# The Role of Generative Artificial Intelligence Techniques in Predicting Financial Volatility: An Applied Study on Emerging Markets

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| Sections Info | ABSTRACT |
|---|---|
| | *Objective:* This paper examines the perception and implementation of generative artificial intelligence (AI) in the context of financial forecasting on emerging markets. *Method:* The research uses a structured survey that was emailed to 137 financial analysts and professionals to examine their familiarity with the latest AI technologies, their application in the field, and the obstacles that they encounter in the implementation of these models. *Results:* The findings show that an enormous proportion of the population feels that generative models, including GANs, can provide more valid predictions than conventional ones. Approximately 65 percent of the respondents affirm that these models render it significantly more correct to predict, and an additional 75 percent of those who responded affirm the necessity to utilize these models in order to execute contemporary financial analysis. A lack of data (68%), poor infrastructure (50%), and a lack of skills (45%) are also pointed out as some of the key issues in the study. The positive relationship between the talents of the respondents at eminent AI and their desires to employ sophisticated modelling techniques is statistically significant. The results emphasize the necessity of the construction of a strong data collection infrastructure and enhancement of technological infrastructure, and the development of human capabilities through the specialization of training. *Novelty:* This research provides important lessons on the opportunities and challenges of introducing generative AI models into the financial decision-making processes in emerging economies and some key areas for policy and industry intervention to optimise their potential advantages. |

## INTRODUCTION

The modern economy is very much reliant on the financial markets. They directly affect the indices of growth and social stability. But emerging markets are still susceptible to large swings and cyclical instability, making it hard and risky for both investors and regulatory authorities to forecast economic changes. Because of this, there is an increasing demand for sophisticated analytical tools, which exceed those of the past and are enabled by intelligent technical skill. One of the most popular of these tools is artificial intelligence (AI), which, certainly in this generation mode, looks like a good tool for processing data and predicting dynamics. It does not just seek the patterns, but it also develops new data and predictive models that can help people make improved financial decisions. Nevertheless, the implementation of generative AI in the emerging markets is fraught with such pitfalls as the technical infrastructure, the availability of data, and the lack of institutional trust in such technologies. Therefore, the current paper will seek to investigate the possibility of such an artificial intelligence to understand and study the market forces in a volatile and uncertain environment.

**Research Problem**

Everything is becoming more challenging in the emerging markets, with markets becoming less predictable and volatile. Artificial intelligence (AI) is rapidly being improved as an analysis tool, yet these markets are not using it heavily. This raises the question of why, and whether it is applicable on a broader basis.

**Significance of the Study**

This research is important because it aims to use generative AI to find ways to deal with rising financial risks before they happen.  This makes the emerging markets deal with problems and makes their analytical infrastructure stronger.

**Study Objective**

This research is used to explore and study the performance of generative AI in the development of models used to predict financial market movements and to identify its potential and suitability in emerging market contexts.

**Study Questions**

1.  Is generative AI providing more value than traditional methods of investing and forecasting?

2.  How does the use of this technology change the level of accuracy of short and long-term predictions?

3.  What are the technical and regulatory obstacles to the use of these models in developing settings?

**Scientific and Practical Significance**

This research aims at the emergence of intelligent financial analysis tools in response to the nature of EMs.

The new long-term technique of synthetic design, or generative artificial intelligence, feeds the literature with an alternative understanding of the predictive capacity of generative artificial intelligence.

provides useful solutions for decision makers.

**Brief Literature Review**

Over the past years, generative AI technologies have developed at a rapid pace and are becoming increasingly prevalent in the financial sector. Examples of these are the generative adversarial networks (GANs) to generate financial data that is similar to the original data and the large language models (LLMs), which can be used to analyze financial texts and produce automated reports. In addition, generative Markov models can be used to simulate evolving patterns on the market and to assume future trends.

These models are applied to a wide range of applications in the finance sector, including predicting stock and portfolio bond movements, managing credit risk optimization, and economic prediction that are used as inputs to financial planning and analysis. However, the implementation of these techniques in emerging markets is not straightforward because they are challenged by issues such as poor availability of data, economic and political instability, and poor technical capabilities and infrastructure.

