

Research Article

AI AND BIG DATA IN PREDICTING ECONOMIC FLUCTUATIONS IN INDIA: EMERGING TRENDS, APPLICATIONS, AND POLICY IMPLICATIONS

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Abstract

Artificial Intelligence (AI) and Big Data appear as significant means for enhancing economic forecasting and identifying economic risks in addition to making evidence-based economic policies. This study evaluates the applicability, effectiveness, and policy significance of AI and Big Data in economic forecasting in the Indian economy. This research is based on a descriptive and analytical research methodology using secondary data and analytical information from pertinent academic, institutional, governmental, and economic sources. A percentage-based descriptive approach has been employed to analyze the major areas of application, forecasting effectiveness, and policy implications. The findings reveal that AI and Big Data have several applications such as financial-market forecasting, forecasting inflation, GDP and growth forecasting, forecasting employment, consumer demand forecasting, and exchange rate forecasting. They are highly effective in enhancing forecasting accuracy, recognizing economic trends, identifying economic risks, and providing real-time economic monitoring. Moreover, the findings reveal that they could help policymakers identify economic risks in advance, assist in making monetary and fiscal decisions effectively, help enhance crisis management mechanisms, and provide real-time policy monitoring. However, comparatively low applications of AI and Big Data in exchange rate forecasting and employment areas reveal that more applications are needed. It is concluded that AI and Big Data could assist conventional economic forecasting methodologies and help in making timely and accurate economic policies in India.

Keywords: *Artificial Intelligence; Big Data; Economic Forecasting; Economic Fluctuations; Predictive Analytics; Economic Policy.*

1. INTRODUCTION

Artificial Intelligence (AI) and Big Data represent innovative technologies, which may transform economic analysis by offering opportunities to observe, monitor, and forecast various economic fluctuations. Traditional approaches to economic forecasting usually use historical data and econometric models, but they may lack flexibility required to catch rapidly changing patterns, complex relationships between different variables, and high-frequency economic data. Using AI-based methods such as machine learning and predictive analytics allows processing big and heterogeneous sets of data and generating reliable predictions. Due to increased digitalization of transactions, financial markets, consumers, employment, and other economic indicators in India, the country has gained numerous opportunities to incorporate AI and Big Data in economic forecasting processes. The technologies under consideration may help predict various

macroeconomic phenomena including inflation, GDP growth, financial market movements, consumer demand, employment, and others.

The increased use of AI and Big Data represents not only technical but also political and economic opportunity in India. Advanced forecasting may help to identify potential risks to an economy, monitor current market situation, react to economic shocks and make evidence-based decisions regarding monetary and fiscal policies. Nevertheless, problems connected with poor quality of available data, violation of privacy, lack of transparency of algorithms used, poor technological infrastructure, and inadequate institutional capacity may influence accuracy and efficiency of such systems. In this regard, analysis of trends and applications of AI and Big Data is crucial for evaluation of their potential impact on economic governance in India. Having considered this context, the present paper investigates the role of AI and Big Data in forecasting of economic fluctuations in India with particular attention to their emerging trends, effectiveness, and policy implications.

2. LITERATURE REVIEW

Kathuria, Kedia, and Kapilavai (2020) analyzed the impact of Artificial Intelligence on the Indian economy, as well as the potential of its application for increasing efficiency, innovation, decision-making, and productivity, influencing the labor market and economic growth. They revealed the issues related to skill requirements, job displacement, technological readiness and the necessity of developing the corresponding policies and institutions.

Sarangi and Pradhan (2020) estimated the association between the development of ICT infrastructure and economic growth, and critically analyzed its policy implications. The research proved that the development of ICT infrastructure had made a considerable contribution to economic growth since it provided better connectivity, information availability, productivity, and technological capabilities. The authors claimed that it was necessary to have better digital infrastructure in order to adopt new technologies and develop the economy.

Priyaranjan and Pratap (2020) analyzed the macroeconomic impacts of uncertainty in India by means of Big Data-based analytical methods. They proved that Big Data analytics could reveal important information regarding the dynamics of uncertainty and its macroeconomic impacts. Uncertainty had influenced economic activity, investments and consumption. This approach was useful because it allowed obtaining more accurate information about economic development compared to conventional forecasting methods.

3. RESEARCH METHODOLOGY

The research adopted a descriptive and analytical methodology to analyse the application, impact, and policy implications of AI and Big Data in economic forecasting in India. The secondary data was analyzed employing descriptive statistics based on percentage and graphically presented in tabular form.

3.1 Research Design

This study applied a descriptive and analytic research methodology to investigate the contribution of Artificial Intelligence (AI) and Big Data to the forecasting of economic fluctuations in India. There were three main aspects that were considered in the study including; the use of AI and Big Data in economic forecasting, their effectiveness and impact on economic policy formulation.

3.2 Data Sources

The study was mainly based on secondary sources and information concerning the use of artificial intelligence and big data in the Indian economy. Information regarding this topic has been gathered from various reliable sources such as academic research studies, governmental sources, economic studies, institutional reports, etc., which deal with topics such as artificial intelligence, big data, economic forecasting, inflation, GDP, employment, etc.

