How and why investor confidence decline across years in the U.S. Stock Market?

A study of Investor Confidence in the U.S. Stock Market

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This study explores the dynamics of investor confidence in US stock market from 2000 to 2020 for institutional and individual investors. To determine declining trend in confidence levels over the years and factors contributing to higher confidence among institutional investors, Bayesian modeling approach was conducted. It was found a strong negative time confidence relation which is mitigated by economic events and market volatility. This study demonstrates the extent of further investigation needed pertaining to the psychological and contextual determinants of investor sentiment in the stock market.

1 Introduction

The US stock markets which are one of the main indicators of the overall economical state of the country represents the sentiments of both large financial institutions and ordinary people. Using confidence indices several years of interest – from the year 2000 to the year 2020 demonstrate some interesting patterns. The U.S. One-Year Confidence Index plays a crucial part here as an indicator of investors' opinions and their expectations of market actions. For instance, the results show that institutional investors, who are usually endowed with optimum resources and research tools, possess higher levels of confidence than individual ones. Such a situation gives rise to several questions regarding the causes of investor perception and market differentials.

That is why in this analysis we attempt to predict the decline scenario of the USA. Annual Confidence Indicators for both institutional investors and for individuals. In this case, through quantitative analysis of the historical data, we seek to find out the level of degradation of confidence within the specified period. The estimand in our case ignores trends and concentrates on the difference in the indices and underscores the constancy of divergence between institutional and individual attitudes. Thus, this comparison not only indicates the differences in

the level of confidence in the market condition but also in the wider perspective stresses on the overall nature of the behaviour of market agents, and their decision-making processes.

This is supported by the results, that seems to tell a continuously decreasing tendency at both the US and global levels. Historical & Forecasted One-Year Confidence Index of institutional and individual investors covering the period of 2000-2020. Even so the confidence level is comparatively low in the current years institutionally it is consistently higher in the years gone by. Global stock market was volatile because of different economical events, for instance, economical crisis in 2008 and the pandemic COVID-19 in the current period. The data shows that though both groups struggled institutional investors had more tools to cope with the uncertainty hence, the continued confidence in the market.

Analyzing investor confidence has a number of considerations, which are discussed below. It not only affects investment approach but also affects the quality of the market and economic development. Increased self confidence of institutional investors ensured success enhances market engagement, result in escalating of prices and hence economical growth. On the other hand, however, decreased confidence of individual investors as known to finance may lead to carefulness and reduced spending.

The remainder of this paper is structured as follows. Section 2 gives an overview of the data used as well as descriptions of Measurement and key variables. Section 3 introduces the glm and bayesian model used. Section 4 section show the results based on the model output. At last, Section 5 discuss some details.

2 Data

2.1 Overview

We use the statistical programming language R (R Core Team 2023) with main packages Wickham, Vaughan, and Girlich (2023). Our data (Management 2024) apply U.S. Stock Market Confidence Indices dataset which has been compiled with by using great care by the Investor Behavior Project at Yale University, provide rich information about the minds of American investors during the years. Professor Robert Shiller methodically accumulates data obtained with the help of questionnaire survey since 1984. These include the analysis of sentiment of investor across critical junctures of the market such as the famous market crash of 1987. Ongoing surveys since 1989 have provided an array of data encompassing nearly three times that equal to any other study set to assess investor sentiment and perceptions. The uncertainties involved in expressing confidence level in stock market shares are clearly opposed to the general simplicity in consumer confidence indices. Business people are operating in a complex environment mostly seeing the market as a battlefield where they have to be quick to get the most out of it. This multifacesset is strengthened by daily monitoring of stock performance and the presence of media coverage that adds a psychological perspective to the investment process. Thus, investor confidence is a wider concept than the consumer confidence

which is reflected in the index and embraces feelings, thoughts and actions of an investor in contrast to a more simple decision in case with a consumer. Data collection techniques also reveal changes through uses of samples from both rich and institutional investors. From 1989 through 1998, the wealthy individual investors were obtained from W. S. Ponton Inc., and from high-income Americans, a random sample was taken thereafter. Money Market Directory of Pension Funds and Their Investment Managers remains the major source of Institutional investors sampled over the period. The large number of participants, on average more than one hundred in each interval, also guarantee the robustness of data collected.

