Journal of Infrastructure, Policy and Development 2024, 8(14), 9180.
https://doi.org/10.24294/jipd9180

Review

Government regulation of Kazakhstan economy: Evidence from Eurasian Economic Union sanctions

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CITATION

Beketova K, Kurmash A, Alibekova A, et al. (2024). Government regulation of Kazakhstan economy: Evidence from Eurasian Economic Union sanctions. Journal of Infrastructure, Policy and Development. 8(14): 9180. https://doi.org/10.24294/jipd9180

ARTICLE INFO

Received: 18 September 2024
Accepted: 10 October 2024
Available online: 21 November 2024

Abstract: The research issue at hand pertains to the intricate mechanisms of state regulation that govern the economy of Kazakhstan, particularly in the context of the international sanctions that have been instituted by the nations comprising the Eurasian Economic Union. In order to thoroughly investigate this complex subject matter, this scholarly paper employs a variety of sophisticated methodologies grounded in bibliometric analyses of the most recent 90 academic papers that focus on the various mechanisms of state regulation pertinent to the economic landscape of Kazakhstan. As a subsequent phase in this research endeavor, the modeling of higher-order moments is undertaken with the express aim of delineating the multifaceted ramifications that stem from a singular and isolated perturbation affecting one of the key variables encapsulated within the higher-order moments model. This detailed analytical approach facilitates an in-depth exploration of both the immediate outcomes and the subsequent values of the endogenous variables that are under scrutiny. The innovative aspect of this article's findings lies in the comprehensive analysis dedicated to the state regulation of Kazakhstan's economy, which is significantly influenced by the international sanctions that have been imposed by member countries of the Eurasian Economic Union. The outcomes of this research provide a methodical and scientifically rigorous framework for understanding the overarching system of state regulation, which is of paramount importance for cultivating sustainable development within the socio-economic dynamics that characterize the nation of Kazakhstan.

Keywords: socio-economic dynamics; Eurasian Economic Union; Kazakhstan; economic state regulation

1. Introduction

At this particular moment in history, it is of utmost importance to acknowledge the fact that each and every nation around the world is currently contending with the extensive and significant repercussions stemming from the prevalent international sanctions, a situation that has been further intensified by the pervasive effects of global economic crises, which are typically marked by their intrinsic unpredictability and the strong possibility that they may continue to linger for an extended duration. These challenging circumstances lead to the emergence of a scenario in which the modern framework governing regulatory practices becomes progressively less capable of

effectively executing its assigned roles and responsibilities within the complex and multifaceted domains of financial oversight and economic management. Consequently, it is essential to comprehend that the interplay of these factors poses a profound challenge not only to individual nations but also to the collective stability of the global economic landscape, calling for a reevaluation of existing strategies and frameworks to better address these pressing issues.

In order to further enhance and strengthen the foundational framework that serves as a catalyst for the sustainable development of the state, it becomes increasingly imperative to embark upon a series of comprehensive and high-quality initiatives that are meticulously crafted to not only improve the efficacy and effectiveness of public administration but also to ensure the judicious and prudent conservation of the valuable resources and assets that are the rightful property of the state. These pressing and formidable challenges underscore the imperative and urgent necessity for a comprehensive and thorough reassessment of the existing business methodologies and practices, coupled with the enhancement and improvement of the organizational structures that pertain to economic management, as a strategic approach to effectively address and mitigate the prevailing difficulties that are currently being experienced. In light of these considerations, it is evident that a concerted effort must be made to revitalize the economic landscape through innovative strategies and robust policy frameworks that can facilitate a more resilient and sustainable economic environment, ultimately leading to the betterment of the state and its citizens (Yesbergen et al., 2022; Zhamiyeva et al., 2022; Zhanbayev et al., 2023; Zhang et al., 2023; Zhunussova et al., 2020).

