨胀率、独联体国家、分位数回归

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Introduction

The COVID-19 pandemic has become one of the world's greatest challenges since World War II, with its economic impact far more widespread and severe than most previous crises, this recent disease outbreaks has caused far greater economic damage than any other crisis known till today. Moreover, COVID-19 has caused significant disruption to global value chains, now accounting for more than two-thirds of global trade (Lucas, 2020). To prevent the spread of the virus, governments have implemented lockdowns and restricted the movement of people (Kumar et al., 2021).

The implementation of COVID-19 pandemic movement restrictions as part of countries' control measures has implications for food security, as movement restrictions coincided with planting periods for most staple crops (Ayanlade, Radeny, 2020). The lockdowns triggered by the outbreak have significantly impeded economic activity and thus the income cycle (Henry, 2021). Furthermore, declining economic activity and the perception of income cycles pose challenges to economic growth in most countries (Inegbedion, 2021; Smianov et al. 2020; Ashraf& Goodell, 2022).

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According to the Organization for Economic Cooperation and Development[1] the containment measures put in place to prevent the spread of the COVID-19 pandemic have resulted in many businesses being temporarily closed, chaos spread in financial markets, and the erosion of confidence, increased trade uncertainty, and travel and movement restrictions. The main consequences were output falls by 20–25 % in many economies, with consumer spending possibly falling by a third. This has affected GDP growth in most countries, especially in the services and retail sectors, construction works and non-essential manufacturing, the latter being the least affected as most manufacturing firms are less labor intensive.

König and Winkler (2021) found that the impact of mandatory social distancing imposed by lockdown policies and voluntary social distancing triggered by COVID-19 fatality rates on GDP growth in the first three quarters of 2020 was the most severe. They found that more restrictive measures resulted in lower GDP growth. Fezzi and Fanghella (2020) discovered that Italy's GDP declined by 30% over a 3-week period due to the severe lockdown policies. Jena et al. (2021) found that in the April-June of 2020 GDP figures for eight countries, namely the United States, Mexico, Germany, Italy, Spain, France, India, and Japan, experienced sharp declines.

To investigate the impact of the government's rigorous policies on economic growth, as well as the interplay between stringent policies and inflation on economic growth, we conducted an empirical study across CIS countries. The countries included in the study are Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan. The study spans the period from March 1, 2020, to September 17, 2021. We employed a quantile regression model, which is an extension of the ordinary least squares (OLS) method, to examine the linkage between economic growth, stringency index, and inflation rate. We found that government policies that are more stringent have a significantly negative effect on economic growth, regardless of the level of growth. The results showed that GDP growth would decrease by 4.9 % in the mean model due to these stringent policies, leading to what Fornaro and Wolf (2020) referred to as stagnation traps. This happens because businesses are hesitant to invest in uncertain situations, leading to weak economic growth.

The study also examined the interaction between the stringency index and inflation rate using the Johnson-Neymar interval. The results indicated that if restrictions are overextended, their impact becomes extremely harmful to the economy. On the other hand, the interaction effect between stringency and the inflation rate has a positive effect on the economy, provided that the measures are not too extreme and are not continuous. This study contributes to the existing literature on the impact of government policies on economic growth and inflation in CIS countries. It highlights the importance of finding the right balance between stringent policies and economic growth, particularly in times of uncertainty. The findings could be useful for policymakers in developing countries who are grappling with the economic fallout from the COVID-19 pandemic and other crises.

The rest of the paper follows this structure: Section 2 outlines the theoretical framework; Section 3 presents the research hypothesis; Section 4 introduces the methodology and data set; Section 5 contains the results and discussion; and the final section offers some concluding considerations.

Theoretical framework

Effect of COVID-19 on the economy

The effect of COVID-19 on the global economy has been profound and far-reaching, creating an intricate web of challenges that have reverberated across industries and nations. As the pandemic swiftly spread, it triggered an unprecedented series of events, leading to a cascade of economic disruptions.

The economies of many countries have been severely impacted by the pandemic (Akbulaev et al. 2020). In fact, the global recession caused by COVID-19 is the worst since World War II. According to the April 2021 IMF World Economic Outlook report, the global economy in 2020 will contract by 3.5 %, down 7% from its October 2019 growth forecast of 3.4 %. At the global level, fiscal support reached nearly $16 trillion in 2020 (Yeyati & Filippini, 2010). The Chinese economy is also losing its position as the world's leading exporter. Although transport, tourism, trade, health, and

[1] Organisation of Economic Cooperation and Development. Report 2020. Retrieved from https://www.Organisation-of-Economic-Cooperation-and-Development.org/coronavirus/policy-responses/evaluating-the-initial-impact-of-COVID-19-containment-measures-on-economic-activity-b1f6b68b