2.2 Measurement

The data starts with a large-scale event in the market that has an influence on the actions of investors in the market. For example, investigation of economic or political risks, such as deepening economic crises, or geopolitical instabilities, requires capturing of changes in investor attitude in systematic surveys. To capture such sentiments, researchers pay great attention to developing questionnaires made out of questions likely to produce responses on expectations for the future, perceived risk levels, and investment horizon. This qualitative data is then quantised and converted into structured one which makes calculation of investor's confidence level easier.

After survey data have been collected, every single response is coded to guarantee validity and inter-observer reliability while consideration is taking to possible prejudice and pattern responses. Academic or researchers are able to add up the responses and thus are able to create confidence indices that forms the variables in the data set. For instance, the U.S. One-Year Confidence Index is obtained by taking mean of responses within fixed time horizons as it provides periodic feedback of investor perception. This transform process is important because it turns perceptions that may be bias into data that is factual and the final data set gives investors the dynamics of the confidence over time. Scientists can thus map observed regularities to elements of a predefined structure that will help provide a more extensive framework for the general economy and finance domains.

2.3 Outcome variables

2.3.1 US one year confidence index

(1) illustrates the outcome variable US one year confidence index over time, it was clearly to find that there are decline trends of the US one year confidence index with increasing of years. But it is little hard to find differences between the trends of US one year confidence index for US Institutional and Individual. Model section would help us to investigate the problem.

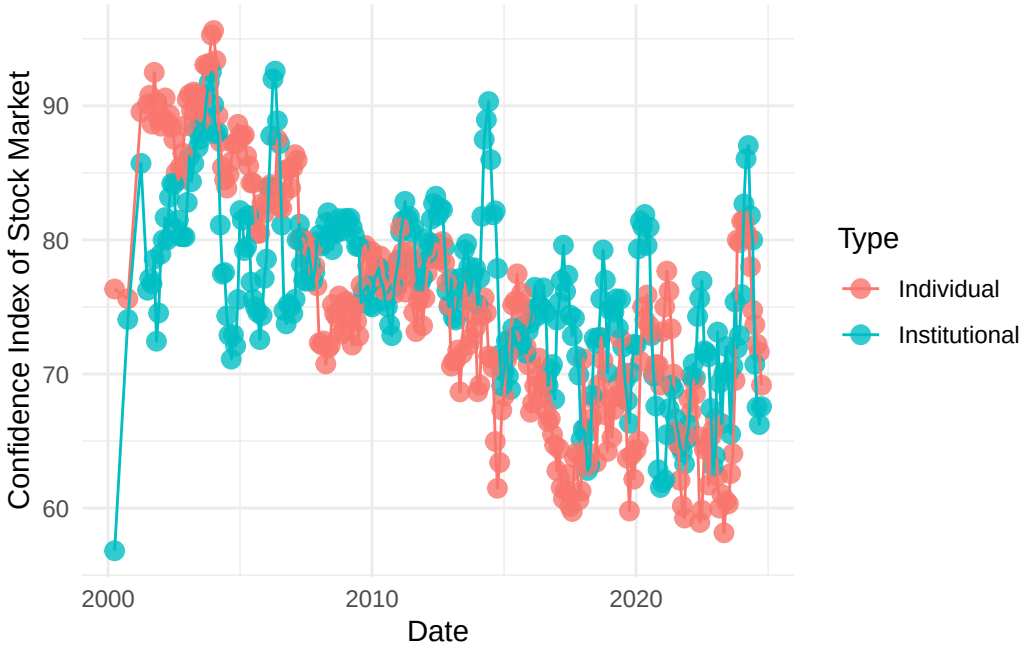


Figure 1: Confidence Index of Stock Market Over time from year 2000 to 2020 for both US Institutional and Individual, it shows the trends of Confidence for US Institutional and Individual across years, decline trends are observed.