In light of these multifaceted challenges, it becomes increasingly clear that a strategic and informed response is essential for navigating the complexities of the current economic landscape. The pursuit of such a response will undoubtedly lay the groundwork for a more resilient and adaptive economic framework moving forward (Wang et al., 2023b; Wang et al., 2023c).

2. Related literature

In light of the aforementioned considerations, the primary objective of this comprehensive study is to meticulously formulate both theoretical and methodological frameworks pertaining to the intricate mechanisms involved in the state Kazakhstan regulation of economic stability, while simultaneously providing a thorough justification for various strategies aimed at enhancing this stability as a pivotal driver of the socio-economic advancement and overall development of the nation (Chen and Tang, 2014; Dewald and Osiyevskyy, 2018; Ozenbayeva et al., 2022; Pan et al., 2020; Petrenko et al., 2020; Pieper, 2021; Rapposelli et al., 2023; Rustemov and Tutumlu, 2021; Seitzhanov et al., 2020; Serebrennikova et al., 2020; Shaimenova et al., 2020; Shang and Teng, 2018; Singh et al., 2023; Siregar et al., 2004; Soltangazinov et al., 2020; Song et al., 2023; Stepanova et al., 2024; Taleb, 1998; Tasmaganbetov et al., 2020; Wang et al., 2023a;).

It is precisely within this context of profound and radical transformations that decisive actions must be undertaken to navigate the complex socio-economic landscape of contemporary Kazakhstan effectively (Jamshed and Majeed, 2023;

Kuatova et al., 2020; Kulanov et al., 2020; Kuzhabekova, 2020; Lakbayev et al., 2020; Li et al., 2023; Linnenluecke and McKnight, 2017).

At present, one of the pressing socio-economic challenges that economic regulation in Kazakhstan is grappling with is the observable trend of diminishing economic growth that is anticipated to persist in the medium term, which is a matter of considerable concern for policymakers and economists alike. Furthermore, this phenomenon is characterized by a uniform deceleration affecting all sectors of the economy within Kazakhstan, thereby exacerbating the overall economic climate. The simultaneous contraction of economic activity can be attributed to several negative external factors, including the persistently low levels of global commodity prices, which have a detrimental impact on the nation's revenue streams. Additionally, sectors that contribute minimally to the gross domestic product due to insufficient domestic demand are also contributing to the potential for a pronounced economic slowdown, which could have far-reaching consequences for the country's financial stability (Beimisheva and Junussova, 2021; Jiang et al., 2018; Jiang et al., 2019; Jun et al., 2017; Kassenova, 2020; Khamitov et al., 2023; Khamzina et al., 2020; Kinateder and Papavassiliou, 2019; Kratz, 2019; Krugman, 1979).

The structural characteristics inherent to Kazakhstan's economic scheme reveal a continued dependence on raw materials, which significantly impedes the opportunity for vigorous economic growth and further complicates the prospects for the nation's integration into the larger global economic landscape, thereby presenting challenges for future development. Furthermore, the absence of robust intersectoral and interregional economic integration within Kazakhstan itself serves to restrict the overall efficiency and functionality of the economic structure, resulting in suboptimal performance across various sectors. Additionally, the level of government expenditure allocated to research and development activities remains conspicuously low, which results in a considerable disconnect between the realms of scientific inquiry and tangible production applications, ultimately stifling both innovation and growth within the economy.

Moreover, numerous challenges are currently being identified within the framework of the government's policy initiatives that are specifically designed to promote economic diversification and diminish the nation's dependency on raw materials, a critical endeavor that is fundamental to achieving sustainable development in the long run. In particular, the share of the manufacturing industry within the overall gross domestic product structure was documented at 16.6% in the year 2019, which reflects a slight decline from the previously recorded figure of 17.1% in 2016, although a marginal increment was observed in 2020, with the figure rising to 18.7%. Furthermore, the proportion of the manufacturing sector relative to the total volume of industrial production has demonstrated a gradual upward trend, indicating positive growth, with specific figures recorded at 36.7% in 2016, 39.4% in 2019, and ultimately reaching 48.9% in 2020. It is critical to acknowledge that these accelerated growth rates within the manufacturing sector can be predominantly attributed to the expansion of the raw materials sector, which has experienced a notable resurgence fueled by a significant increase in production levels coupled with a remarkable rise in global prices for hydrocarbons, thereby underscoring the intricate and complex interplay between various sectors of the economy (Aboura and Finta, 2020; Chikanayev, 2021;

