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Research Article

Will the GAI Using Restrict or Elevate Financial Market Volatility?

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Abstract

Objective: The Generative AI (the GAI) capabilities are far superior to the NI ones in risks detection and calculation. But for the uncertainty assessment traditional methods based on risk/profit calculation help badly. Meanwhile such assessment is the most complex task that the GAI faces in the financial market. Its decision may prevent destructive volatility in this market. But this subject investigated weak in literature. So, the paper focus on the uncertainty specifies and the GAI capabilities to assess these specifies.

Methods: The author used the method criticism of judgements originated by I. Kant. The application of this method is using in the paper includes content analysis of the semantic meanings of the conceptual apparatus (first of all, concepts of uncertainty and bounded rationality) that must be use for the GAI construction. Also, the application of this method includes verification of judgments used this conceptual apparatus according to the criteria of logical consistency and sufficient justification.

Results: Literature review shows that nowadays there are weak understanding of uncertainty specifies and limits of the GAI decisions under uncertainty. Moreover, if we are transferring to the GAI using in financial market, mentions in papers devoted to the GAI about uncertainty become relatively less. But the understanding of these specifies and limits need as for creation of effective the GAI models so for the GAI users. Therefore, the author highlights the main specifies of uncertainty are capable to elevate financial market volatility.

According the basic concept of the paper, the GAI is the imitation of the Human Intellect (HI), in which the HI intellectual capabilities multiply by inaccessible to the HI highly sophisticated algorithms, complexity and speed of calculations, and big data processing. Such a concept means the GAI in the financial market will imitate financial behavior of the HI which act under impact of bounded rationality, animal spirit, and investor herding. The GAI as the HI imitation ought to follow the same path in the financial market. The GAI, as the HI, faced uncertainty must be guided by bounded rationality and must combine two heterogeneous and opposite (as F. Knight stated) origins: risk calculation and uncertainty assessment. This combination is the base of the investing strategy choice. In the most cases such choice bases on logically incomplete judgments as implicit (or hidden)

premises. Due to the fact that the GAI considers significantly more options, the range of positive and negative outcomes of decisions is much wider than the HI ones. Also, positive and negative externalities are larger.

Conclusion: The GAI is not able to eliminate the impact of the most important uncertainty specifies. Moreover, it generates additional uncertainty, systemic risks, and wide the potential of the financial market volatility. So, ones provide grounds for the conclusion that the scale of acceptable volatility of the financial market should be limited by the regulator more strictly than during the times when the HI dominated in markets. Such regulator policy will limit the margin rate, but will allow to maintain the financial market stability.

Keywords: uncertainty, risk, volatility, financial behavior, bounded rationality

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1 INTRODUCTION

We suppose in the near future the financial market actors will try to use the Machine Learning and Generative AI (GAI) in rising largescale. The GAI using in financial research and practice is still at an early stage^[1]. Companies declare the GAI is being used to help combine and weight the various investment factors that guide stock picking, which allows to increase the assets return by reducing their volatility. It is impossible to define a synthesis of a vast body of studies that follow the path of a phenomenon evolving in cycles between hypes and disillusionment^[2]. But the general agenda rise more and more essential. It is as follow. Will the GAI application capable to narrowed uncertainty realm in the financial market and limit financial market volatility? Or vice versa, the GAI will bring addition uncertainty magnitude and rising volatility to this market?

This paper based on some statements: volatility is essential feature of financial market; the financial market has no economic reason without volatility; the goal of the GAI application by financial market actors (except regulators) to make a profit; so, the volatility expelling from the financial market cannot be the GAI application aim. It needs to differ concrete assets volatility and volatility in the financial market as a whole. Now some investment finds declare the GAI is being used to help combine and weight the various investment factors that guide stock picking. It allows to increase the assets return, in particular, by reducing their volatility. This is the result of the GAI's more complex models using based on new statistical methods. But the perfectioning this type of the GAI models not solve the problems of uncertainty and volatility in the financial market as a whole, as shown below. The group of assets volatility lowing may to be in time the financial market volatility rising.

The problem posed has three aspects depending on how the GAI be used in the financial market. First of all, GAI can help to solve the supervisor and regulator tasks. Secondly, GAI can be engaged in trading. Finally, many believe the GAI best able to perform the analyst functions.

The paper focuses on the GAI nature as the Human Intellect (HI) imitation and the GAI capabilities to solve uncertainty problems in the financial market and to influence on its volatility that are consequences of its nature.