Table 1: Summary statistics of US one year confidence index grouped by US Institutional and Individual

	Individual					Institutional				
	mean	sd	min	max	median	mean	sd	min	max	median
Confidence	75.24	8.83	58.16	95.62	75.00	76.35	6.40	56.82	92.59	76.47

2.4 Predictor variables

(2) illustrates the outcome variable US one year confidence index grouped by different types of US Institutional and Individual, it was clearly to find that there are didfferences between the two types of US one year confidence index, it indicates the distribution of US one year confidence index are different for US Institutional and Individual and it seems US Institutional has a higher level average US one year confidence index of stock market compared with US Individual.

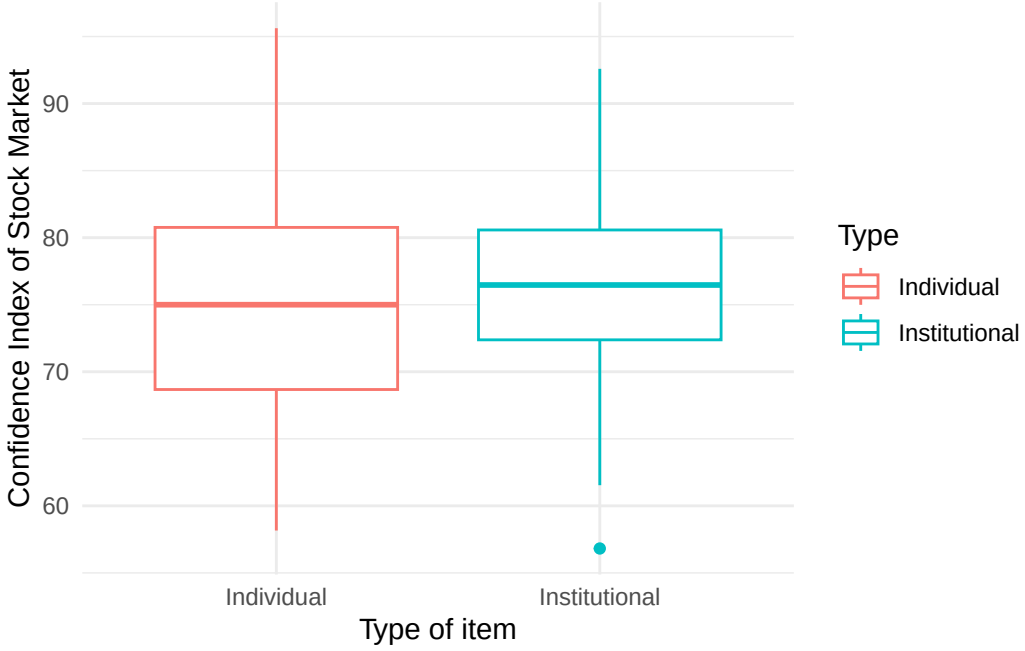


Figure 2: Confidence Index of Stock Market grouped by US Institutional and Individual from year 2000 to 2020, the distributions are easy to compare between the two groups to check which group has a higher confidence in average

Table shows the U.S. One-Year Confidence Index differences between individual and institutional investors. The confidence mean for individual investors is approximately 75.24, SD

equals 8.83, and the median close to 75. It must be noted that their performance scores when it comes to growth and evolution of their venturesimentary vary from 58.16 to 95.62. On the other hand institutional investors have better average score of 76.35, standard deviations of 6.4 and a median of 76.47. Their confidence scores are 56.82 to 92.59. These statistics show that institutional investors are more accurate and have slightly higher reliability than the individual investors This clearly shows that the investor sentiment differs.