Cui and Maghyereh, 2023; De Clerk and Savelev, 2021; Doern, 2016; Gulis et al., 2021; Guliyev, 2024; Howie et al., 2020; Igaliyeva et al., 2020; Janenova and Knox, 2020).

At the same time, it should be noted that the largest flow of investments is still directed to the extractive sector, more than 64.0% of the total investment in fixed assets.

Another problem is the fundamental consequences of inflation, such as low productivity of industries, low competition in individual markets for goods and services, which continues to determine the price background in the economy. Accordingly, despite some stabilization in world markets and a decrease in inflationary pressure, the risk of maintaining high prices remains, which may have an adequate impact on socio-economic problems in general (Akhmetov and Howie, 2024; Akhmetzharov and Orazgaliyev, 2021; Alimkhanova, 2020; Altynbassov et al., 2020; Amirbekova et al., 2022; An and Mikhaylov, 2020; An et al., 2024; An et al., 2020; Ashurov et al., 2020; Baldakhov and Heim, 2020; Batten et al., 2019; Baubekova et al., 2021; Bespalyy, 2021; Bonato et al., 2020; Bouri, 2023; Boute, 2020; Buribayev et al., 2021; Butova et al., 2022; Chatzis et al., 2018).

3. Materials and methods

This paper methodology is based on 2 steps: Bibliometric analyses of 90 latest papers about mechanisms of state regulation of the economy of Kazakhstan (Mandal and Thakur, 2023; Mei et al., 2017; Mikhaylov, 2021; Mikhaylov, 2023; Mikhaylov et al., 2023a) and modelling of moments of higher orders (Mikhaylov et al., 2023b; Mitskaya, 2020; Moiseev et al., 2023; Movkebayeva et al., 2021; Mutalimov et al., 2021; Nukusheva et al., 2023; Nurgozhayeva, 2020; Omirbayev et al., 2021) (**Table 1**).

Table 1. Searching and selecting the articles.

Country of research	Number of Papers	Keywords	Time period
United States	17	State regulation of the economy	2015–2024
EU	14	Economy of Kazakhstan	2023–2024
Kyrgyzstan	3	Sanctions	2023–2024
Kazakhstan	32	Economy of Kazakhstan	2023–2024
Uzbekistan	2	Economy of Kazakhstan	2023–2024
China	10	Economy of Kazakhstan	2023–2024
Tajikistan	2	Economy of Kazakhstan	2023–2024
Russia	10	State regulation of the economy	2008–2024
Total	90		2008–2024

Source: Authors.

The modelling of moments of higher orders are below.

The examination of the two principal categories of moments associated with a random variable reveals the distinction between initial moments and central moments. More specifically, the initial moment corresponding to the *i*-th order can be defined as

the expected value of the random variable *X* raised to the power of *i*, as articulated in the following equation:

$$\nu_i = M\left[X^i\right] \tag{1}$$

In contrast, the central moment of the *i*-th order is characterized as the expected value of the *i*-th power of the deviation of the random variable *X* from its first-order initial moment, as denoted by the equation presented below:

$$\mu_i = M\left[(X - \nu_1)^i\right] \tag{2}$$

It is important to note that if one is able to ascertain the moments of the *k*-th order, then it logically follows that all moments of lower orders can also be derived, given the condition. Furthermore, it should be emphasized that the calculation of these moments is confined strictly to finite interval estimations of the random variable in question.