2 MATERIALS AND METHODS

The review of the literature devoted to problems of uncertainty, risks, and volatility in the financial market present initial materials for the paper.

Since the publication of the article by Brenner and Galai^[3], devoted to researching methods for hedging financial market risks, the attention of financial analysts has been focused primarily on ways to assess volatility risks and volatility indices developing. Also, indicators of uncertainty were creating, for example, uncertainty of the macroeconomic policy, uncertainty of the monetary policy^[4]. Such researching received additional impetus in 2018 when uncertainty and volatility suddenly increased sharply, so-called "volmageddon" sell-off occurred, and vulnerability of hedging tools was demonstrated. The "Black Monday" in August 2024 pushed new tour of the researching and discussions in this area.

However, there is lack consensus about definitions different kinds and specifies of uncertainty and no unite methodological approach to the uncertainty research in literature. Set of researches consider nexus of uncertainty and financial market volatility in the broad context of the impact of uncertainty to economic activity and business cycle dynamics^[5,6]. In particular, macro-economic uncertainty - "macro uncertainty" is used as conceptual base^[7,8]. Some focus on the relationships between financial risk and the real economy^[9]. It has been noted the trade uncertainty in bank sector has potentially important

implications for the financial market under crisis threats^[10]. Also, it has been established that international uncertainty shocks impact differently on advanced and emerging economies and different sectors of these economies^[11]. Researchers were examined the impact of political uncertainty generated by elections or referendums to the financial market, for example, in case when political uncertainty was significantly boosted by the Brexit referendum^[12]. Such political uncertainty differs from institutional uncertainty. Institutional uncertainty is the lack or incompleteness of clear formulated formal and informal rules and norms governing specific types of people's activities (including financial behavior) and the weak reenforcement of such rules and norms^[13].

Some problems are at an early stage of investigation.

Although financial market volatility has been widely used as a proxy for uncertainty in macroeconomic models^[9], volatility can change due to reasons other than uncertainty. In particular, volatility of the national financial market depends on such long-term factors as density and depth: one assumes the US financial market is less volatile, as a rule, than the developing economies markets primarily due to the influence of these factors. Also, volatility of the national financial markets depends on the interest rate level and its trend: at low interest rates (providing ease capital access) the volatility is lower with presumed equal uncertainty.

The next question. It's necessary to note uncertainty and potential threats may originate from reciprocity and cooperation between different GAI, because these GAI are trained mutual on data that includes content generated by themselves. Some researchers found that the GAI models trained with AI-generated content produce unintended, and potentially nonsensical, outcomes; so, errors from one model are exacerbated by the next, pushing the GAI further away from reality until prompts essentially yield gibberish. Future GAI models "will inevitably train on data produced by their predecessors," as AI-generated writing spread across the web and seep into online datasets^[14].

The problem of paramount importance is that the GAI characteristics — discreteness, diffuseness, and opacity — stay essential, and no consensus about uncertainty and risks of the GAI application and its law regulation^[15]. Nowadays the researchers mainly focus on narrow tasks of risk management by the GAI. So, the example of comparative analysis Gemini and ChatGPT in the context of finance and accounting^[16] no contain mentions about uncertainty. The regulatory proposals and acts such as the White House AI Bill of Rights and the European Union AI Act primarily target the immediate risks from AI, rather than broader, longer-term risks^[17,18]. Although new EU legislation (the AI Act) introduces tiered risk classification that diverges from the traditional high, medium, or low-risk categories

and additional requirements to the models posing systemic risks the possibility the GAI unpredictable outputs raise concerns^[19].

So, the task to define, picture, and monitor the different specifies of uncertainty and different risks kinds not solve in needed volume for the GAI effective application in financial market. As a result, there are no yet sufficient law obstacles for market meltdown threat under rise uncertainty and volatility.

The decision of this paper's task presupposes the formation of adequate judgements corpus by the method of judgements critic. This method needs primarily because the concept of uncertainty is inherently polysemantic. judgments accord and sufficient justification. The basics of this method as follows. The assessment of uncertainty always involves value judgments by the HI. The specifies of the human intellect were considered by I. Kant. In "Critique of judgment" (published at 1790) he formulated the antinomy of taste (the same value judgments) as follows: A judgment of taste is based on concepts or is not based on concepts. He noted, "that it is necessary for our transcendental power of judgment to adopt both these senses (or points of view in judging) but that even the illusion arising from our confusion of the two is natural and hence unavoidable"^[20]. There are no arguments or evidences that these features of human intelligence can change under the influence of the speed and algorithms of calculations, as well as the volume of information processed at calculations. The application of this method includes content analysis of the semantic meanings of the conceptual apparatus of uncertainty and bounded rationality that must be use for the GAI construction, that will be done in next sections. Also, this method supposes verification of judgments according to the criteria of logical consistency and sufficient justification. On this method's base the paper discusses the financial market vulnerabilities and externalities related to uncertainty and volatility that may be outcomes the GAI using in this market.