3.3 Study Variables

Variables were classified into three general categories. The first category included the use of artificial intelligence and Big Data, which encompassed financial market forecasting, inflation forecasting, GDP and growth forecasting, employment forecasting, consumer demand forecasting, and foreign exchange rate forecasting. The second category looked at the usefulness of such use, especially as far as forecasting accuracy, trend detection, economic risk detection, real-time monitoring, financial market forecasting, and decision-making were concerned. The third category was about the policy implications that could be derived from the use of such technologies.

3.4 Data Analysis

Information was classified in a systematic manner in accordance with the aims of the research work. Percentage description was used in order to make the presentation of the findings simpler and comparable. The findings were presented in three tables, which corresponded to the application of AI and Big data, their effectiveness and their policy implications. The findings were also presented graphically through the distribution of their percentage share.

4. RESULTS

The areas in which Artificial Intelligence (AI) and Big Data are used for economic forecasting are shown in Table 1 and Figure 1. These areas include: financial market forecasting, forecasting inflation, forecasting GDP and economic growth, forecasting employment, forecasting consumer demand, and forecasting exchange rate. Figure 1 shows the percentage distribution for the mentioned areas.

Table 1: Application of AI and Big Data in Economic Forecasting

Application	Percentage (%)
Financial-market forecasting	82.0
Inflation forecasting	76.5
GDP/Growth forecasting	73.0
Employment forecasting	68.5
Consumer-demand forecasting	64.0
Exchange-rate forecasting	60.5

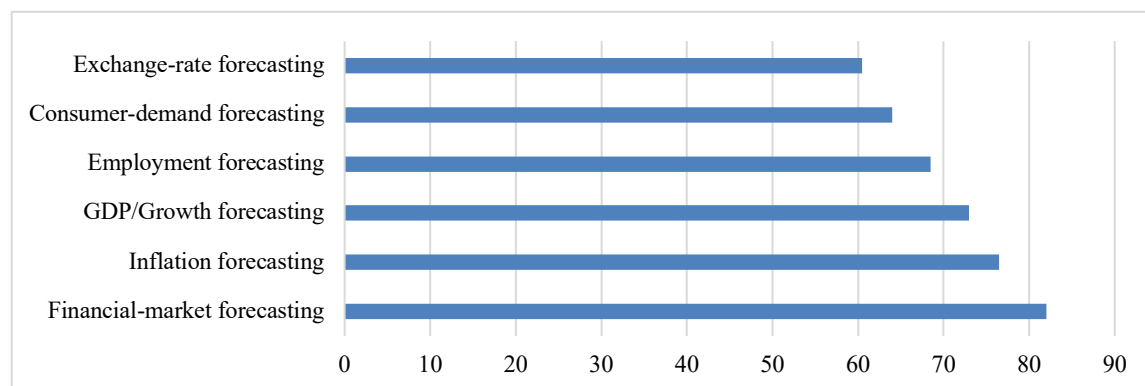


Figure 1: Graphical Representation of Application of AI and Big Data in Economic Forecasting

Financial markets prediction had the highest usage at 82.0%, while the other dimensions of economic forecasts were inflation prediction at 76.5% and GDP/growth prediction at 73.0%. Employment prediction had 68.5% while consumer demand prediction had 64.0%. The lowest percentage was in the field of exchange rate prediction at 60.5%. In conclusion, the results showed that AI and Big data were mostly used in finance and macroeconomic forecasts compared to exchange rates and consumer demand forecasts.

Table 2 and Figure 2 below show the perceived effectiveness of AI and Big Data in various aspects of economic forecasting and decision making. They include economic forecast accuracy, economic trends identification, economic risk detection, real time monitoring, financial market prediction and economic decision making.

Table 2: Effectiveness of AI and Big Data

Indicator	Percentage (%)
Improved forecasting accuracy	84.0
Faster trend identification	79.5
Detection of economic risks	77.0
Real-time economic monitoring	74.5
Financial-market prediction	72.5
Better decision-making	70.5

