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NAVIGATING UNCERTAINTY: AN INTERVAL METHOD TO UNCOVER EXPORT DYNAMICS – INSIGHTS FROM THE REPUBLIC OF ARMENIA

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ABSTRACT

Purpose: This article introduces an innovative interval method to evaluate Armenia's export dynamics in uncertain economic contexts.

Theoretical Framework: Focusing on export forecasts and interval forecasts, this research addresses the dynamic nature of economic processes, enhancing accuracy in assessing economic indicators during uncertainty.

Methodology: We apply the interval approach to assess Armenia's exports, particularly in the EAEU market versus the global market. We analyze the effectiveness of export-oriented scenarios amid uncertainty.

Findings: Our analysis shows that the EAEU market offers more favorable export growth compared to the global market during uncertainty. The interval method significantly improves forecast accuracy. We emphasize the importance of prioritizing trade relations with specific countries and the economic significance of finished product exports.

Research, Practical & Social Implications: This research provides insights into Armenia's export-oriented growth prospects and offers a practical guide for policymakers. It underscores the significance of modernization, collaboration, and economic competitiveness, particularly in smaller economies.

Originality/Value: This article introduces the interval method for export dynamics in Armenia. It adds value by advocating targeted trade strategies and emphasizing economic policy focused on finished product exports during uncertain times.

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NAVEGANDO NA INCERTEZA: UM MÉTODO DE INTERVALO PARA REVELAR A DINÂMICA DAS EXPORTAÇÕES – PERSPECTIVAS DA REPÚBLICA DA ARMÉNIA

RESUMO

Objetivo: Este artigo apresenta um método de intervalo inovador para avaliar a dinâmica das exportações da Arménia em contextos económicos incertos.

Enquadramento teórico: Centrando-se nas previsões de exportações e nas previsões intervalares, esta investigação aborda a natureza dinâmica dos processos económicos, melhorando a precisão na avaliação dos indicadores económicos em tempos de incerteza.

Metodologia: Aplicamos a abordagem de intervalo para avaliar as exportações da Arménia, especialmente no mercado da EAEU em comparação com o mercado global. Analisamos a eficácia de cenários orientados para a exportação em meio à incerteza.

Conclusões: A nossa análise mostra que o mercado da EAEU oferece um crescimento das exportações mais favorável do que o mercado global em tempos de incerteza. O método de intervalo melhora significativamente a precisão das previsões. Destacamos a importância de priorizar as relações comerciais com países específicos e a relevância económica das exportações de produtos acabados.

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Pesquisa, implicações práticas e sociais: Esta investigação fornece informações sobre as perspectivas de crescimento orientado para as exportações da Arménia e oferece orientação prática para os decisores políticos. Sublinhamos a importância da modernização, da colaboração e da competitividade económica, especialmente nas economias mais pequenas.
Originalidade/Valor: Este artigo apresenta o método de intervalo para analisar a dinâmica das exportações na Arménia. Acrescenta valor ao defender estratégias comerciais específicas e ao enfatizar a política económica centrada nas exportações de produtos acabados em tempos de incerteza.

Palavras-chave: Crescimento Orientado para as Exportações, Incerteza, Método Intervalar, Previsão.

NAVEGANDO LA INCERTIDUMBRE: UN MÉTODO DE INTERVALO PARA DESVELAR LA DINÁMICA DE LAS EXPORTACIONES – PERSPECTIVAS DE LA REPÚBLICA DE ARMENIA