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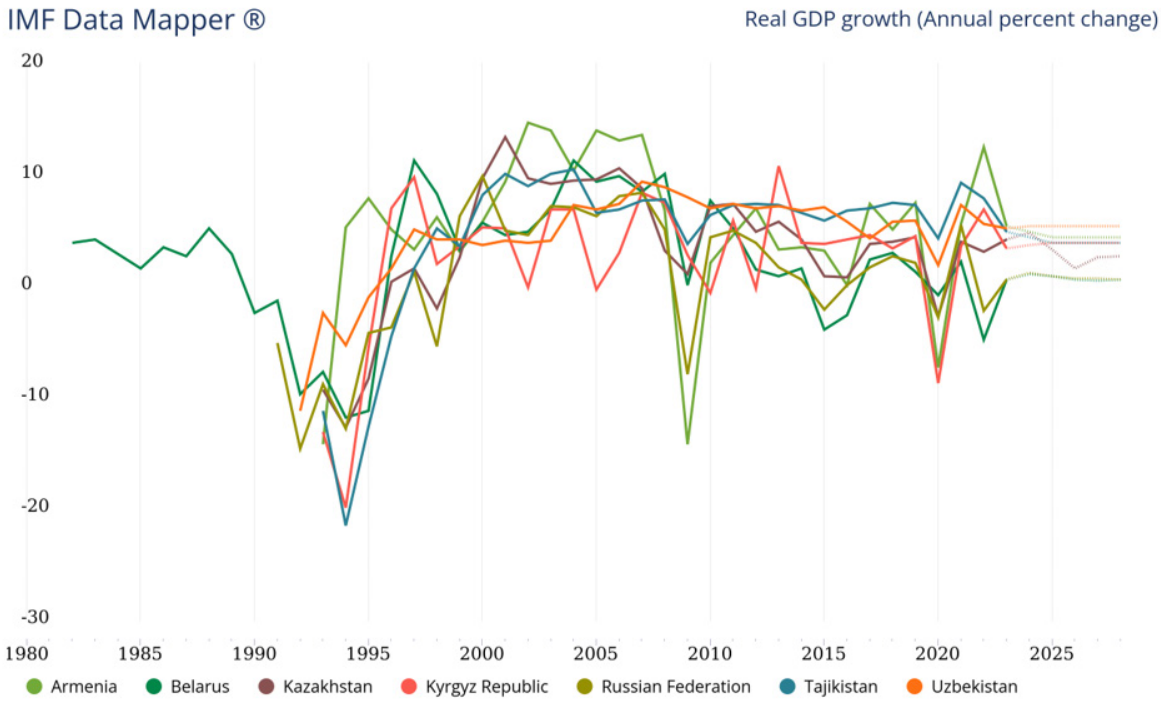

Figure 1. *GDP growth of CIS countries during COVID-19 pandemic*
Source: International Monetary Fund. Retrieved from: https://www.imf.org/external/datamapper/index.php

other sectors have been affected by the pandemic, the economic sector most affected by COVID-19 is the household sector (Susilawati et al., 2020). According to the World Bank's report[2], trade in goods declined sharply, contributing to the economic decline of producing countries, but reflecting a displacement of demand for goods from contact-intensive services (hindered by COVID-related restrictions and recovered rapidly) and the significant resilience of global value chains to the temporary disruptions in the first half of this year. Beckman and Countryman (2021) analyze the agricultural sector and conclude that the effects of COVID-19-induced changes will have a more significant influence on the overall US economy compared to the initial contribution of agriculture to the economy during the onset of the pandemic. However, non-agricultural shocks surpass agricultural impacts by a factor of three, according to their findings.

According to Dhar (2020), due to the COVID-19 outbreak, imports to China fell by 4 % year-on-year to $299.54 billion, while exports from China dropped to $292.45 billion in January-February 2020. It decreased by 17.2 % from the previous year (Dhar, 2020). Using radiofrequency indicators, Chen et al. (2020) examined the economic impact of his COVID-19 in Europe and the United States during the early stages of the pandemic. They found that countries in Europe and the United States that experienced large outbreaks suffered greater economic losses. European energy consumption witnessed a significant reduction, ranging from 20–29 % in the median weekly production of countries in mid-April. The most affected nations, such as Italy and Spain, experienced nearly double the decrease. Similarly, U.S. electricity usage saw a substantial decline, with average daily usage in early April dropping by 5 % compared to the same period in 2019. Moreover, the first six weeks of the pandemic saw a surge in new unemployment claims, reaching 30 million, leading to a decline in employment and labor force participation (Bick & Blandin, 2021).

The economic repercussions of COVID-19 in these countries include escalating healthcare expenses, market failures within multidimensional healthcare systems, heightened domestic spending, an upsurge in the burden of non-communicable diseases, and a decrease in GDP (Figure 1).

[2] The World Bank. (2021). Global Economic Prospects, January 2021: Subdued Global Economic Recovery. January. Washington, DC.

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Additionally, there are socioeconomic implications, including increased unemployment and poverty stemming from missed economic opportunities.

During the pandemic, remittances from migrant workers abroad are a major component of GDP affected by the COVID-19 crisis. According to Ibbotson (2020) at the start of the crisis, as many as 4.2 million Central Asians were working in Russia alone, and many others in Europe, Turkey, Middle East and China. Further, it is also mentioned that remittances contribute between 30 and 50 percent of GDP in Kyrgyzstan and Tajikistan in a typical year. This figure is lower in percentage terms in Kazakhstan and Uzbekistan, but it is still a significant amount (Ibbotson, 2020). Economic activity in Russia decreased by almost 25% (Kolomak, 2020), while in Belarus, external economic transactions with the rest of the world resulted in a current account deficit of $0.2 billion, equivalent to 0.4% of GDP (Bandarenka, 2022). The Uzbek economy weakened in part due to lower prices and supplies of natural gas to Russia and China, as well as lower remittances from migrant workers in Russia (about $1.3 billion) (Kurpayanidi & Abdullaev, 2021). According to Shimizutani and Yamada (2021), the COVID-19 pandemic has had a negative impact on the economy of Tajikistan by reducing migration and remittances. The authors examined the impact of COVID-19 on various welfare outcomes of households in Tajikistan, where remittances have recently exceeded a quarter of annual GDP, using a dataset about households. Monthly single family covers the pre- and post-pandemic period. They found that the negative impacts of the pandemic on the health of households were substantial after April 2020 and were particularly pronounced in the second quarter of 2020. Employment and household incomes fell, food insecurity immediately worsened with the first confirmed cases of COVID-19, and it continued to worsen six months after the start of the pandemic in Tajikistan (Murakami, 2022).