Drawing upon the principle of linearity inherent in mathematical expectation, one can deduce that central moments can indeed be represented in terms of initial moments, as stipulated by the formula provided.

For instance, through this representation, we can derive values such as and others accordingly.

In the subsequent discussion, we will delve into the concept of absolute initial moments and central moments represented as

$$\mu_k = \sum_{s=0}^{k} (-I)^s C_k^s \nu_{k-s} \nu_I^s \tag{3}$$

$$\nu_{\text{abs i}} = \mathrm{M}\left[|\mathrm{X}|^{\mathrm{i}}\right], \mu_{\text{abs i}} = \mathrm{M}\left[(|\mathrm{X} - \nu_1|)^{\mathrm{i}}\right] \tag{4}$$

in conjunction with the corresponding initial moment and central point.

The absolute moments that have been derived can be expressed through the following formulation:

$$\overline{\overline{\nu_\iota}} = \sqrt[i]{M[X^i]} \tag{5}$$

$$\overline{\overline{\mu_\iota}} = \sqrt[i]{M[(X - \nu_1)^i]} \tag{6}$$

$$\overline{\overline{\nu_{abs\,\iota}}} = \sqrt[i]{M(|X|^i)}, \overline{\overline{\mu_{abs\,\iota}}} = \sqrt[i]{M[(|X - \nu_1|)^i]} \tag{7}$$

It is pertinent to acknowledge that the aforementioned adduced moment corresponds to the operation of exponentiation to the *i*-inverse (or negative) power, which essentially entails the calculation of the *i*-th root. Moreover, the adduced moment possesses the same dimensional characteristic as that of the random variable itself, thus making it, in certain scenarios, significantly more practical to utilize the adduced moment for comprehensive data analysis purposes.

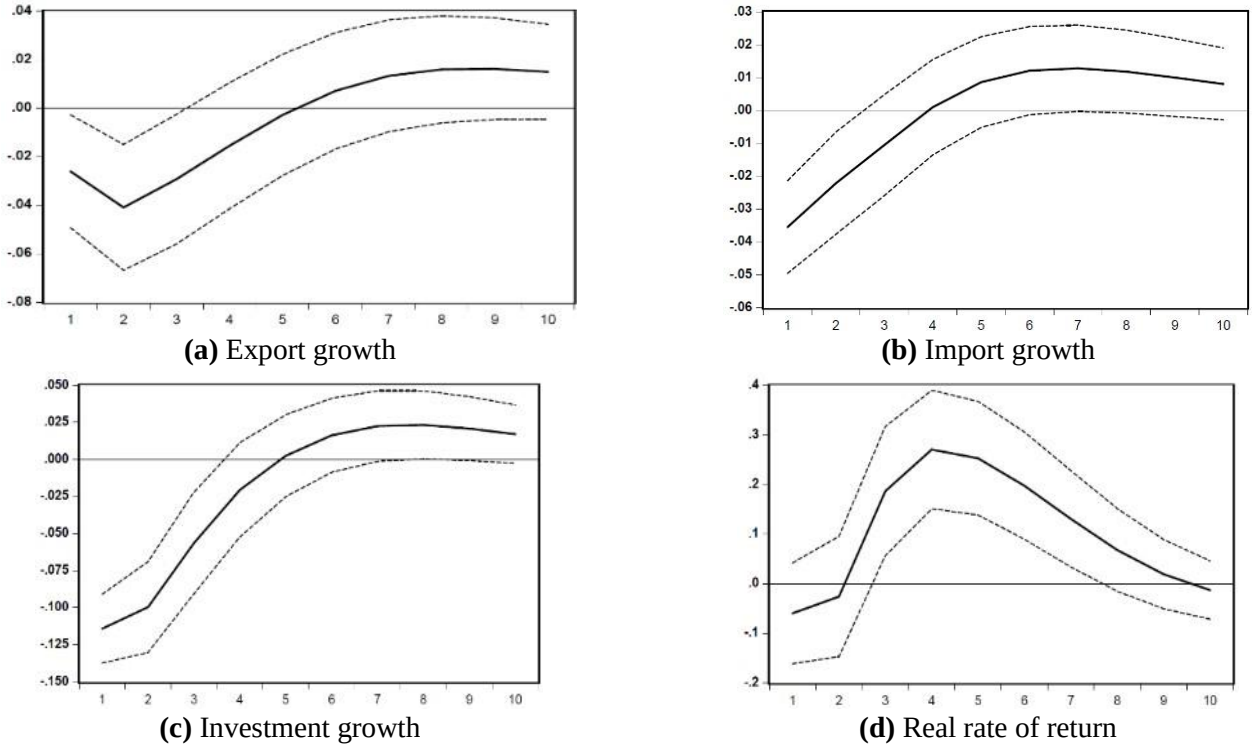
In the year 2020, the total volume of Gross Domestic Product (GDP) at current prices reached an impressive figure of KZT 70.7 trillion, which reflects not only the resilience of the economy but also the strategic responses implemented in the face of adversity. The real growth rate of GDP, when juxtaposed with the preceding year of