RESUMEN
Objetivo: Este artículo presenta un innovador método de intervalo para evaluar la dinámica de las exportaciones de Armenia en contextos económicos inciertos.
Marco teórico: Enfocándonos en los pronósticos de exportación y los pronósticos de intervalo, esta investigación aborda la naturaleza dinámica de los procesos económicos, mejorando la precisión en la evaluación de los indicadores económicos en momentos de incertidumbre.
Metodología: Aplicamos el enfoque de intervalo para evaluar las exportaciones de Armenia, particularmente en el mercado de la UEEA en comparación con el mercado global. Analizamos la efectividad de escenarios orientados a la exportación en medio de la incertidumbre.
Conclusiones: Nuestro análisis muestra que el mercado de la UEEA ofrece un crecimiento de las exportaciones más favorable que el mercado global durante tiempos de incertidumbre. El método de intervalo mejora significativamente la precisión de las previsiones. Destacamos la importancia de priorizar las relaciones comerciales con países específicos y la relevancia económica de las exportaciones de productos terminados.
Investigación, implicaciones prácticas y sociales: Esta investigación proporciona información sobre las perspectivas de crecimiento orientado a las exportaciones de Armenia y ofrece una guía práctica para los responsables de la formulación de políticas. Subraya la importancia de la modernización, la colaboración y la competitividad económica, especialmente en las economías más pequeñas.
Originalidad/Valor: Este artículo presenta el método de intervalo para analizar la dinámica de las exportaciones en Armenia. Agrega valor al abogar por estrategias comerciales específicas y enfatizar la política económica centrada en las exportaciones de productos terminados en tiempos de incertidumbre.

Palabras clave: Crecimiento Orientado a las Exportaciones, Incertidumbre, Método de Intervalo, Previsión.

INTRODUCTION

Enhancing the competitiveness of a nation's economy stands as one of its fundamental objectives. Central to this pursuit is the imperative of fostering export growth, a critical factor for bolstering national economic competitiveness. This imperative is particularly vital for countries characterized by small, transforming economies. In the current landscape, where the uncertainty factor exerts a growing influence on economic dynamics, it becomes imperative to delineate the pivotal tasks that must be addressed to fully harness the potential for economic expansion.

At the forefront of these tasks lies the augmentation of exports, with a particular emphasis on the export of finished products boasting the highest added value. Failure to accomplish a set of priority objectives related to product exports carries the inherent risk of severely impeding the export-oriented trajectory of economic growth. In the face of mounting

uncertainty, seizing opportunities for economic collaboration becomes paramount. This is especially true for countries undergoing economic transformation, as they must ascertain the most plausible scenario for augmenting exports of finished products, identify avenues for improving trade balance, and fine-tune economic policy priorities to ensure sustainable progress.

In the current economic landscape, one of the fundamental goals of any country is to increase the competitiveness of its national economy. Export growth plays a pivotal role in achieving this objective, particularly for countries with small transforming economies. Given the escalating influence of uncertainty on economic processes, it becomes crucial to identify and address the critical tasks that must be resolved to fully realize the potential for economic growth. Among these tasks, the growth of exports, specifically finished products with the highest added value, holds a paramount position.

Failure to fulfill a set of priority tasks aimed at addressing the challenges associated with product exports carries a high risk of significantly undermining the export-oriented scenario of economic growth. In the face of mounting uncertainty, it is imperative for a country, particularly one with a transforming economy, to determine the most probable scenario for increasing exports of finished products, explore avenues for improving the trade balance, and adjust economic policy priorities accordingly.

LITERATURE REVIEW

The study of uncertainty bands and interval forecasts is a fundamental topic in economics, as it provides insights into the unpredictability of economic processes and the challenges of economic forecasting. The importance of the uncertainty factor was noted by S. Armstrong in 2001, and S. Makridakis and M. Hibon in 2017, have supported this conclusion by demonstrating that the more complex the economic model, the worse the forecast of economic processes.

Other studies have also investigated the uncertainty factor in economic forecasting. For example, Gilboa (2009) argued that decision-making under uncertainty involves considering the multiple possible outcomes of a given decision, rather than relying on a single point forecast. Similarly, Maowia (2007) emphasized the importance of probabilistic assessments of economic processes, which can help to capture the uncertainty and volatility of economic indicators.