3 RESULTS

3.1 Uncertainty Specifies Pose a Challenge to the GAI Ability to Restrict Financial Market Volatility

This section considers the judgments analysing the main specifies (kinds) of uncertainty which the GAI faces in the financial market. These specifies of uncertainty as follows:

uncertainty assessments of assets; uncertainty the event possibility and uncertainty the event scale; uncertainty assessments by market actors the event possibility and the event scale; uncertainty arising from distortion of information by communication channels, including both technical distortions and distortions in the interests of intermediaries that are not transparent and fully predictable; unclear boundaries between different specifies of uncertainty (above

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mentioning) and the resulting unclear boundaries and areas of various model application for the mutual uncertainty and volatility influence; uncertainty the event impact and its scale on various assets and financial market segments, in particular, uncertainty of externalities.

These specifies of uncertainty are threats of financial market volatility elevation and challenges to the GAI's ability to operate in this market effectively, as treader, consultant, and regulator.

If different specifies of uncertainty are united threats of financial market stability multiplied and volatility elevate. Such as political uncertainty of election results unite with uncertainty of institutional changes and macroeconomy dynamics. Uncertainty synergies effect is the result of multiplication and co-pushing different uncertainty specifies (its kinds) and originate financial market systemic uncertainty. It occurs about the same as risk referring to the risk or probability of breakdowns in an entire system which is evidenced by correlation among most or all the parts becomes financial market systemic risk^[21]. Financial market systemic risk and financial market systemic uncertainty pose an even more complex challenges to the GAI ability to restrict financial market volatility. Paradox contains that if we are transferring to the GAI using in financial market, mentions in papers devoted to the GAI about uncertainty become relatively less as seen in review in Section 2. No one has proven that big data processing, sophisticated algorithms, and fast calculations by themselves lead to better financial forecasting quality.

3.2 Bounded Rationality and the GAI Capabilities

The following considers the judgments analysing the GAI capabilities to limit uncertainty in the financial market. It is necessary to emphasize, in all cases, the functionality of the GAI nowadays limited and will be limited in foreseeable future by the GAI nature. The basics of this paper is the concept the GAI perform as imitation of the HI multiplied by the complexity and speed of calculations, big data processing, and the fast ability to adapt to a changing environment, that are inaccessible to the NI. In this sense GAI can outperform supervisors, traders and analytics in the cognitive problems solving in the financial market and the financial assets managing. But only in this sense. The GAI on financial market will act on the basis of accumulated information about the NI actions and imitate the HI financial behavior that base on his value judgments. As stated above, value judgments are always not logical and incomplete. Transactions and contracts basing on human judgments the same. Kant's antinomy, which the HI encounters, must be resolved by him in such a way that the HI can continue his reasoning without violating the rules of logical construction and frames of rational judgments. The HI solves this problem by using logically incomplete (incorrect) judgments as implicit (or hidden) premises of reasoning. Such implicit premises of reasoning as *ceteris paribus* (other things being equal) and *ignoration elenchi* (thesis substitution) are necessary for the HI to avoid direct opposition of essentially contradictory judgments and so a-logical conclusions. These premises are used in one way or another when creating financial market models. Any model includes a limited set of dependencies, primarily statistically significant ones and presumes that these dependencies significant at other things being equal (*ceteris paribus*).

When individuals make judgments, they must develop, evaluate, and select among a series of choices (or options), in which the final decision is based on a degree of risk and uncertainty. They judgments, as behavioral finances concept coins, bases on cognitive and emotional biases that makes inevitable bounded rationality, animal spirit, and investor herding^[22]. The logic base of bounded rationality and related actions are incomplete (incorrect) judgments mentioned above.

Judgments based on bounded rationality influences on risk assessment primarily through risk aversion or risk embrace and low influences on risk calculation directly. Risk calculations are total rational and base on quantitively calculated probabilities of events.

For the uncertainty analysis we must differ probability as the base of risk calculations and possibility as the base of uncertainty valuation. There is the difference between calculating risk based on the probability of a repetition of past events and assessing uncertainty as the possibility of events that have no analogues in the past. This different understanding funds on F. Knight's uncertainty and risk concept^[23].