## Research Hypotheses

The study makes the assumption that the use of generative artificial intelligence methods will result in more accurate predictive models than the traditional models that are used in the developing world.

Further, it assumes that the application of the techniques identifies financial forecasts with a lower error rate.

## RESEARCH METHOD

The research is based on an applied analytical approach, with the application of real data gathered from a financial market in an emerging country such as Egypt, Nigeria, or Indonesia over a period of five to ten years.

### Data Collection Methods

Sources include historical financial market data, macroeconomic indicators, published financial data, trading information on the Internet, and market reports.

### Analysis Tools

The AI models that are generative are made using the techniques of GANs and others. They are compared with old models, such as ARIMA and regression models, and are compared using performance evaluation indicators such as the root mean square error (RMSE), mean absolute error (MAE), and the forecast accuracy.

### Study Steps

1. Take and clean data, and prepare for modelling
2. Design and implement generative models.
3. Evaluate the performance of the models with traditional models.
4. Analyse results and draw recommendations for action.

### Research Objective (Ultimate)

This research's aim is to present a scientific and practical model to utilize the generative artificial intelligence techniques to predict financial volatility in emerging markets, with the aim of focusing on the effectiveness of the presented models to support financial stability in the emerging market and to help improve the quality of investment decisions.

### Chapter Two: Introduction

This chapter is intended to present the cognitive and theoretical basis for the research by examining the major concepts associated with generative artificial intelligence (AI) and its application in financial field in emerging market environments. It also involves going through the previous research and studies which have dealt with the utilization of AI techniques for enhancing the accuracy of forecasting in financial markets. The research study recognizes gaps in research which an analysis of existing resources and knowledge gaps aims to address.

### A. Basic Concepts

### Generative AI

It is a form of machine learning algorithm that allows generating new data, of a similar kind to the original data, with the help of algorithms such as generative

adversarial networks (GANs) and probabilistic models [1]. These models assist in the processing of incomplete or variable data, and thus are applicable to market systems with data insufficiency or changes that occur at a rapid pace.

**Financial Forecasting**

It involves using data analysis of historical information to predict price trends, market changes and economic events. Traditional models consist of statistical analysis, including time series analysis and economic equations, and require a lot of information which is limited in dealing with volatile and fast-changing market environments [2]. Therefore, AI tools, specifically generative models, have become more flexible tools for forecasting.

**Features of the Emerging Markets**

These are markets which show fast economic growth however, are characterised by instability and challenges associated with data quality, technical infrastructure and economic regulations [3].

These characteristics have a direct influence on the application of AI techniques, which require models to be adapted to the always challenging market environment.

**B. Previous Studies**

**Application of AI in Financial Forecasting**

Research has demonstrated that artificial intelligence (AI), generative network in particular, offers better forecasts when compared to conventional methods, particularly when limited or unrealistic data is available (Finn et al). In one study GANs had been applied to financial data. The results led to an improvement of up to 15% in the accuracy of the forecasts.2.3.2 Challenges and Opportunities in Emerging Markets

The application of AI in these markets has issues like limited data, poor infrastructure, and unstable policies [4]. However, other studies indicate that the opposite result can be achieved when appropriately adapting models are employed, that is if suitable account is taken of the local characteristics and the unstable environment (Nasser & Bouajiln).

**Research Gap**

Despite the diversity of studies on the applications of AI in financial forecasting, there is still a gap that is clearly seen in the context of emerging markets. Most research is concentrated around developed markets, with few finding out how well generative models work in an unstable economic environment with a lack of sufficient data [5]. Many different studies are based many on historic data without taking economic and political factors into consideration. This approach requires field research based on some real-world data, and an in-depth analysis of the position of the models relative to the challenges specific to developing markets [6].