Silver (2012) suggested that forecasts often do not provide a more flexible and realistic assessment of economic processes. Uncertainty cannot be quantified since there are unknowns

which calls for whole new managerial approaches, coping mechanisms, and entrepreneurial impulses (Kalogiannidis, et al., 2023). Meanwhile, Mester (2016) highlighted the challenges of predicting extreme events in the economy, which can be difficult or even impossible to forecast using traditional forecasts. Kohn (2017) concluded that forecasts with probabilistic assessments can contribute to a more accurate and nuanced understanding of the possible dynamics of economic processes, and can improve decision-making under uncertainty. Poloz (2022) has noted that a future with greater economic volatility means that things could turn out either worse or better than we expect and that the range of possible outcomes will expand, the greater the uncertainty between cause and effect, the wider the range of possible economic outcomes. In the context of increasing globalization, the uncertainty of the economic situation should be taken into account. The uncertainty of the environment implies the impossibility of planning certain developments (Kulinich et al., 2023).

Jens Beckert and Richard Bronk (2018) noticed that the past is not necessarily a good guide to uncertain futures. Standard economic models cannot handle genuinely uncertain futures. To understand decision-making in such conditions requires an entirely new model of economic reasoning. Longer time horizons imply greater forecast uncertainty.

Taken together, these studies leads to the conclusion that it is important to forecast and evaluate economic indicators within an uncertainty bands, rather than relying on rigid forecasts that may not reflect the true complexity and volatility of economic processes. These studies provide valuable insights into the significance of uncertainty factors in economic forecasting. However, more research is needed to develop rational methods of regulating economic processes under uncertainty. Based on our research, considering uncertainty and enhancing the forecast's accuracy requires the inclusion of economic indicators, such as exports, within an interval. Decision-making that considers the uncertainty bands entails the study of economic process scenario’s while accounting for the band’s uncertainty factor, which enhances the forecast’s probability (Tavadyan, 2022). The current paper shows role of uncertainty bands and interval forecasts when assessing the exports growth.

METHODOLOGY

Research of Interval Method for Analyzing Economic Processes

Interval forecasts can significantly increase the probability of accurately assessing indicators under conditions of uncertainty, while simultaneously providing an opportunity to narrow down the uncertainty interval. However, they cannot eliminate uncertainty by turning the interval into a point estimate. An overlap can be purely accidental, like a shot in the dark. Thus, decision making amounts to the determination of the most possible minimal uncertainty interval for key indicators and establishing scenarios for economic development with their implementation methods.

The diagnosis of the minimal interval of an economic indicator, including its extreme values, and possible consequences when obtaining such values is no less important than the forecast itself. When carrying out an interval forecast of an indicator, its diagnosis is also necessary. The utility of the forecast depends on the interval bounds—the less, the better. It also depends on how accurate the estimates of the possible consequences in case of obtaining results outside the interval are.

Possible, albeit unlikely, deviations from the uncertainty interval should be evaluated. If the consequences are significant when the economic indicator exits the uncertainty interval, then the economic system is fragile. In this case, particular outcomes can often be successful, but success will be unstable and short-lived. Let’s say a monetary policy may be successful at first glance. However, if serious issues arise with the unlikely possibility of inflation or the national currency exiting their respected intervals, then such an economic policy, of course, cannot be considered viable. Such circumstances would inevitably have a negative impact on the country's exports. If a study of the uncertainty interval does cover only mundane situations, without considering the probability of exiting the interval, which may have significant implications, there is a clear possibility of a serious setback, even a failure of the monetary policy.