Stringency and economic growth

In the initial phases of the pandemic, most countries prioritized measures such as social distancing and testing for individuals infected with COVID-19 to curb the spread of the novel coronavirus. Furthermore, many nations implemented travel restrictions as a means to manage infections resulting from the new coronavirus (Kumar et al., 2021).

In March 2020, when the pandemic struck Central Asia, the region found itself unprepared and responded in varied ways. During the period from March to May, Kazakhstan, Kyrgyzstan, and Uzbekistan promptly acknowledged the pandemic and implemented diverse measures. These measures ranged from declaring a state of emergency to imposing quarantine measures and enforcing strict lockdowns, including significant restrictions or closures of borders and countries. In July, Kazakhstan and Uzbekistan re-imposed restrictive measures, and Tajikistan announced its first COVID-19 cases in May (Balakrishnan, 2020). Russia implemented restrictive measures on March 30, 2020 (Osadchuk et al., 2020). In March 2020, Belarus imposed relatively mild restrictions on travellers arriving in the country in self-isolation (Charemza et al., 2022). Lockdowns have adverse effects on society, the economy, and education, as highlighted by Kumar et al. (2021). Consequently, the economies of these countries experience negative consequences, as illustrated in Figure 2.

The increase in the number of cases and deaths caused by the coronavirus has also forced governments of the world's major economies to take stringent restrictive measures.

To curb the spread of the disease, the Chinese government had to close down major manufacturing hubs. This disruption in China, being a significant manufacturing center, has had a ripple effect on global supply chains, impacting various sectors, ranging from pharmaceuticals to automotive. Many countries, witnessing primary infections in endemic areas, responded by suspending flights and closing borders, leading to a significant reduction in travel, numerous flight cancellations, and substantial losses for airlines (Gupta et al., 2020).

König and Winkler (2021), utilizing evidence of GDP growth in 42 countries during the first, second, and third quarters of 2020, identified changes in lockdown severity as the most crucial factor influencing GDP development. The inclusion of a lag variable enables the distinction between two effects: a negative impact where more restrictive measures result in lower GDP growth in the same quarter, and a positive catch-up effect associated with austerity occurring one quarter later. Cross et al. (2020) examined the stringen-

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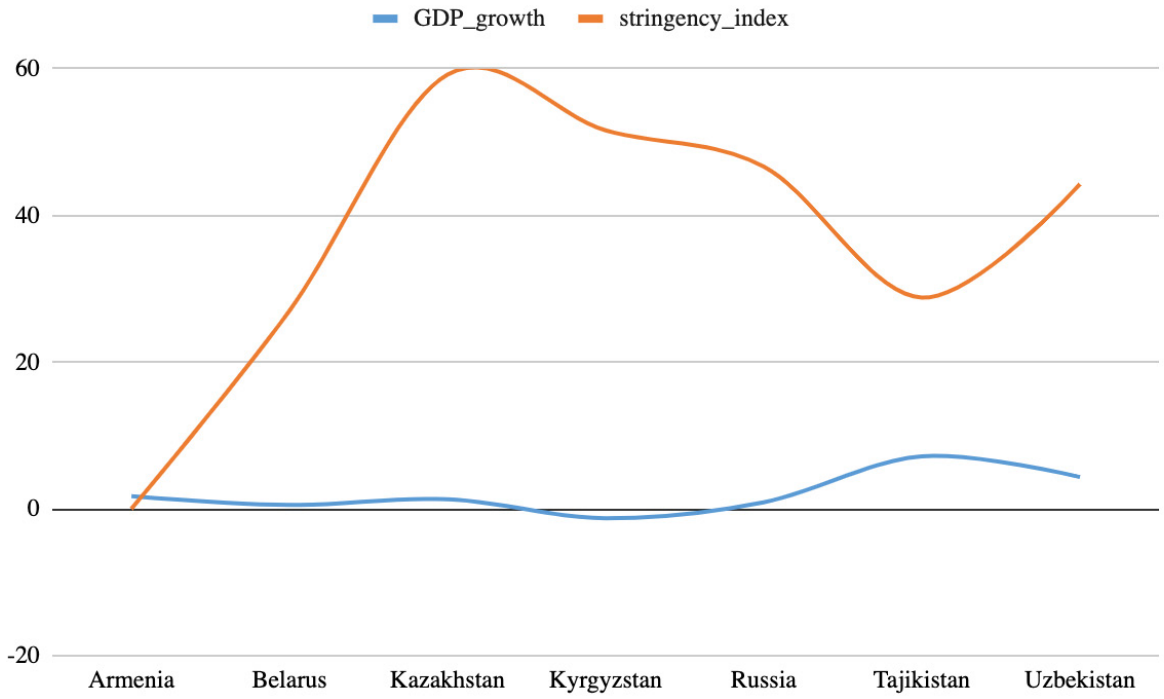

Figure 2. *Government response from COVID-19 and its effect on GDP growth of CIS countries.*

Note: Stringency index — Oxford Coronavirus Government Response Tracker (OxCGRT). The policy stringency index ranged within the score from 0 to 100. The higher is the score, the higher is the level of policy response.