2019, was recorded at a modest yet positive rate of 1.7%, thereby indicating a remarkable degree of resilience and adaptability within the economy, even amidst the challenging and tumultuous circumstances that characterized that particular period.

4. Computational results

The modelling of moments of higher orders serves the purpose of delineating the ramifications that arise from a singular, one-time perturbation to one of the variables encapsulated within the model of moments of higher orders, thereby allowing for an examination of both the immediate and subsequent values of the endogenous variables in question. The specific shock that is the focal point of our discussion in this particular chapter pertains to a singular standard deviation decrement in the per capita oil rents, an alteration that warrants thorough investigation.

Figure 1 illustrates four carefully selected impulse response functions that concentrate on the primary variables of interest as the economy of Kazakhstan transitions from period 1 to period 10, as illustrated along the horizontal axis. It is imperative to reiterate that this analysis does not constitute a forecasting endeavor aimed at achieving precise predictions regarding future events or trends. Rather, the overarching objective is to attain more qualitative insights concerning the potential implications of sanctions on the political landscape and the intricate dynamics that unfold along the trajectory of such sanctions. With this important caveat firmly in mind, **Figure 1** presents a dynamic illustration of how an oil boycott can significantly contribute to the evolution of political developments within Kazakhstan, thereby providing a nuanced understanding of the intersection between economic factors and political processes. **Table 2** shows forecasts for Kazakhstan GDP after sanctions.



(a) Export growth **(b)** Import growth

(c) Investment growth **(d)** Real rate of return

Figure 1. Forecast of main economic parameters of Kazakhstan for next 10 years (%).

Source: Authors.

Table 2. Recent forecasts for Kazakhstan GDP after sanctions.

Method	GDP
The cModel, which is an intricate computational framework meticulously crafted by the esteemed Globalization and Prosperity Lab located at the prestigious University of California.	−0.9%
The CGE GTAP Model serves as a pivotal point of reference for economists and policymakers who seek to understand the multifaceted nature of global trade dynamics.	−0.8%
CGE GTAP, a Computable General Equilibrium model developed by the Global Trade Analysis Project (GTAP)	−1%
The implications drawn from the discrepancies between the forecasts articulated in the Global Economic Prospects prior to the conflict and the updated prospects that have emerged in the aftermath are of paramount importance for understanding the shifting economic landscape.	−1%
Implied by the difference between World Economic Outlook forecast that were made before the conflict and the current outlook.	−1.1%
Additionally, the Vector Auto Regression methodology is employed as a sophisticated statistical tool that facilitates the examination of the relationships between multiple time series variables, further enhancing the robustness of the economic analysis.	−1.1%
The output generated by this model encompasses a multi-sector and multi-country perspective, thereby allowing for a comprehensive analysis of economic interactions across various sectors and nations.	−1.4%
Global Integrated Monetary and Fiscal Model, which represents an enhanced general equilibrium framework that was originally conceived by the International Monetary Fund (IMF), offers invaluable insights into monetary and fiscal interactions on a global scale.	−1.6%

Source: Authors.

