



The impact of good governance uncertainty and foreign direct investment on employment in Iran: A fuzzy regression approach

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Abstract

In the present study, the impact of uncertainty in good governance indicators and the realization of foreign direct investment on employment in Iran has been examined using fuzzy regression with a membership degree of 0.9 for the period from 1990 to 2024. Given the flexibility of the fuzzy regression model, the right, average, and left widths for each of the variables under investigation in conditions of uncertainty have been calculated in the optimal state using the wild horse metaheuristic algorithm. The results indicated that among the six good governance indicators, a reduction in uncertainty in the indicators of political stability, quality of laws and regulations, and control of corruption has the highest impact on increasing employment, with coefficients of 0.881, 0.701, and 0.784, respectively. Additionally, foreign direct investment has an impact on employment with a coefficient of 0.689. Considering the comparison of the trends of the right, left, and average widths with the actual employment trend in the country, it can be stated that in recent years, the trends of good governance indicators and the realization of foreign direct investment in the country have not been favorable, as there has been a position for the right width to increase employment. However, the employment trend in the country has been lower than the average width and, in some years, has aligned with or been slightly below the actual employment trend.

Keywords: Good Governance Indicators, Employment, Uncertainty, Fuzzy Regression, Wild Horse Algorithm.

JEL Classification: F21, O47, J21.

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1. Introduction

Employment is one of the most significant economic challenges in Iran, with severe adverse effects on various economic and social aspects of the country. Unemployment has not only failed to decrease but has also shown an upward trend among certain demographic groups, such as youth and university graduates. This situation indicates the existence of structural barriers to sustainable employment, necessitating the identification and analysis of key factors. In this context, good governance and foreign direct investment (FDI) are recognized as two primary drivers of employment. Given the fluctuations and uncertainties in governance indicators and investment attraction, it is essential to use analytical models capable of modeling such uncertainties. This study employs a fuzzy regression model to analyze the impact of uncertainty in good governance indicators and foreign direct investment on employment in Iran over the period from 1990 to 2024. In light of these considerations, addressing unemployment in Iran requires a comprehensive understanding of the structural barriers that hinder sustainable job creation. Good governance can play a pivotal role by improving regulatory quality, enhancing policy stability, and fostering an environment conducive to economic activity. Likewise, foreign direct investment contributes to technology transfer, managerial expertise, and productivity growth, all of which can stimulate employment. However, fluctuations and uncertainties in governance indicators and FDI inflows have limited their effectiveness. Given these challenges, examining how uncertainty shapes the impact of these variables on employment becomes essential. This study fills this gap by employing fuzzy regression to capture the ambiguous and nonlinear effects inherent in Iran's economic environment.

2. Theoretical framework

Good governance plays a crucial role in economic development and employment through various mechanisms, including voice and accountability, political stability, government effectiveness, quality of laws and regulations, rule of law, and control of corruption. Improvement in any of these indicators can lead to increased job opportunities and reduced unemployment. Foreign direct investment also plays a vital role by creating new industries, transferring technology and managerial skills, and stimulating supply chains, thereby enhancing productivity and employment. However, fluctuations and uncertainties in these indicators can limit their effectiveness, necessitating more detailed examination and complex modeling.

3. Methodology

Data analysis was conducted using a fuzzy regression model with a membership degree of 0.9 to simultaneously consider the uncertainties and fluctuations present in good governance and foreign direct investment data. Annual data on governance indicators and foreign investment for the period 1369 to 1403 (1990–2024) were gathered from the World Bank, and modeling was performed using

MATLAB software. The fuzzy regression model, incorporating fuzzy coefficients and employing the Wild Horse optimization algorithm, enabled the estimation of the central value and left and right spreads of the variables' effects, facilitating a more precise analysis of uncertainty impacts. The findings indicated that reducing uncertainty in political stability, quality of laws, and control of corruption had the most significant positive effects on employment, while foreign direct investment also had a notable impact.

4. Discussion

The fuzzy analysis results revealed that increased political stability and quality of laws and regulations, along with decreased corruption, are the most important employment drivers under conditions of uncertainty. The positive impact of foreign direct investment on employment is maximized when good governance indicators are also in better condition, as appropriate governance creates a suitable environment for attracting investment and enhancing its productivity. Furthermore, the optimization algorithm used effectively managed data uncertainties and provided a comprehensive framework to understand the interactions between variables. Analysis of the left and right spreads showed that the current employment status is realistically closer to the left spread, indicating increased uncertainty and reduced effectiveness of key factors. This implies that policymakers should improve governance indicators and establish political stability to provide a conducive environment for increased foreign investment and consequent employment growth.

5. Conclusion and Suggestion

This study demonstrated that employment in Iran has significant growth potential but requires concurrent improvement and interaction of various governance and investment indicators. Enhancing political stability, legal transparency, reducing corruption, and improving government efficiency are among the most critical factors that should be prioritized in macroeconomic policies. It is recommended that the government support employment growth by providing a stable political and economic environment, reforming laws and regulations, vigorously combating corruption, and targeted support for foreign investments. Additionally, establishing mechanisms for training skilled labor and developing infrastructure for attracting investment is essential. These policies, alongside intelligent management of uncertainty, can ensure sustainable employment growth in the country.

6. Ethical Considerations

6.1. Compliance with Ethical Principles

The study was conducted using publicly available World Bank data and involved no experiments or interventions on human subjects; therefore, ethical principles for human research were observed.

6.2. Funding

This research received no external funding and was conducted independently.

6.3. Authors' Contribution

All authors equally contributed to data collection, analysis, and article writing.

6.4. Conflict of Interest

The authors declare no financial or personal conflicts of interest related to the subject matter of this article.

6.5. Acknowledgments

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