3 Model

To investigate of the declining trend of U.S. confidence indices for both the individual and institutional investor, we undertake a Bayesian model analysis as well as a GLM model with gaussian family. Both of the models are useful in modeling the effects of the interested variables on the outcome the U.S. confidence indices for both the individual and institutional investors. This strategy enables us to compare the level of investor confidence over time and or between the institutional and the individual investors. The details of the model explain the variations in levels of confidence and serve as a reliable key to understanding investors' attitudes over the years. The Bayesian analysis model used to investigate Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Let y_i represent the confidence index. Incorporated in the model is a linear predictor. Here, β_i is an indicator of the trend line of the confidence index reducing year in year out. The symbols $gamma_i$ refer to the impact of investor type which targets individual and institutional investors.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 1) \tag{3}$$
$$\beta \sim \text{Normal}(0, 1) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 1) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors with SDs to be smaller to be 1s as the variation across confidence index with years are changed slowly one year after another year from `rstanarm`.

For the GLM model with gaussian family, the form is:

$$y_i = \alpha + \alpha_1 type_i + \alpha_2 time_i + \epsilon_i \tag{7}$$

Where y_i represent the confidence index. α_1 is coefficient for type of individual and institutional investor, $ _2 $ is coefficient of time. ϵ_i is error term.

We run the model in R (R Core Team 2023) using the `base` package.

3.1.1 Model justification

The coefficients to be expected are negative for the variable representing time β_i against the confidence index y_i with an implication that U.S. confidence indices of stock market reduces with increase of years. Further, we also postulate that γ_i pertaining to institutional investors is higher than that of the individual investors because institutions invest more resources in analysis. The specified structure of this model corresponds to hypotheses formulated and offers clear analytical concepts to study changes of investors' confidence in US stock market. For GLM model, we can check the significance of the estimated coefficient of type of individual and institutional investor to investigate the question of interested.

In our case, the investor type and time can help reveal the process and interactions within the set data The type of the investor – individual or institutional – have a dramatic influence on the market. The confidence levels are therefore different from their individual counterparts due to better resources, information and analysis tools which are usually available to institutional investors. By including the predictor, we can see how confidence is affected by the type of investor and show that different participants have different approaches toward the market. Besides, time is a key factor which could be considered in this case. The essence of the financial environment is absolutely dynamic, constantly evolving as a result of various economic factors, shifts of policy and market instabilities. To this end, by aggregating the information by time, one is more likely to spot certain trends within time, for instance, the declining confidence indices with the influence of temporal effects understood. Such inclusion enables us to analyse long term trends from short term oscillations thus increasing the validity and reliability of the results.

The GLM is relatively simple and eminently useful. We can predict the value of the response variable given the predictors by minimizing the prediction error easily. In addition to that, through the choice of Gaussian distribution for the response variable we also solve the normality assumption usually present in most statistical analysis. Another aspect of this model is that it is easy to use when calculating and even interpreting results for a wide range of audiences. In addition, because the relationships between independent variables and the dependent variable are usually not linear and can involve a number of continuous as well as categorical, GLM provides unleash in accommodating these form of predictors. We always have prior beliefs in Bayesian and this model gives more possibilities for the inference use than the frequentist

one. This aspect is very important, more often especially when working with small samples or when population might not have been well measured by data collected. It also means that Bayesian analysis is a very effective tool in a world of fluctuating financial parameters, because it allows to update the previous conclusions as new data emerges. Furthermore, it provides a more accurate view of the aptitude levels by extending a credible interval on uncertainty estimates.