Source: calculated by the authors based on World Population Review, Retrieved from: https://worldpopulationreview.com/country-rankings/gdp-growth-by-country (data of access: 15.10.2022); Tradingeconomics.com,retrieved from: https://tradingeconomics.com/country-list/gdp-annual-growth-rate?continent=world (data of access: 15.10.2022); Our World in Data, retrieved from: https://ourworldindata.org (data of access: 17.10.2022).

cy of the response, quantified by the stringency index, and examined how restrictive interventions affected infection rates and gross domestic product in China and her OECD countries. They found that China imposed the most stringent restrictions and Sweden and Japan the least stringent, given the response timeframe. The projected GDP decline ranges from -8% (Japan) to –15.4% (UK). Tighter restrictions generally slowed virus transmission but did not reach statistical significance and decreased GDP ($p = 0.006$).

Timing played a crucial role: Governments that swiftly responded to the pandemic witnessed a notable reduction in virus infections ($p = 0.013$) but also experienced a significant decrease in GDP ($p = 0.044$). As a result, the authors argue that the timing of COVID-19 intervention has a more substantial impact on GDP than on infection rates. To support sectors of the economy, governments have expanded measures to support the economy. The U.S. government introduced more than 50 economic assistance programs, including moratoriums on small business debt service costs, fines, taxes, penalties, utility bills, and insurance premiums[3].

During the global pandemic, governments worldwide implemented measures to mitigate its economic impact and offered financial support to their citizens. They formulated economic recovery strategies, including injecting funds into the economy through stimulus packages, to alleviate the hardships faced by the people. Specifically, the Spanish government implemented income and liquidity support measures, which were expected to reach 3.7% of GDP in discretionary measures and around 15.6% of GDP in off-budget measures (Aspachs et al., 2021). The UK government also announced additional support for businesses in retail, hospitality, and leisure following the Prime Minister's declaration of a third lockdown,

[3] Viney, B., Bowles, J., Dvorkin, E., & Gallagher, L. (2020). Supporting small business through coronavirus: Ideas from experts and leaders across NYC. The Center for an Urban Future. Retrieved from https://nycfuture.org/research/supporting-small-business-through-coronavirus.

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with a package totaling £4.6 billion[4]. 44 of WTO members announced urgent stimulus and backstop measures for businesses by April 2020. These measures primarily include government loans and loan guarantees, moratoriums on interest and principal on unpaid loans, tax and rent exemptions, and relaxation of financial regulations (release of deposits or restricted cash). Furthermore, France announced the subsequent payment of unguaranteed direct taxes and loans without any actual guarantees for the assets of the company or its management. Declared a two-month delay in filing annual tax returns. In March 2020, the United Arab Emirates announced extension of filing tax returns, six-month arrears on rent, relaxation of installment payments, refund of deposits and security deposits, end of fines. Qatar also announced on March 15 a six-month grace period for installment payments on unpaid loans and interest payments for a temporary waiver of water and electricity bills (Assefa, 2021). The top ten countries with the highest percentage of GDP allocated to stimulus packages, in comparison to the rest of the world, were Bahrain, Malta, Austria, Luxembourg, France, Oman, Belgium, Sweden, Germany, and Malaysia, with percentages of 31.30, 25.61, 25.11, 22.91, 22.59, 22.59, 19.61, 18.65, 17.29, and 16.42 %, respectively (Vitenu-Sackey, Barfi, 2021).

Adapting strategies from other nations, the governments of CIS countries have customized them to suit their specific economic and social circumstances. For instance, at the beginning of 2020, the Armenian government devised anti-crisis measures, encompassing several essential activities aimed at bolstering the socio-economic situation within the country. The amount of government support was about 150 billion Armenian dram or about 2.3 % of national GDP (Voskanyan, 2022). In Belarus, the government limited itself to economic stimulus measures, which included a revision of the refinancing rate of the National Bank of the country to 7.75 percentage points, which consequently made loans cheaper for households and businesses. In Kazakhstan, 5.9 trillion tenge ($13.98 billion or 9.0 % of GDP) was allocated. Beneficiaries were earmarked to improve access to health care, to provide payments to those who had lost their jobs, and to support businesses (Sabyr, Әbilqayır, 2021). Similarly, in Russia a total of 2.9 trillion roubles ($39.77 billion, equivalent to 2.7 % of GDP) was allocated to the response to the pandemic. These subsidies included subsidies of various forms, mostly for households, about 0.8 % of GDP, tax deferrals and exemptions of 0.3% of GDP, and loans and state guarantees of 1.4 % of GDP (Klepach, 2020).

In July 2020, Tajikistan increased state budget expenditure on medicine by 90 %, rising from USD 178.5 million to USD 334 million. The State Sanitary and Epidemiological Surveillance Service was reinstated in May 2020, leading to a tight schedule for the country's hospitals and polyclinics, along with the organization of training and retraining courses for medical personnel. By July 2020, the number of laboratories capable of conducting relevant tests had increased from two to ten, with the daily number of coronavirus tests reaching 1,500–2,000. Since autumn 2020, the government has provided material assistance to the most vulnerable groups of citizens. The Antimonopoly Service of Tajikistan intensified control over prices for essential consumer goods and medicines. Tariffs for electricity, communications, and utilities were temporarily frozen, and tax holidays were granted to the affected sectors of the economy (Popov, 2021).