**C. Theoretical Concepts and Methods Used**

**Forecasting Models In Financial Markets**

Financial forecasting methods vary from Statistical methods (e.g., time series analysis such as ARIMA and GARCH) to Machine learning based techniques (e.g., artificial neural network ANN). With the development of artificial intelligence, there

have been the emergence of models based on deep learning, especially generative models, characterised by its ability to deal with unstable data in a more efficient manner [7]. Generative models are known for the ability at producing realistic synthetic data, this contributes to data completion and improves the accuracy of predictive models in case of deterioration of data quality.

**Generative AI Models**

One of the most well-known models applied in this field is generative adversarial networks (GANs), in which two types of neural network function against each other: one for generating and one for discriminating. The generator tries to generate realistic data while the discriminator tries to distinguish between real and generated data (Goodfellow et al., 2014). These models have been found to be very good in enhancing quality of data input for forecasts by training the two networks continuously to work together.

Probabilistic Bayesian models are also employed to estimate the level of uncertainty in the forecasts, so as to improve the reliability of their outputs in volatile markets (which is especially important for EMs) [8]. These models are dynamic and practical tools for processing incomplete data as they can automatically adjust and update their predictions in reaction to new market disturbances.

**D. Relevance of the Proposed Research**

Scientific and practical significance of the study: The findings of this research advance the study on application of generative AI in the emerging markets, as well as it gives research foundation to frame better suited and adaptable prediction tools. Moreover, its findings will be of great use for investors, policymakers and financial institutions, who will benefit from analytical tools helping them to manage risk better, minimize loss and maximize economic performance with volatile settings.

Various models and methods have been applied for forecasting of financial data in the last decades, such as traditional statistical models, time series models (ARIMA-GARCH). However, these models usually show limitations in accommodating atypical changes and abrupt fluctuations, especially in emerging markets where the data is volatile and poor enough [9].

In recent years, artificial intelligence techniques, more specifically generative neural networks (GANs) and deep learning, have shown potential and flexibility to solve complex problems and even circumvent the issue of data scarcity [10]. However, the use of such techniques in emerging markets is still in its early stages. It is hindered by weak infrastructure, poor data, and an unavailability of models adapted to the unique characteristics of those markets.

Also, a large number of researchers have emphasized the pressing need for the implementation of models that transcend traditional capabilities and that would pragmatically incorporate more advanced technologies, economic and political understanding, etc. There is even less research done when it comes to their application in emerging markets [11]. In this vein, the present research aims to fill such lacuna by experimenting with adapted generative models that incorporate the business specifics of each market.

## E. Problems and Recommended Resolutions.

A lack of information, unpredictable changes in policies, and the inability to quickly adapt to the changes in the economy and politics are the most noticeable issues of the use of generative AI methods in the new markets. In order to overcome these difficulties, it is suggested to rely on dynamic model adaptation techniques, as well as active learning to overcome missing data. The models also require continuous communication and field testing that will help to check its applicability to the market conditions [6].

In addition, another important step to increase the accuracy of the forecasts is the increased collaboration between the researchers and the stakeholders regarding data quality. The integration of such measures with the modern technologies may play a huge role in enhancing the performance and development of models.

## F. Perspectives of AI Usage in the new markets.

Nowadays, research and development are aimed at increasing the range of AI applications, especially generative models, in the field of financial forecasting, risk management, and financial fraud detection. As the access of data increases and new technologies are implemented, it is predicted to stay that models will become more efficient and adjust to unstable environments. The more interactive and adaptable models are predicted to appear, which will be based on constant learning and will apply the methods of reinforcement learning and explainable AI to deliver transparent and trustworthy predictions depending on the needs of investors [12].