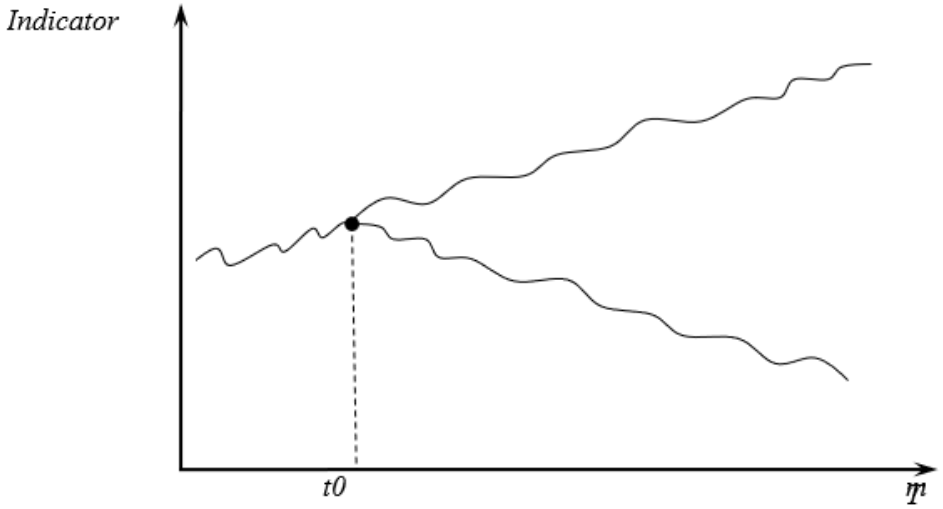
Shortening the forecast interval may be justifiable if it does not result in a significant decrease in the probability of fulfilling the assessed interval. However, aiming for precise forecasts, especially in crises, significantly reduces the fulfillment probability and does not contribute to the creation of a mechanism for adjusting an economic policy. Doing a precise forecast is like trying to pinpoint what is ever-changing. In crises, the uncertainty interval sharply increases, and it is important to have several scenarios for the development of any economy, considering their implementation.

The presentation of programs for years ahead has little value because the uncertainty intervals expand when economic volatility increases, forming uncertainty bands. The rate of change in the world has increased; the economic situation has become highly volatile. It is essentially impossible to present sufficiently accurate long-term programs. It is advisable to establish a direction for economic development and implement targeted programs aimed at fostering export growth, particularly in the realm of finished products. These measures are crucial for improving the overall economic situation.

Any economy is a dynamic, low-validity system, and the minimal intervals are acceptable only in the short run. The larger the span of the forecast, the wider the uncertainty interval of the most probable indicator values. The uncertainty band over time tends to expand significantly. Depending on the rate of expansion of the uncertainty band, forecasts become of little value; in fact, the formulation of its range after a certain time loses its practical meaning. Besides, for different indicators, the expansion process has its specifics.

Business cycles are in an uncertainty band. Moreover, the phase of cycles cannot be determined clearly. The bands, within which the business cycles are fitted, are presented over time in Figure 1. The projections of business cycles are becoming progressively provisional because economic crises are increasingly unpredictable both in time and in depth. The economic indicator varies in an uncertainty band over time, wherein various scenarios are possible.

Figure 1. Uncertainty bands containing economic cycles



Prepared by authors (2023)

Economic processes essentially have low validity; different and opposite scenarios may develop with wide variations of the uncertainty band. The further into the future, the larger the

range of all possible variations of the uncertainty band. This is the nature of the economy and any low-validity system. In a crisis, the uncertainty interval expands sharply, significantly increasing the range of the uncertainty band.

Amidst uncertainty, maintaining economic homeostasis, which entails sustainable development without significant disruptions, becomes the foremost factor in ensuring economic security. The ability to withstand threats is a vital precondition for economic progress. Consequently, responding to indicators that signal a potential breach in economic security assumes paramount importance. Such indicators may comprise a sharp decline in exports, an increase in the trade deficit and unemployment rates, depreciation of the national currency, and rising inflation. Given the dynamic nature of economic indicators, recognizing the presence of an uncertainty band in their assessment facilitates adjustments in forecasting.