Uzbekistan also developed a programme to support the economy and reduce the negative effects of the coronavirus pandemic. On 19 March 2020, President Shavkat Mirziyav signed a decree designed to mitigate the impact of the coronavirus epidemic on the economy, focusing on four points: containing the spread of the coronavirus, supporting businesses, expanding social protection measures, and ensuring the continued functioning of the financial sector. The decree allocated 10 trillion UZS (about US $1.05 billion) to the Anti-Crisis Fund. The fund was used to help affected entrepreneurs and government companies, as well as to provide social assistance to the population (Teshaboeva, 2020).

While the restrictive measures adopted by national governments have curtailed the spread of the virus, these policies have dampened the pace of economic growth.

Hypotheses

The impact of COVID-19 on the global economy has been unprecedented. In response, governments worldwide implemented stringent policies to mitigate its destructive effects, aiming to protect the population while minimizing economic

[4] Lea, R. (2021). Another lockdown and more Government support. Arbuthnot Banking Group, 11.

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damage. The stringency index reflects the degree of strictness in government-imposed restrictions on businesses, hindering the free flow of goods, services, and funds within and between economies (Hale et al., 2020; König, Winkler, 2020).

"We know how to revive the economy; what we don't know is how to bring people back to life," remarked the President of Ghana[5]. This quote holds particular relevance in the context of this paper, which focuses on CIS countries. It encapsulates the profound dilemma faced by governments globally, including those in the CIS region, in responding to the dual challenges of the COVID-19 pandemic. This statement underscores the intrinsic tension between safeguarding public health and minimizing economic damage, a delicate balance that is central to your examination of the impacts and policy responses within the CIS countries in the wake of the COVID-19 crisis.

Lockdowns limit labor supply and improve health prospects at the expense of economic production and consumption. Health conditions are not fixed but undergo changes in line with the SIRD model. The trade-offs encountered by governments are dynamic rather than static, and the issue of time discrepancies transforms over time (Ferguson et al., 2020).

Extant research has shown that stringent policies by the government had a negative effect on the economy. According to Coibion et al. (2021), higher uncertainty leads to lower spending by households on nondurable goods and services. Trade and transportation disruptions resulted in a significant drop in remittances and government revenues, resulting in urgent balance of payments and fiscal financing requirements. Most developing countries depend on remittances from families abroad, which is especially true for the countries under study. Businesses are the fuel that powers the economy and if this power is no more the economy comes to a standstill. According to Kolomak (2020), economic activity in Russia decreased by nearly 25% as a result of the lockdown measures, with some regions experiencing a more than twofold decrease in production output. The COVID-19 shock was amplified by the plunge in oil prices and the accompanying volatility in financial markets. This sent shockwaves to the surrounding CIS countries like Armenia, Uzbekistan, Tajikistan. According to a McKinsey & Company report[6], "lockdowns also cause uncertainty to remain high", and "this uncertainty is paralyzing". The uncertainty that came along with the lockdown caused the collapse of a lot of SMEs. With the above stated points in mind, we are going to put forward the following hypotheses.

H1: The CIS governments' stringent policies had a severe negative effect on economic growth.

As the pandemic unfolded, global inflation initially showed signs of moderation, continuing a downward trajectory during the initial months of the crisis. However, from late 2020 onward, escalating prices steadily propelled inflation to higher levels. In the 18 months following the onset of 2021, the average global cost of living surged at a pace surpassing the cumulative increase of the preceding five years. This inflationary surge can be attributed to a decline in aggregate supply, a phenomenon driving the nominal rate upwards within the conventional RANK model.

The fundamental reason behind this inflationary trend lies in the disproportionate contraction of aggregate demand relative to aggregate supply, exacerbated by stringent government policies. These measures, including widespread lockdowns and business closures, severely disrupted global supply chains, resulting in substantial losses for both national and international enterprises. In an effort to counteract the financial repercussions on individuals and small businesses, governments simultaneously implemented policies such as issuing stimulus checks and augmenting unemployment benefits.

Auray and Eyquem (2020) highlight the significant impact of lockdowns on employment, emphasizing that if the number of employed workers is adversely affected, the ensuing negative effects become markedly pronounced, inducing deflationary pressures. In response to the economic downturn, governments injected substantial amounts of money into the system through expansive stimulus packages. While averting a prolonged and deep recession, the unprecedented size of these global

[5] Ghanaweb. (2022). Retrieved from https://mobile.ghanaweb.com/GhanaHomePage/NewsArchive/Things-are-getting-better-and-will-get-better-Akufo-Addo-assures-Ghanaians-1794203

[6] Smit, Sven, Martin Hirt, Penny Dash, Audrey Lucas, Tom Latkovic, Matt Wilson, Ezra Greenberg, Kevin Buehler & Klemens Hjartar. (2020). Crushing Coronavirus Uncertainty: The Big 'Unlock' for our Economies, Report, McKinsey & Company

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stimulus packages, as documented by Elgin et al. (2020), resulted in an excess of money circulating in the economy, leading to demand-pull inflation. This brings us to our second hypothesis:

H2: The interplay of stringent government policies and inflation had a positive impact on economic growth in CIS countries.