5. Discussion

The central thesis articulated within the corpus of research papers posits that the overarching expansion of the Gross Domestic Product (GDP) has been markedly invigorated by a commendably robust surge of 2.0% within the goods production sector, wherein the manufacturing industry has ascended to the forefront as a crucial contributor to this economic phenomenon, showcasing an extraordinary growth rate of 14.3%, which, when translated into fiscal terms, corresponds to a substantial monetary figure of 13,232 billion tenge for the fiscal year of 2020. In conjunction with this, the agriculture sector has also exhibited a laudable growth trajectory of 22.3%, culminating in a considerable monetary value of 6334.7 billion tenge. Simultaneously, it is of paramount importance to emphasize that the real sector of the economy has exhibited a heightened vulnerability to the adverse repercussions that arise from the enforcement of international sanctions, which have negatively impacted a myriad of industries across the board. The production dynamics inherent within the mining industry, regrettably, have highlighted the emergence of a pronounced downturn, as evidenced by a substantial decline of 26.2%, which equates to an astonishing loss of 4,193 billion tenge during the fiscal year of 2020 (Shang and Xu, 2018; Sotskov and Werner, 2006).

With regard to employment metrics, the aggregate number of individuals actively participating in the workforce throughout the year 2020 was documented at a total of 8.7 million people, which denotes a marginal decrease of 0.6% when compared to the figures recorded in the previous year. The unemployment rate for the year in question was determined to be 4.9%, which translates to approximately 448.8 thousand individuals, thereby reflecting a slight uptick of 0.1% in comparison to the statistical data compiled for the year 2019. Furthermore, the average monthly nominal salary for the year 2020 has been ascertained to be KZT 213,003, which signifies a notable

enhancement of 14.0% relative to the average figures documented in the preceding year of 2019. Additionally, the average per capita nominal monetary income of the citizenry within the nation during the year 2020 was reported to be 116,126 tenge, illustrating a commendable increase of 11.4% when juxtaposed with the figures recorded for the prior year of 2019 (Xu et al., 2018; Yerkinbayeva et al., 2021).

In parallel, various indicators that serve to reflect the sustainable development dynamics within the Republic of Kazakhstan reveal a pronounced disparity in income levels among the general populace, with distinctions made based on factors such as geographic location and gender. Many researchers proved these ideas (Batten et al., 2019; Baubekova et al., 2021; Bespalyy, 2021; Bonato et al., 2020; Bouri, 2023; Boute, 2020; Buribayev et al., 2021).

6. Conclusions, practical implementations and further ideas of research

The paper confirms that the main tool for achieving the goal set in the Strategy 2050 should be a diversification of the economy. The following areas of economic development are needed: Making free the foreign trade regulation in Kazakhstan.

Results can be used in state regulators activity. Further analysis in the following areas may be promising stages of future research: Regulation of foreign economic and foreign trade regulation in Kazakhstan.

The interpretation of the impulse response is, in essence, rather unambiguous: When a positive value is represented on the vertical axis, it signifies a notable enhancement or increase, whereas a negative value conversely indicates a significant decline or deterioration in the variable under consideration. Additionally, the dotted lines that are depicted within the graphs signify the 68% confidence bands that envelop the impulse responses derived from the moments of higher orders models, serving as a crucial statistical reference. It is essential to note that when the horizontal axis in the IRF graphs extends beyond both confidence bands, the impulse responses that are generated can be deemed statistically significant, implying that the null hypothesis, which posits the absence of effects of oil rents per capita on the specified variable, is effectively rejected.

Acknowledgments: Kamar Beketova is grant holder for the project «500 scientist» of the Center for the international program «Bolashak».

Conflict of interest: The authors declare no conflict of interest.

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