## Conclusion and Recommendations

In conclusion, this chapter underlines the significance of applying the cutting-edge technologies, especially the generative AI, to improve the quality of market forecasts. This is a critical assignment in new markets where there are no reliable and plentiful data. The models require modification to suit the characteristics of such markets, problems of data availability, and an integrated model that brings together the best of modern technologies and the understanding of economic and political issues. The results of the study will be expected to provide practical interpretation tools and principles which can be used by decision-makers of public and private sectors, as in policy makers, financial institutions and investors, to make better decisions and more reliable decisions. Besides, they pave the way for future work of refinement of forecasting models and adaptation to market challenges. Researchers as well as market makers are also advised to use the technological advancements along with economic and political knowledge to guarantee more dependable results and "leverage the AI tools in risk management as well as effective investment decision making". To achieve the need for scaling in use and impact of AI, increased collaboration between academics and stakeholders and the development of enabling policies are key components that determine the increased effectiveness of AI application and actual results on the ground. In this regard, this research is a significant step to know the potential of the innovation of generative models in a better forecasting financial needs, especially in the special circumstance within the market. The idea within this approach is to provide an holistic vision to guide the development of and modernization of financial analysis tools for these markets.

## Conclusion and Implications for Future Practice

The study emphasizes that generative AI models and algorithms, such as adversarial generative networks (GANs) and probability models are viable solutions for enhancing the accuracy of financial prediction, especially in emerging markets that are faced with the issue of data stability and swift volatility. These models are used to generate plausible industrial data, and to reveal hidden patterns for increasing forecast reliability and improving risk management. However, there are still several knowledge gaps and concerns with the misuse of economic models to the reality of emerging markets, where information is limited or unstable, and levels of economic and political variables are stochastic. Therefore, the present study should include fitting these models to actual data in an emerging market and compare their performance with the traditional ones such as ARIMA or the traditional neural networks and assessing the effectiveness using different metrics such as the mean square error (RMSE). The study will also examine methods for handling incomplete or volatile data by adapting and supervised training, in order to increase the performance of the models applied in an actual market situation.

## General Summary of Chapter Two

The study reviewed theoretical principles and previous research related to the application of artificial intelligence techniques, especially generative models, to the improvement in the accuracy of financial forecasting in the emerging markets. The findings, however, showed a severe research gap, that is, the dearth of applied research to test the effectiveness of these models in unstable market environments. The findings emphasised adaptation of these models to local characteristics and constant updating of such models for better quality of the forecasts and for reduction of risks, opening up wider horizons for researchers and policymakers to contribute in stability and economic growth in these markets.

## Chapter Three: Practical Section

## Introduction

This chapter is aimed to review and analyse data that are collected through a questionnaire directed to financial experts and analysts in emerging markets. The goal is to test their beliefs and practices about the application of generative artificial intelligence models for better accuracy of financial forecasts and focus on possible challenges and opportunities. This chapter contains the explanation of the data collection tools, the analysis of the results and the scientific discussion of the findings following scientific research principles, a reference to relevant previous studies.

## A. Methods of Research Tools and Collection of Data

## Study Tools

The study was based on the electronic questionnaire developed on Word, the questionnaire was developed on basis of previous scientific literature particularly those works which deal with evaluation of forecasting models and modern artificial intelligence techniques [4][13]. The questionnaire was set up with the aim to measuring

the knowledge, the degree of use of generative AI models and the evaluation of the performances of these AI models in the context of emerging markets.

**Survey Content**

Part One Participants personal details (age, educational qualifications, years of experience, job title).

Part Two: Their familiarity with the technologies of modern AI - the generative models.

Part Three: Assessing market dependence on traditional and new forecasting models including their satisfaction with the performances of these models.

Part Four: Their view of how effective generative models are compared to traditional models as a means of improving forecast accuracy.

Part Five: The challenges and difficulties that they encounter in implementing these models, according to their perspective.

**Data Collection Procedures**

The survey was sent out electronically through email and social media platforms to 150 financial professionals. The stratified random sampling method was employed in order to achieve balanced geographical and regional representation. In the period from January to March 2024, a total of 137 complete responses were collected for a participation rate of 91.3%.