In essence, the intricate dynamics of government measures, economic shocks, and unprecedented stimulus efforts converged to reshape global economic conditions during the pandemic, creating an environment where inflation became both a consequence of disrupted supply chains and a tool for stimulating economic recovery, particularly in the context of the Commonwealth of Independent States (CIS).

Data and Methods

The main purpose of this study is to show the impact of restriction measures on economic growth in the CIS. To achieve our goal, we use a quantile regression model, an extension of OLS. Quantile regression estimation is more resilient to outliers. To examine interaction effects, we use Johnson-Neimann intervals and simple slope analysis. The Johnson-Neyman interval provides two moderator values at which the slope of the predictor goes from insignificant to significant. The form of the investigated OLS regression is the following:

$$GDP\_growth_{it} = \beta_0 + \\ + \beta_1 stri\_index_{it} + \beta_2 infl\_rate_{it} + \\ + \beta_3 unemp\_rate_{it} + \beta_4 hd\_index_{it} + \epsilon_{it}, \quad (1)$$

where GDP_growth_{it} is the dependent variable and $stri\_index_{it}$ is the research variable, i is the country, t is time and ϵ is the error term. The data are further elaborated below.

We use weekly panel data from March 1, 2020, till September 17, 2021.We chose the following CIS countries for our research: Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan. As a dependent variable we use GDP growth rate (GDP_growth_{it}) from World Population Review and tradingeconomics.com[7,8].

To determine the impact of government measures to contain the outbreak and their impact on economic growth, we examined indicators from the Oxford Coronavirus Government Response Tracker — stringency index ($stri\_index_{it}$). This is a basic index calculated using data from the 9 main components: school closures, workplace closures, cancellation of public events, restrictions on public gatherings, closure of public transport, house arrest, restrictions on internal freedom of movement, restrictions on international travel, public relations campaigns.

$stri\_index_{it}$, ranged between 0 and 100. The higher is the score, the higher is the level of policy response (Charemza et al. 2022). We have collected data from Our World in Data (https://ourworldindata.org). Nominal GDP is often adjusted for inflation to reflect real GDP (Sarel, 1996). Based on this, we used the inflation rate ($infl\_rate_{it}$) from the Eurasian Commission and tradingeconomics.com. Unemployment is a major cause of widespread poverty and income inequality. Therefore, understanding the relationship between unemployment rate and economic growth during the covid-19 pandemic is extremely important. We add unemployment rate ($unemp\_rate_{it}$) and get data from the World Bank, National Bank of Tajikistan and tradingeconomics.com and human development index (hd_index_{it}). The hd_index_{it} is a measure that summarizes key aspects of human development: a long and healthy life, a good education and a good standard of living. We have collected data from Our World in Data (https://ourworldindata.org). Tables 1 and 2 provide descriptive statistics and correlations of the variables.

Results and Discussion

The magnitude and intensity of the coefficients on our predictors change across the quantiles, as shown in Table 3. Government stringent policies have a negative effect on GDP growth, which will decrease GDP growth by 4.9% in the mean model. The results of the quantile regression suggest that the effect of stringency on the dependent variable varies across different quantiles of the distribution. Specifically, the 40th percentile shows the highest effect of stringency, followed by the 80th percentile, while the lowest effect is indicated in the 20th percentile, which is also negatively insignificant. The 60th percentile indicates the weakest level of significance. These

[7] World Population Review. Available at: https://worldpopulationreview.com/country-rankings/gdp-growth-by-country (data of access: 15.10.2022).

[8] Tradingeconomics.com. Available at: https://tradingeconomics.com/country-list/gdp-annual-growth-rate?continent=world (data of access: 15.10.2022).

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Table 1

Descriptive Statistics

	n	mean	sd	Skew	kurtosis	se	min	max
GDP_growth_{it}	931	2.10	5.36	–0.50	0.15	0.18	–13.50	13.30
$unemp\_rate_{it}$	931	10.09	3.42	0.46	–0.21	0.11	3.70	17.90
$infl\_rate_{it}$	931	7.66	4.46	1.51	1.81	0.15	2.90	21.20
$stri\_index_{it}$	931	36.80	25.23	0.11	–0.82	0.83	0.00	92.73
hd_index_{it}	931	0.76	0.06	-0.27	–1.58	0.00	0.67	0.83

Source: calculated by the authors

Table 2

Pearson Correlation

Index value	GDP_growth_{it}	$stri\_index_{it}$	$infl\_rate_{it}$	$unemp\_rate_{it}$	hd_index_{it}
GDP_growth_{it}	1.00				
$stri\_index_{it}$	0.18	1.00			
$infl\_rate_{it}$	–0.03	–0.42	1.00		
$unemp\_rate_{it}$	–0.17	0.01	–0.47	1.00	
hd_index_{it}	–0.25	–0.08	–0.21	0.04	1.00

Source: calculated by the authors

Table 3

Empirical results of the quantile regression of the variables

	OLS	20th	40th	60th	80th
Intercept	21.274*** (2.582)	21.116* (9.172)	26.808*** (2.776)	26.541*** (5.374)	20.451*** (1.450)
$stri\_index_{it}$	–0.049*** (0.007)	–0.015 (0.031)	–0.056*** (0.009)	–0.027* (0.012)	–0.040*** (0.003)
$infl\_rate_{it}$	0.153** (0.056)	0.194 (0.137)	0.069 (0.039)	0.171 (0.097)	–0.067 (0.040)
$unemp\_rate_{it}$	–0.179*** (0.049)	–0.461** (0.168)	–0.058 (0.129)	0.082 (0.093)	0.189*** (0.031)
hd_index_{it}	–23.016*** (2.803)	–26.738** (8.674)	–30.566*** (2.790)	–31.851*** (5.915)	–17.580*** (1.787)
Adjusted R-squared	0.122				
Country FE	Yes	Yes	Yes	Yes	Yes

