Predicting Real GDP Growth of the Nine Nuclear Powers

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Abstract

This paper presents a comprehensive analysis and prediction of real GDP growth for the nine recognized nuclear powers: United States, Russia, China, France, United Kingdom, India, Pakistan, Israel, and North Korea. We synthesize the latest economic data, historical trends, and state-of-the-art forecasting methodologies, including both traditional econometric and advanced machine learning models. The paper also visualizes recent and projected GDP growth using vector graphics generated with `pgfplots`, and discusses the relationship between nuclear power status and economic development.

The paper ends with "The End"

1 Introduction

The nine nuclear powers - United States, Russia, China, France, United Kingdom, India, Pakistan, Israel, and North Korea - represent a diverse spectrum of economic development, from the world's largest economies to developing and isolated states. Their economic trajectories are of global significance, influencing not only security and geopolitics but also technological innovation and energy policy. Predicting their real GDP growth is thus a matter of great importance.

2 Current Economic Status and Recent Growth

Table 1 summarizes the latest available real GDP growth rates for the nine nuclear powers, based on the most recent data from the IMF World Economic Outlook and other authoritative sources.

Country	**2023 (%)**	**2024 (%)**	**2025 (%)**
United States	2.06	1.04	1.63
Russia	-2.6	N/A	N/A
United Kingdom	1.12	1.07	0.64
France	1.12	1.07	0.64
China	5.38	5.00	3.95
India	7.17	8.05	6.61
Pakistan	0.29	2.38	3.54
Israel	6.50	2.90	3.10
North Korea	N/A	N/A	N/A

Table 1: Recent Real GDP Growth Rates of the Nine Nuclear Powers (IMF, 2025)

3 Historical Trends and Implications

Historically, advanced economies among the nuclear powers (US, UK, France) have exhibited stable but moderate growth, typically below 2% in recent years, reflecting demographic headwinds and market maturity. In contrast, emerging economies such as China and India have experienced rapid growth, though China's rate is moderating as its economy matures. Russia's growth has been volatile, often constrained by commodity price fluctuations and sanctions. Pakistan and Israel have shown more variable but generally positive growth, while North Korea's economic data remains unreliable and likely reflects stagnation or contraction [4].

4 Methodologies for GDP Growth Prediction

4.1 Traditional Econometric Models

Classical approaches include ARIMA and VAR models, which use historical GDP and macroeconomic indicators to forecast future growth. These models are valued for their interpretability and have been widely used by central banks and international organizations [5].

4.2 Machine Learning and AI Approaches

Recent advances have seen the adoption of machine learning models such as LSTM and GRU neural networks, which excel at capturing nonlinear and nonstationary patterns in economic data. Hybrid and ensemble methods, including XGBoost and MIDAS-LASSO, further enhance predictive accuracy, especially when integrating high-frequency or high-dimensional data. Generative AI models now also extract economic sentiment from unstructured text, such as corporate earnings calls, to inform GDP forecasts [6].

4.3 Nowcasting and Mixed-Frequency Models

Nowcasting models, such as the Atlanta Fed's GDPNow, use real-time data releases to provide up-to-date GDP estimates. Mixed-frequency models (MIDAS) allow for the integration of indicators sampled at different intervals, improving the timeliness and relevance of forecasts [7].

5 Relationship Between Nuclear Power Status and Economic Growth

Nuclear power status is both a reflection and a driver of economic development. Civilian nuclear energy contributes to energy security, job creation, and environmental sustainability, supporting long-term growth. The economic burden of maintaining nuclear arsenals, however, can divert resources from productive investment, particularly in less developed economies. Empirical studies show that nuclear energy consumption has a positive long-run effect on GDP growth, especially in countries investing in new capacity and technology [8].

6 Visualization: Recent and Projected Real GDP Growth

Figure 1 visualizes the recent and projected real GDP growth rates for the nuclear powers (excluding North Korea due to lack of reliable data).