Among the advantages of using the Bayesian model for the analysis of U.S. confidence indices that fully substantiate the choice in favor of this approach compared to traditional models. A principal characteristic of the Bayesian approach is data updating from prior knowledge or beliefs. This feature enables us to add prior knowledge or experts' point of view in respondent data, making our analysis of changes in investor confidence richer. In the realm of finance, where uncertainty is an important aspect, the performance of the Bayesian model is highly visible, as it is able to calculate credible intervals of this uncertainly. Different from the classical approach that delivers point estimates of the parameters, Bayesian analysis provides people with a set of values that work as the representation of the given confidence level. It is especially useful in decisions because it helps the stakeholders in determination on the options to take depending on the risk they want to take or are willing to offer. The Bayesian model above also has another important advantage in terms of structure complexity of a problem: the approach is particularly suitable for handling hierarchical data. This characteristic is important in achieving the goal of studying various aspects of investor behavior, which in turn creates a possibility to identify potential interrelationships between predictors that an ordinary model would have difficulties containing. In addition, the Bayesian model has such issues as small sample sizes. Since prior distributions are used in the model, a reliable estimate of the data is avails even with cases of incomplete data information. Although this feature proves valuable in general, it can be especially helpful in cases pertinent to finance where the amount of information would be absolutely insufficient.

4 Results

Our results are summarized in Table 2, Table 3.

Table 2: GLM model estimates of US confidence index of stock market

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	1638.1988946	69.4953297	23.572791	0.0000000
time	-0.7764344	0.0345230	-22.490348	0.0000000
TypeInstitutional	1.1106714	0.4708167	2.359031	0.0186633

From the GLM and the Bayesian analysis, it is possible to obtain two views for identifying factors affecting the U.S. confidence indices for individual and institutional investors. The

Table 3: Bayes models of US confidence index of stock market

	First model
(Intercept)	1635.47
	(68.97)
time	−0.78
	(0.03)
TypeInstitutional	1.11
	(0.48)
Num.Obs.	566
R2	0.474
R2 Adj.	0.473
Log.Lik.	−1777.660
ELPD	−1781.5
ELPD s.e.	22.0
LOOIC	3563.1
LOOIC s.e.	43.9
WAIC	3563.1
RMSE	5.59

two approaches provide consistent estimates, which adds strength to our analysis. First, the GLM, the estimates the coefficient for time as -0.78 with a standard error of 0.03, what shows the negative dynamics of confidence. This would also be in support of our finding since the t-value of -22.49 falls under absolutely ostracize level of significance thresholds. As we carry out inference about the trend we also test for the significance of the trend This is done by determining the associated p-value, which in this case is < 0.01, which assertively tells us that confidence indices are decreasing over time. The estimate of the Type Institutional is 1.11 with standard error = 0.47. The t – test showed a t – value of 2.36, and p -value of 0.02, indicating higher confidence index among institutional investors than individual investors. This is supportive of our expectation given earlier studies and confirms differences in the level of confidence between these two types of investors.

The Bayesian results present the same pattern as the ML results. As seen from the table, the median proved once more that confidence decreases over time, and it is -0.78 for the time. Remarkably, a MAD SD for this estimate equals 0.03 indicating that there is very low confidence interval for this estimate. Regarding the Type Institutional the median is 1.11 with SD = 0.48 once again showing the positive effect of institutional investor status on confidence levels. Further, the structure of Bayesian analysis includes the associated sigma parameter with median estimate of 5.61 and MAD SD of 0.20. This parameter checks the model's fluctuating values in the estimated coefficient of confidence and seems to be fairly oscillating and acceptable between observations.

Moreover, based on the GLM results and the Bayesian model, we can assert that the U.S. confidence indices have been in decline in total, with institutional investors being more confident than ordinary ones. These findings suggest that the identification of investor characteristics and temporal aspects can be useful for determining broader patterns of market sentiment, which will be useful to those in the financial markets.

5 Discussion

5.0.1 Discussion of Model Results

The analysis of such options for modeling identified several significant qualitative characteristics of the dynamics of US confidence indices for both individual and institutional investors over the years from 2000 to 2020, according to the results of applying the developed model here. A median estimate of -0.8 for the time variable which means that confidence level indicates a negative trend with time. This finding is an indication that the level of investor confidence has been on the decline, in our study period from 2000 to 2020. The underlying causes for this trend would be the various economics events and market conditions such as the credit crunch in 2008, persistent conflicts in the geopolitical front and of course the recent outbreak of the Covid 19 virus. All these events may be explained to have caused an improvement of uncertainty and volatility in the market reducing investors confidence. Also, the model