Source: calculated by the authors

Note: Coefficients and the standard errors in parenthesis. Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.

findings suggest that the impact of stringency on the dependent variable is not uniform across the entire distribution, and there are significant variations in the effects at different quantiles. This implies that the effect of stringency on the dependent variable is not linear and may depend on the specific threshold or cutoff point of the dependent variable. Generally, the results of government stringent policies have a significantly negative effect on economic growth irrespective of the level of growth of the country. This confirms our first hypothesis (H1). The restrictive measures reduced the GDP of some CIS countries because most migrants lost their jobs or were unable to go to work in Russia due to government restrictions, closed borders, and flight cancellations. In Russia, oil production was reduced, and the price collapsed; production chains were also suspended, resulting in an economic downturn. Our results confirm the findings of Kok (2020) who investigated the short-term trade-off between the stringency of NPIs and economic growth. Alfaro et al. (2020) also indicate why there are variations in the effect of government stringentness on economic growth from different levels.

Inflation rate is only statistically significant for the mean model. The 20th, 40th, 60th and the 80th quantiles are not statistically significant.

Balancing rescue efforts with economic activity posed a significant challenge, which not all CIS countries were able to meet. This is partly due to certain governments heavily relying on foreign exchange flows, such as money repatriated from migrant workers, and facing budget deficits, making external borrowing more complicated.

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Under such circumstances, some countries have requested financial support and credit from international financial institutions such as the World Bank, IMF, AfDB and EBRD[9]. As a result, governments could manage inflation rates during lockdowns and predict their impact on economic growth.

The impact of the unemployment rate on GDP growth diminishes as GDP growth transitions from the 20th percentile to the 80th percentile. The 80th percentile exhibits the strongest positive significance, while the 20th percentile is negative with a less robust significance level. The relatively low effect of unemployment is attributed to the government's decision to retain jobs during the period of restrictive measures until the decline in the spread of the coronavirus. Additionally, in some of the countries under consideration, the duration of restrictive measures was relatively short.

Interesting findings emerge when examining the impact of the Human Development Index (HDI), revealing a consistently negative significance across all quantiles. Well-being, a constituent of HDI, has been previously explored in the literature, illustrating the effects of COVID-19 on overall well-being (Ranasingheet al., 2020; Rooney, & McNicholas, 2020; Maugeri, & Musumeci, 2021). This makes the results not surprising as the COVID-19 had a devastating effect on the physical, mental and psychological wellbeing of people which automatically translates into its effect on economic growth.

Coefficient Plots

The graph below depicts the difference in coefficients across quantiles using bootstrapped confidence intervals. It also includes the OLS estimates and their confidence intervals, which are constant across all quantiles.

Figure 3 shows that the majority of the OLS coefficients are within the confidence intervals of the quantile regression coefficients. This means that the quantile regression results are not statistically significantly different from the OLS results, except for the $unemp\_rate_{it}$ and hd_index_{it}.

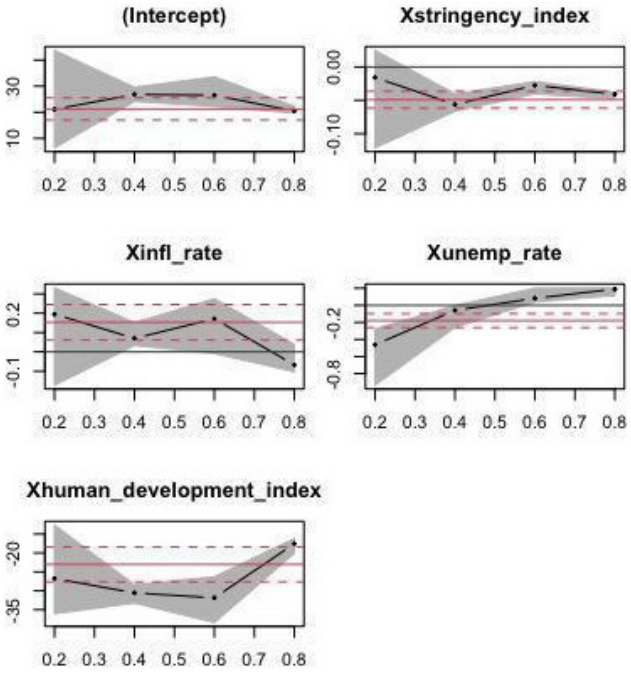

Figure 3. *Confidence intervals of coefficients*

Source: calculated by the authors

To identify the interaction of $stri\_index_{it}$ and $infl\_rate_{it}$. We use the Johnson-Neyman interval and simple slope analysis. The results are indicated in figure 4 and table 4. It is identified that when the $stri\_index_{it}$ is within the interval [–34.22, 93.51], the slope of $infl\_rate_{it}$ is $p < .05$. This indicates at all levels of government stringent policies, inflation rate positively moderated its effect on economic growth. When stringency equals 62. The interactive effect increases economic growth by 29 %.