The export-led growth scenario holds significant importance for small economies as it serves as a catalyst for the welfare of the population. The development of export sectors plays a pivotal role in fostering economic growth and diversification, as highlighted in a World Bank report. Export competitiveness offers small countries the opportunity to earn foreign exchange, access larger markets, and acquire technological knowledge through trade (Ianchovichina & Lundstrom Gable, 2009). In this scenario, the focus is on transitioning national economies towards new trajectories, specifically by emphasizing the growth of exports in finished products. This strategic shift aims to improve the trade balance, which serves as a crucial factor for augmenting the overall GDP and generating significant employment opportunities.

It is essential for small economies that the ratio of exports of goods and services to GDP exceeds 50 percent. Moreover, the number of finished goods that have high added value should prevail in exports:

Exports to GDP $\geq$ 50%.

In countries where the population is less than 10 million and GDP per capita is well above the average, the exports to GDP ratio has been 56 percent for Austria, 66 percent for Switzerland, 56 percent for Denmark, 176 percent for Singapore and 122 percent for Ireland. This data is the average of the recent 10 years.

Economic policy should undoubtedly focus on significantly increasing export opportunities and improving the state of the trade balance. This objective necessitates the development of appropriate strategies, standards, and methods to effectively pursue a coordinated monetary and fiscal policy. The factor of uncertainty, particularly in the face of

significant fluctuations in the exchange rate and heightened dynamism in economic processes, exerts a profound influence on the dynamics of economic processes, including exports, and the feasibility of their forecasting.

During crisis situations, a multitude of new factors emerge, the consequences of which are often difficult to assess and quantify, thereby significantly widening the uncertainty interval. This underscores the need to provide interval forecasts encompassing diverse ranges. It is essential that these forecasts consider random events that directly impact both the interval's width and the reliability of the forecasts.

RESULTS AND DISCUSSION

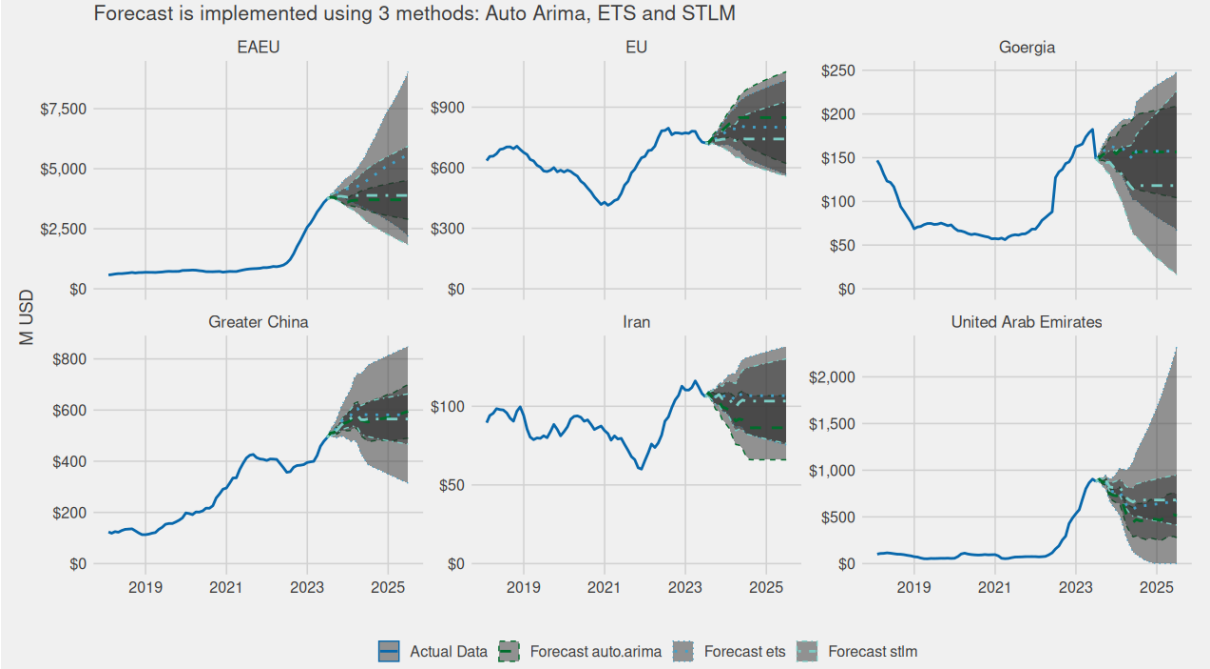
Results of Forecast Intervals of Armenian Exports

We have conducted an assessment and forecast of Armenia's exports using the interval approach developed by our team to account for uncertainty factors. It is important to note that these forecast intervals depend on both the level of uncertainty and the specific economic development scenarios.