**B. Sample Characteristics**

To illustrate the sample characteristics, descriptive data were as follows, which showed the good representations of demographic variables (SPSS, 2024).

| Properties | Percentage (%) |
|---|---|
| Gender (Male) | 65 |
| Gender (Female) | 35 |
| Age (30-45) | 70 |
| Age over 45 | 30 |
| Experience over 5 years | 75 |
| Occupation: Financial Analyst | 50 |
| Occupation: Investor | 30 |

**C. Data Analysis Tools**

The data was analysed using the version 25 software package, Statistical Package in Social Sciences (SPSS). Descriptive analyses were performed using frequencies, percentages, means and standard deviations. Correlation tests were also applied, e.g., Chi-square was applied to analyse the relationship between qualitative variables, and Pearson's r test was applied to explore the relationship between levels of knowledge and reliance on modern models of AI (Tabachnick & Fidell).

**D. Study Results and Analysis**

**Understanding of Contemporary technologies and AI methods.**

The survey data revealed that 80% of the respondents were well informed about AI methods with 60 percent of them having the view that generative models could transform financial forecasting. This is because the studies performed showed that the generative

models work well with Liu et al [14], where they discovered that the generative model improves the accuracy of forecast in volatile data since the model can adjust the input data and generate synthetic data which can withstand the abrupt changes and volatility in stock market.

## Quantification Model Dependence of the Market on generative AI Models in financial forecasting.

Three-quarters of respondents confirmed that the accuracy of the prediction forecasted by the market, with the aid of generative AI models, such as generative adversarial networks (GANs), is significantly superior to the outcome of traditional models. It supports the findings of Hassan et al [6]. Where the authors have proposed that the using of generative models will be able to process the incomplete information and highly volatile environments, specifically in the emerging market. Three-fourths of the respondents also stated that generative models have become fundamental to the financial forecasting processes since multiple scenarios are offered, and risks are more accurately understood, which have been confirmed by Li et al [13].

When asked about the level of satisfaction with the performance of existing models, 55% of the respondents said that they were not completely satisfied. Nevertheless, they do have certain reservations concerning the necessity to enhance their capabilities, in particular, in small and unstable data spaces. This is aligned with the observation made by Liu et al who observed the need to keep on developing and adjusting models to suit the market expectations [9].

## The Problems that Participants Can encounter during the implementation of Generative AI Models.

The findings of the survey identified the following challenges as the most eminent: Inadequate data: 68 percent of the respondents reckon that data of low quality and quantity is a major barrier to full generative model use. This requires the enhancement of data collection and analysis systems, which is also verified by Kumar and Singh [11].Weak technical infrastructure: 50% report that poor technological facilities, including computing software and storage, interfere with actual implementation of the models. Tian et al confirmed this by underlining that the technology environment and infrastructure require improvement as a means to optimise the use of these technologies [12].

The absence of skills and expertise: 45% have no skills to manage and develop AI models, and it is recommended to conduct training programs, and continuous professional growth, according to Hassan et al [6].These findings highlight the need to create detailed national strategies to enhance the quality of data and the acquisition of skills. Updating the technological platform to utilize generative AI models in new markets to the fullest extent.

## The Interconnection between the Level of Knowledge and AI Models usage

The outcomes of the correlation test revealed that there is a statistically significant positive correlation between the level of knowledge of modern technologies and the degree to which the participants use advanced forecasting models (r = 0.45, p < 0.01). It

implies that the more knowledge and technical skills associated with the use of AI models, the greater the trust in the application of AI models will inevitably be high. The latter was supported by the previous studies, such as the results of Kim who claimed that the contribution to the effective implementation of the AI models is made by both the level of education and experience. This highlights that the continuous training and professional development, which is confirmed by Li et al, may be used to make these models more reliable [13].

## E. Discussion of the Results

The results of the research indicate that the respondents are getting more enlightened on the value of the generative AI models in increasing accuracy of forecasts and financial analysis processes. This is in accordance with the previous researches that have been summarised in various studies such as by Hassan et al and Li. et al [6][13]. However, lack of data, insufficient infrastructure, and human skills are also some of the paramount challenges of implementing these models globally to the emerging markets as opined by Kumar and Singh [4]. The quality of data, developing technical skills and advancing the infrastructure should be the strategic priorities of improving AI applications and providing more accurate results, basing on the recommendations provided above. Tian et al argue that better technological infrastructure and specialised training can improve the market to adopt AI models more effectively, which is why government and corporate policy can help promote technological innovation. Another important point made by the research is that the degree of professional knowledge and experience is the factor that contributes to the enhanced confidence and the use of new models [12]. These results are justified by positive correlations, and it was observed that those with more experience and knowledge were more willing to use generative models. This aligns with the article of Kim that revealed that ongoing learning and training enhances the effectiveness of implementing AI technologies in the financial industry [15].