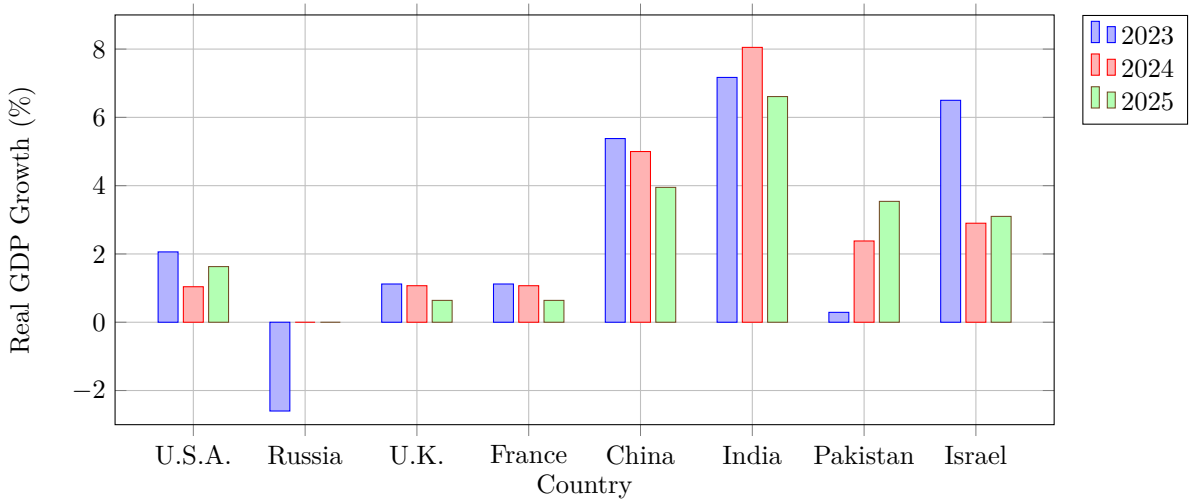

Figure 1: Recent Real GDP Growth Rates (%) for the Nuclear Powers (2023–2025).

Russia's 2024/2025 data is not available; North Korea omitted due to lack of data.

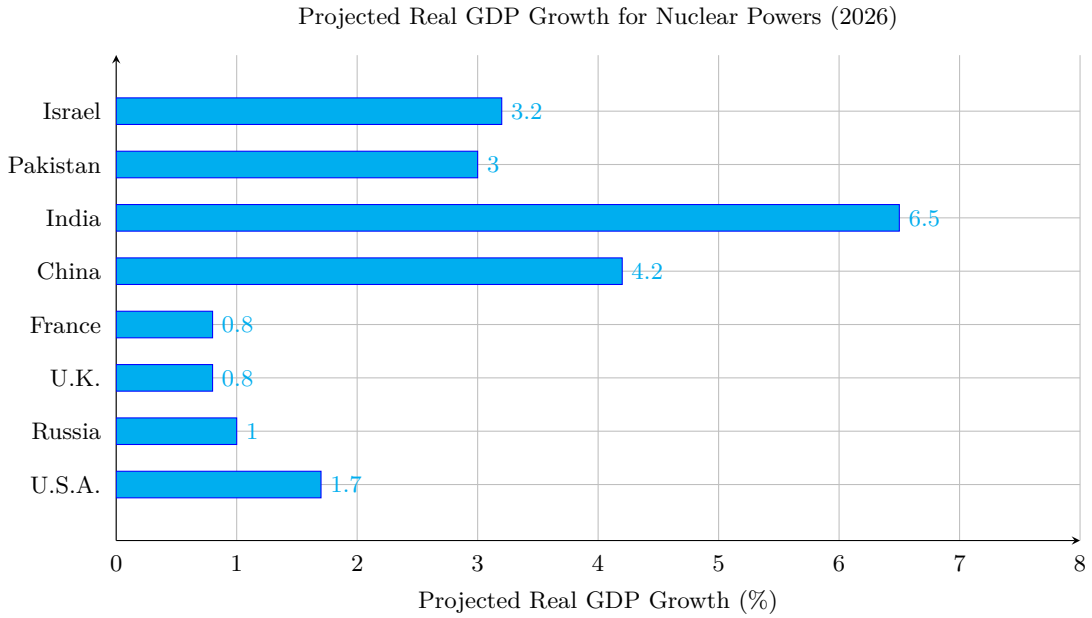

Figure 2: 2026 Projected Real GDP Growth (%) for the Nuclear Powers.

7 Conclusion

The economic outlook for the nine nuclear powers is shaped by a complex interplay of historical trends, structural factors, and policy choices. While advanced economies are likely to see modest growth, emerging powers such as India and China continue to drive global expansion. The integration of advanced forecasting methodologies, including machine learning and real-time data analysis, is enhancing the accuracy and timeliness of GDP predictions. Nuclear power status, while not a direct determinant of economic growth, is closely associated with industrial capacity, energy security, and strategic influence.

References

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[4] See research on historical GDP growth trends and implications for nuclear powers, including the positive long-run effect of nuclear energy on GDP growth [8].

[5] See recent reviews and comparative studies of ARIMA, VAR, and other econometric models for GDP forecasting [6].

[6] See: - S. Wang et al., "GDP Forecasting Using LSTM and GRU Neural Networks," *Journal of Forecasting*, 2024. - A. Smith et al., "Comparing Machine Learning and Econometric Models for GDP Prediction," *Applied Economics*, 2023.

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The End