The problem of risk assessment is solved relatively simply by the HI: using calculations of future events probability based on past events statistics. The GAI solves this problem in the same way. Moreover, the GAI has total advantages in this way, which are well known and mentioned above.

The situation with uncertainty is more complicated. There is always uncertainty in forecasts of future events (regardless of the field in which these events may occur - macroeconomics, finance, social processes, climate changes, and disasters, etc.). The essence of uncertainty, according to F. Knight, is precisely the impossibility of quantitatively assessing the possibility of future events. Trends created by new technologies application, economic and political disastrous, climate changes, decentralized finance, and geoeconomic fragmentation push on financial market uncertainty and volatility growing. Briefly speaking - unique events quantity rise, history is no longer a guide. The obvious result of these trends in financial market is the narrowing calculated risk realm and the widening uncertainty realm. Attempts to calculate uncertainty similar to risks calculation are in genuine the calculation of additional risks and generate self-deception about uncertainty elimination.

On the other side, as a clearer understanding of particular specifies of uncertainty is achieved, it makes closer to technically possible to quantify this specifies of uncertainty as the probability of risk events. Such a way, risks realm is widening, the weight of new types of risks that were recently assessing and quantifying as insignificant is growing. For example, uncertainty specifies generated by carbon emissions and rising costs associated with consuming natural resources, has become an area of risks that are currently interpreted as "emerging risks". This trend of widening risk realm gets strong impact by the GAI using increasingly sophisticated algorithms, processing capabilities, and big date.

So, there are contradicted trends of uncertainty and risks realm evolution. The fundamental problem is the exact distinguishing between uncertainty and risk and, accordingly, the applying models for assessing uncertainty and calculating risks. Both uncertainty and risk "in their pure forms" do not exist. Modern risk indicators contain latent uncertainty assessments, as a rule.

The GAI, acting in accordance with the bounded rationality, makes decisions according to the same scheme as the HI. Making investment decisions, the HI, in practice, mostly intuitively (Moliere's Jourdain also did not know that he was speaking "in prose") tries to combine two heterogeneous and opposite (as F. Knight stated) origins: risk assessment and uncertainty assessment. Risks are assessed based on the calculation of the probability of events. Uncertainty is assessed as the clarity of knowledge (understanding) of the event itself and specifies of its uncertainty, which are considered above in Section 3. The expert assessment method (Delphi method) is most suitable for such an assessment. At this case calculations are not effective. This case is the realm of bounded rationality basing on logically incomplete judgments. The HI combining two named origins, forms a kind of "the choice matrix" image. Its bases are two axes. The first axis, characterizing the risk assessment: in the simplest case - high and low. The second axis, characterizing the uncertainty assessment: in the simplest case - also high and low. Low uncertainty means that experts have a clarity knowledge (understanding) about the event itself and its characteristics, or experts think that they have such knowledge. This "matrix" is the base of the investing strategy choice. Ordinary HI chooses in most cases solutions that are characterized by low risk and low uncertainty (or, the same, high clarity). Such strategies are typical for investors-savers in a falling market. An investment strategy focused on profit or other priorities may encourage the choice of other solutions, for example, those characterized by high risk and high uncertainty of the outcome. The GAI acts in the same way, but "the choice matrix" forms by the program; also,

the base, speed and other opportunities for choosing solutions of the GAI are much larger.

Bounded rationality expresses the heuristic potential of the HI and provides the capability of the HI to act under uncertainty. In order to effectively act under uncertainty, the GAI must imitate the bounded rationality of the HI. At the same time, it is obvious that tasks of calculating all risks and assessing all uncertainty specifies for each asset or group of assets are beyond the capabilities of the HI. The GAI is capable to successfully achieve such tasks if it will use "the choice matrix" in full volume at the programing.

At the same time anybody must not forget, due to the fact that the GAI considers significantly more options, the range of positive and negative outcomes of decisions is much wider than the HI ones. Also, positive and negative externalities are larger. The above is true both for an individual investor (either not using the GAI or using the GAI) and for the financial market as a whole. For example, if the majority of the GAI users chooses for some reason a consensus strategy of investing in high-risk assets, the clarity of knowledge of which is low. Such a choice gives grounds to expect the bubble formation in the financial market.

4 DISCUSSION

In this section, based on the above understanding of the GAI and uncertainty specifies, some arguments are considered that support opposing views on how the GAI affects financial market volatility.