Taking the uncertainty factor into account, we have projected Armenia's total exports in its primary trade directions. This assessment encompasses export dynamics to the EU, EAEU, China, Georgia, Iran, and Arab countries during 2023 representing 92.1% of Armenia's total exports. Additionally, we have employed a modified integrated autoregressive moving average model (AUTO.ARIMA) (Hyndman & Athanasopoulos, 2015), alongside the stlm model (briefly described below). Our forecasts are presented within an interval framework, acknowledging the significant influence of global uncertainty factors, and rely on data from the United Nations' international trade statistics database.[C]

[C] The data for the forecast, the forecast code, and the plot code can be found by following this link: https://github.com/tavad/exports_forecast/
Detailed export forecasts for Armenia can be found at the following address https://tavad.shinyapps.io/exports_forecast/

Figure 2 Armenia's Exports forecast with main trading partners



Actual data from UN Comtrade, Forecasts prepared by authors (2023)

In 2022, Armenia witnessed a remarkable nearly threefold increase (190.5%) in exports to the EAEU. This surge can be attributed mainly to sanctions imposed on Russia, the largest country within the EAEU. Armenia, as an EAEU member, enjoys the freedom to engage in trade with other Union members. Armenia's exports to the EAEU are characterized by diversification, with a focus on finished goods. The sanctions created challenges for European corporations seeking re-entry into the vast Russian market, prompting a redirection of Russian demand including towards the Armenian market. Despite the substantial growth observed in 2022, which constituted 47.3% of Armenia's total exports by the year's end, our forecasts indicate a gradual slowdown in annual growth. An 80% interval projection suggests export growth in the EAEU ranging from 43.8% to 81.3%.

The accompanying chart illustrates a similar deceleration in exports to Armenia's other major trading partners. The European Union stands as Armenia's second-largest export destination, with shipments primarily consisting of raw materials, metal ore, and base metals. Armenia experienced a 17.8% increase in exports to the EU in 2022. However, our 80% interval forecast suggests a growth range of -7.8% to 8.8% in EU exports.

In 2022, Armenia experienced an astonishing sevenfold increase (618.0%) in exports to the United Arab Emirates (UAE). This remarkable surge was primarily attributed to the re-export of precious stones and metals from Russia to the UAE through Armenia. However, as depicted in the chart, this extraordinary growth is expected to cease, and the forecast for the

near future indicates a negative trend. This shift underscores the dynamic nature of Armenia's trade relationships with the UAE.

CONCLUSION

The models employed in our analysis project faster growth in exports among the EAEU countries when trading within the Union compared to the global market. This underscores the capability of the EAEU market as an attractive option for exporters, especially during periods of heightened uncertainty.

Depending on the effectiveness of implementing export-oriented scenarios while considering the uncertainty factor, a country's export value is expected to align closely with the upper or lower boundaries indicated in the diagram.

The interval method for evaluating economic indicators significantly enhances the accuracy of forecasts. Increasing the export of finished products and prioritizing trade relations with the EU, EAEU, China, India, Georgia, and Arab countries emerge as pivotal factors for economic growth. Especially in times of uncertainty, modernization, collaboration, and enhancing the country's economic competitiveness through a policy geared toward boosting finished product exports, particularly in smaller economies, become paramount for economic development. When considering the cumulative effect, this approach not only directly contributes to GDP and export growth but also elevates employment levels significantly.

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