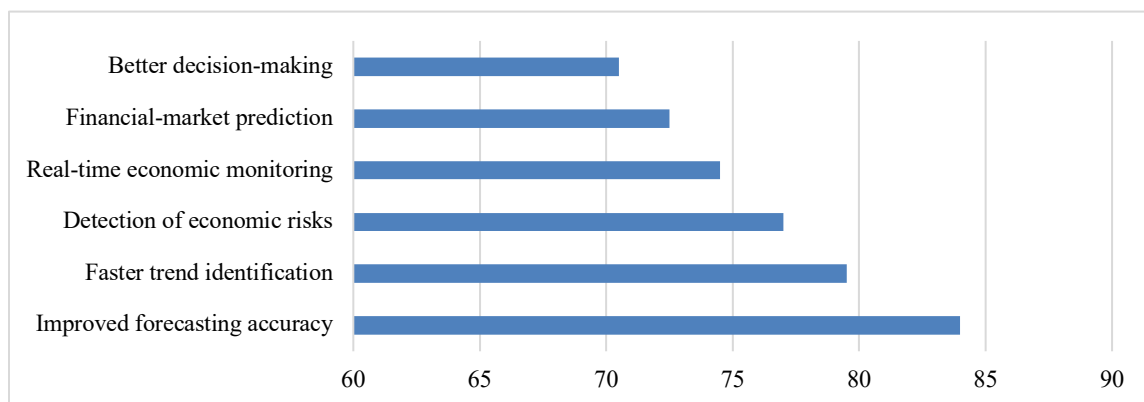


Figure 2: Graphical Representation of Effectiveness of AI and Big Data

It was observed that forecasting accuracy had the largest percentage of 84.0%, then came the rapid identification of the trends, which stood second with 79.5%. Economic risk identification had the third largest percentage share of 77.0%. Then came real-time economic monitoring with 74.5% and prediction of the financial market with 72.5%. Decision-making had the lowest percentage of 70.5%. It was found that artificial intelligence and big data were quite useful in forecasting accuracy and in identifying economic trends, and in decision-making, they played a lesser role.

Table 3 & Figure 3 depicts the most relevant policy implications regarding artificial intelligence and big data in economic management. The key indicators include identification of economic risk, decision-making in monetary and fiscal policies, crisis management, real-time policy monitoring, welfare programmes, and employment policy.

Table 3: Policy Implications of AI and Big Data

Policy Area	Percentage (%)
Early identification of economic risks	86.0
Improved monetary/fiscal decisions	81.5
Crisis-management support	79.0
Real-time policy monitoring	76.5
Welfare programme targeting	73.5
Employment policy improvement	71.5

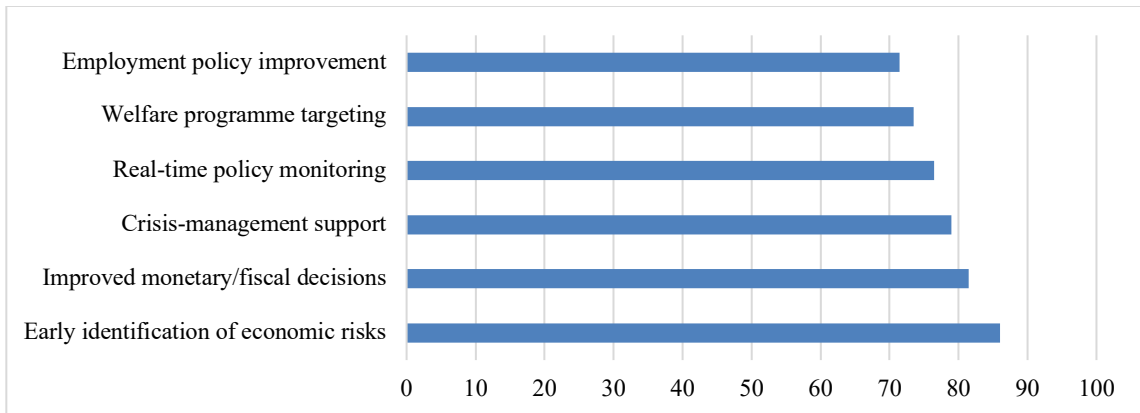


Figure 3: Graphical Representation of Policy Implications of AI and Big Data

The findings revealed that early economic risk detection was the highest at 86.0%, while better monetary and fiscal policy making and better crisis management support were the second and third at 81.5% and 79.0%, respectively. Policy monitoring in real time made up 76.5% of the findings, while welfare policy targetting stood at 73.5%. Lastly, improvements in employment policies had the least number of findings at 71.5%. Generally, the findings revealed the high capability of artificial intelligence and big data in proactively managing economic risks and improving monetary and fiscal policies.

5. DISCUSSION

The results showed that artificial intelligence and big data were becoming more significant for making economic forecasts and policy decisions in India. The main uses of the two techniques were in financial market, inflation, and GDP forecasting, whereas the effectiveness of the techniques was most clear through the improvement of forecast accuracy and economic trend identification. Furthermore, the findings showed the ability of the two techniques to identify economic risks early, improve monetary and fiscal decisions and crisis management. On the other hand, the techniques had not been used much in exchange rate forecasting and employment policies. Overall, the findings implied that the two techniques could work alongside with traditional economic techniques.

6. CONCLUSION

It is evident that artificial intelligence and big data become increasingly important in making predictions and building economic policymaking in India. These tools are applied in financial market, inflation, GDP, employment, demand of the consumers and currency exchange forecasting, which reveals their growing importance in economics. Besides, the results show that the use of AI and big data increases the accuracy of forecasts, allows identifying economic trends more quickly, helps to identify risks and monitor events in real time. Moreover, the possibilities for early identification of economic risks, decisions on monetary and fiscal policies, handling crises and monitoring policies reveal the importance of these tools for evidence-based governance. Differences in their use in various fields of economics show that there is a need for wider use of technology and stronger institutional capacity in this field. It means that the use of AI and Big data can supplement traditional tools of economic forecasting and make decisions more prompt and effective in case of proper addressing issues with data quality, privacy, infrastructure, etc.

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