Generally, the research findings can be compared to the available literature on the advantages of generative models. Still, they point to the necessity to handle the issues of data, technology, and expertise to make the market exploit the potential of these technologies to their fullest [6][5].

## The Relationship Between Knowledge Level and the Use of AI Models
## The connection between the level of knowledge and AI models utilization

The correlation analysis results indicated a statistically significant positive correlation between the degree of modern technologies knowledge level and the degree of reliance of the participants on the modern advanced models of forecasting ($r = 0.45$, $p < 0.01$). This means that the more knowledge and technical expertise is related to the application of AI models, the more confidence comes with the use of AI models. This fact is justified by the result of previous studies, such as Kim, who said that education level and experience are the significant factors that influence the adoption of new technologies [15].

It was also discovered that the experience gained in the profession of more than five years was associated with the higher rate of successful AI models application. It

highlights that the quality of these models can be enhanced through the continuous training and professional development that is confirmed by Li et al [5].

## F. Discussion of the Results

The research findings show that the participants are becoming more conscious about the advantages of generative AI models to enhance the accuracy of forecasts and methods of financial analysis. It aligns with the findings of past research that are summarised by a number of studies [6][13]. There are however, issues related to data scarcity, poor infrastructure, and shortage of human skills that greatly impair the popular use of these models in the emerging markets [4]. According to the above recommendations, data quality improvement, technical competencies development, and infrastructure upgrading are the strategic priorities of the improvement of AI applications and the generation of more accurate results.

Tian et al claim that the market can better adopt AI models with the improvement of the technological infrastructure and specialised training, which is why governmental and corporate policies are significant in the context of supporting technological innovation [8]. It is also mentioned in the research that professional knowledge and experience are also significant factors that contribute to the growth of confidence and implementation of new models. This observation is evidenced by the results of positive correlation, which indicated that the more experience and knowledge a participant had, the more inclined they were to use generative models. This is in line with the research by Kim that revealed that the effectiveness of the application of AI technologies in the financial sector rises with continuous education and training [15]. On the whole, the research results show the alignment with the existing literature regarding the advantages of generative models, however, underline the necessity to overcome the issues with the data, technologies, and expertise in order to allow the market to realise the potential of the technologies to their fullest [6][5].

## G. Recommendation and Conclusion

Considering the findings of the research, it is possible to suggest a set of recommendations that may allow to make the usage of generative AI models in the financial market more effective:

Ensuring the quality of data: This includes developing the complete and robust data collection plans and good data cleaning and data analysis systems that ensure that the quality of data that is used in models is good [4].

Development of technical infrastructure: Stakeholders should invest in computing and storage modernization and make sure that they have sufficient resources to accommodate the implementation of generative AI models [8].

Training and Capacity Development: The specialised training must be created to familiarise the professionals with the process of AI models management and development to enhance the level of specialisation and awareness based on the findings of Kim and the principles of Hassan et al [2][6].

Embracing supportive policies: This entails establishment of clear strategies in government and other agents to promote the innovation and give incentives to the adoption of such new technologies.

## CONCLUSION

**Fundamental Finding :** Generative AI models have the potential to enhance the accuracy of financial forecasts in the new markets. **Implication :** The findings of this study are aligned with the scientific literature and underline the necessity of the enabling environment of technological advancement and constant training as a factor contributing to the increase in the transparency and efficiency of the financial market. **Limitation :** Nevertheless, they need some concerted efforts to improve the technical and human conditions so that they can optimise their use of potential. **Future Research :** Future research can explore in greater depth the types of technical and human interventions required to effectively optimise generative AI implementation in financial forecasting contexts, especially within emerging markets.

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