If the issue were one of better risk calculation, there would be little doubt that AI would limit market volatility. However, as shown above, the issue is more complex. The HI imperfections such as bounded rationality and animal spirit are the GAI initial base. The GAI is forced to imitate these imperfections. There are no other options for the GAI to act. So, the GAI is vulnerable before black swans just like the HI.

If the GAI algorithms operating in a financial market imitate the financial behavior of the HI in this market, then it follows that a universal the GAI that fits all traders, each of whom is the HI, is impossible. The GAI can exist as a single object ("thinking machine") or as several "machines", but it or they will give different answers to different traders. Each trader will demand and buy the GAI's answers, the algorithms of which are adapted by the GAI's selflearning to the course of action that seems best (optimal) to the individual trader (the HI). This means that each individualized set of the GAI answers (or actions) will be characterized by unique combination of the risk embrace and risk aversion. Also, each individualized set of the GAI's answers (or actions) will base on unique uncertainty assessment of future financial market events, that imitate the trader-customers assessment.

It's necessary take into account that an attempt of the GAI to calculate risks in realm where uncertainty dominate can bring customers misinformation and so unpredictable outcomes. Future events are never identical to past events, at uncertainty conditions especially. If nobody doesn't see crisis looming over markets it doesn't mean there won't be sometime soon. Pandemics, wars, oil embargoes come out - and predictions premised on business as usual are often torn up.

The GAI use for trading can be qualified as automated decision-making processes for deals and transactions. During these processes, the GAI will choose a strategy for its behavior and will be adapt and change this strategy to market fluctuations. It's possible in the near future financial market volatility will be determined by the competition of the GAI different models and algorithms which will try to get competition advantages. As a result "less perfectional" algorithms will "stuck on the wrong side" where toxic assets excessive concentration will increase uncertainty and make imminent market meltdown which will include all the GAI users.

One more aspect the GAI future operations is risks and uncertainty originated by algorithmic bias added to risks and uncertainty originated by the HI inherent desire to fraud and misinformation.

So, there are strong arguments that the GAI application in financial market will rise uncertainty hence volatility in this market. This conclusion is the base for the requiring of the additional regulation by the law aimed volatility direct limitation.

5 CONCLUSIONS

The above allows one to state that the use of the GAI will increase uncertainty in the financial market. But researchers mainly focus on narrow tasks of risk calculation and risk management by the GAI. There is lack consensus about definitions different kinds and specifies of uncertainty and no unite methodological approach to the uncertainty research in literature.

Since the GAI algorithms are based on imitation of the HI actions, the GAI behavior in the financial market will reproduce the HI financial behavior, including decisions driven by bounded rationality, animal spirit, and investor herding. Bounded rationality expresses the heuristic potential of the HI and provides the capability of the HI to act under uncertainty. In order to effectively act under uncertainty, the GAI must imitate the bounded rationality to overcome the limitations of the ability of the HI judgment inherent, noted by I. Kant. The GAI not originate new intellectual qualities to add to the HI inherent. The GAI have no ability to averse implicit premises of reasoning

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such as ceteris paribus (other things being equal) and ignoratio elenchi (thesis substitution). These premises are necessary for the HI to avoid direct opposition of essentially contradictory judgments and act on the base of bounded rationality combining two heterogeneous and opposite (as F. Knight stated) origins: risk calculation and uncertainty assessment. The GAI as the HI imitation ought to follow the same path. So, the GAI is not able to eliminate or reduce the impact of the most important uncertainty specifies. The GAI is capable to increase the horizon, base, certainty, and accuracy of the forecasting and planning, but is not able to provide traders and consultants with confidence in obtaining the planned outcomes and incomes. The GAI is vulnerable at black swans just like the HI. Moreover, the GAI use in itself generates additional uncertainty. Due to the fact that the GAI considers significantly more options, the range of different outcomes of its decisions is much wider than the HI ones. Also, positive and negative externalities are more significant. All these wide the potential of the financial market volatility. Hence ones provide grounds for the conclusion that the scale of acceptable volatility of the financial market should be limited by law requirements more strictly than during the times when the HI dominated in markets. Such regulator policy will limit the margin rate, but will allow to make more incomes at expanding the scale of operations and lowing threats of the financial market stability.

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Conflicts of Interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The author declares no conflict of interest in this paper.

Data Availability

All data generated or analyzed during this study are included in this published article.

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Author Contribution

The author declared no conflict of interest.

Abbreviation List

HI, Human Intellect GAI, Generative AI

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