This confirms our second hypothesis (H2). Stringent policies exceeding a certain threshold tend to exert a negative influence on the economy, as evidenced by the draconian measures implemented by the Chinese government. However, when such policies are not prolonged and are viewed as short-term measures, they can have a positive impact on the economy. Extended restrictions may diminish trust in the government, particularly within the business community, which bears the brunt of COVID-19 restrictions. Coccia (2021) found that prolonged lockdowns have a negative impact on GDP growth. Countries with longer lockups (i.e. ~2 months) from Q2 2019 to Q2 2020 experienced an average decline in GDP of around 21%, but had shorter lockups of around 15 days.

[9] Radjabov, B. (2020). Post-COVID-19: Challenges and Opportuntiies for Central Asia. Retrieved from Central Asia-Caucasus Institute: https://www. cacianalyst. org/publications/analytical-articles/item/13622-post-covid-19-challenges-and-opportunities-for-central-asia. html

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Table 4

Johnson-Neyman interval and simple slopes analysis for the interaction of inflation and stringency

Parameters	est	s.e	z.val	P
Slope of $infl\_rate_{it}$ when $stri\_index_{it}$ = 11.56610 (–1 SD):	0.28	0.06	4.60	0.00
Slope of $infl\_rate_{it}$ when $stri\_index_{it}$ = 36.79575 (Mean):	0.28	0.05	5.33	0.00
Slope of $infl\_rate_{it}$ when $stri\_index_{it}$ = 62.02540 (+ 1 SD):	0.29	0.09	3.27	0.00
When $stri\_index_{it}$ is INSIDE the interval [–34.22, 93.51], the slope of $infl\_rate_{it}$ is $p < .05$. The range of observed values of $stri\_index_{it}$ is [0.00, 92.73]				

Source: calculated by the authors

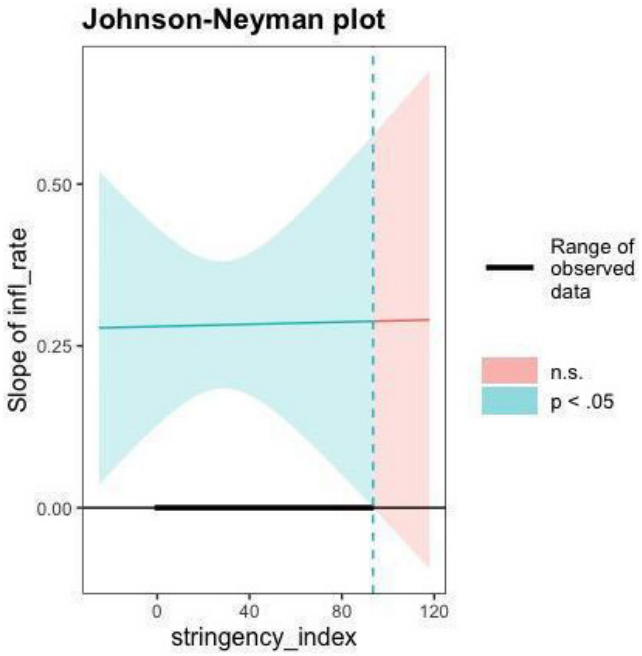

Figure 4. *Johnson-Neyman plot of the Interaction $stri\_index_{it}$ x $infl\_rate_{it}$ on economic growth. In the x label, $stri\_index_{it}$ standard deviations (SD). The y- plan slope of $infl\_rate_{it}$. Green areas represent significant ($p < 0.05$) slopes, and orange areas represent non-significant slopes. The tick line represents the range of observed data*

Source: calculated by the authors

Conclusion

This study examines the impact of stringent COVID policies implemented by various CIS governments on economic growth. Various governments imposed restrictions to slow the spread of the COVID pandemic at the expense of economic development. Using weekly panel data from March 1, 2020 till September 17, 2021 and quantile regression method, we discovered that stringent policies have a significantly negative effect on economic growth irrespective of the level of growth of the country. These stringent policies create what Fornaro and Wolf (2020) term as stagnation traps, leading to weak growth due to businesses' reluctance to invest in situations of uncertainty.

According to the most recent McKinsey Global Survey on Economic Conditions, inflation is the most frequently mentioned threat to economies[10]. We tested the interaction between stringency and inflation rate using the Johnson-Neymar interval. The findings suggest that when restrictions are excessively prolonged, their impact becomes highly detrimental to the economy.

The interaction effect has a positive impact on the economy when the measures are moderate and not continuous.

Based on the findings of this study, policymakers should aim for a balanced approach that addresses both public health and economic growth needs. While stringent policies may be necessary to curb the virus's spread, they should be implemented cautiously to minimize adverse economic effects. Targeted measures focusing on vulnerable populations, like the elderly and those with pre-existing conditions, can be considered, while ensuring minimal impact on other economic sectors.

Policymakers must also recognize the varied effects of stringency across different economic growth levels. The study indicates that stringent policies negatively impact economic growth regardless of a country's growth level. Therefore, policies should be customized to each country's unique economic circumstances and growth potential.

Additionally, policymakers should factor in the interaction between stringency and inflation rate when crafting COVID policies. The study

[10] McKinsey Global Survey. (2022). The coronavirus effect on global economic sentiment. Retrieved from https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/the-coronavirus-effect-on-global-economic-sentiment

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highlights that overly restrictive measures can harm the economy significantly. Hence, a balanced approach that considers both public health and economic growth, while addressing potential inflationary impacts, is recommended. Such a strategy can help mitigate the adverse effects of COVID restrictions on the economy and reduce the risk of stagnation traps.

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