accompanies this conclusion with more confidence as a result of estimating the type sketch with a median of 1.1 among the institutional investors, as compared to individual investors. This outcome is due to the fact that institutional investors have superior resources and analyzed capabilities, as well as superior information. Such advantages help them to manage complexity of the operating market environment and create a less volatile and more positive outlook. This difference can also be explained by psychological factors as well Depending on the circumstances, people gain lose confidence in themselves and their abilities. Although market participants have similar goals of used funds in securities, institutional and individual investors may have different behaviors when market is in downturns, institutional investors may consider it as a good chance to invest, while individual investors, who are easily to be affected by their feelings and current losing state, may consider the same thing cautiously or uncertainly. Therefore, over time and confidence indices adjust their values showing that the difference between individual and institutional investors moves apace.

Furthermore, market structure and investor knowledge are necessary to take into account while assessing the confidence level. Importantly, the US has a rather experienced‘ but highly segmented financial market with immense choices available to the public, which may confuse even experienced users. On the other hand, institutional investors enjoy high level of market acquaintance and peculiarities of various instruments. This knowledge puts institutional investors in a better position to play in the market because they are better placed to make good risk-reward analyses. However, the advanced behavioral finance theories provide important information related to the investor's behavior. This paper has identified different behavioural biases that may affect the decision making of both the individual and institutional investors including overconfidence, loss aversion and herd behaviour. For example, institutional investors could implement the use of BA to overcome mistakes such as panic selling during bear markets, which will in turn, assist with maintaining steady confidence. One more factor which has to be taken into consideration is related to the influence of technological developments on the investors. It also improves their confidence in the volatile market since the technologies they use help in their decision making.

5.1 Why confidence decline across years of US stock market

Confidence index decline in the US stock market across years have been occasioned by factors that have defined the economy from the year 2000 to 2020. The first one was 2008 financial crisis which not only produced extreme vulnerability but also led to the shift in perspectives on the stability of the stock market. As many people's capital was wiped out during this period there was general antipathy towards the financial system. Even the recovery that came since the financial crisis happened at a poor rate which makes the people lose confidence. Indices of economic performance changed, unemployment figures did not go down and many people experienced low wage productivity. This uncertainty must have translated to investors' mindset since people started to doubt the stability of the market. Further, negative news were further fueled by the increasing use of social media like TikTok, Facebook, Youtube.

Equally influential were Geopolitical risks including trade policies, policy stability and conflicts in different areas of the world. The traditionally stable financial markets of the USA and other developed countries witnessed more fluctuations due to the occurrences like the U.S. presidential election of 2016 and the ongoing discussions over economic policies that added more uncertainty factors for investors in assessment of related strategies. It becomes hard to invest under such conditions, thus making this environment characterized by unpredicted decline the perfect cycle that prolongs low confidence. These multiple factors explain how the confidence of the Americans in their stock market has declined over years with fluctuations and changing tendencies as seen in the following diagram. Another factor which has helped in the reduction of confidence indices also include the monetary policy and interest rates Among the above mentioned factors, interest rates appear to be the most influential in the reduction of indices of confidence. Factors that include Brexit and trade war with China have been felt in the financial markets sending shock waves that weaken confidence. Also, the increasing gulf between the Dow and the real economy for the typical American has bred cynicism. Most people have seen the market soaring high while they are still struggling with their financial position. This can invariably make people feel let down hence the disillusionment arising out of disillusionment about the relation between the economy's performance and individual's existence hence a reduction in confidence.

Last but not the least, although digital investment platforms are making markets more accessible, the added volatilities. Such buyers due to the trends that go round in the social media platforms can be motivated to invest in the stocks based on impulse, and these categories of buyers accelerate volatile swings in the prices within the stock market which creates an atmosphere of fear and insecurity that leads to a general loss of confidence in the market.

5.2 Why US institutional investors have more confidence compared with individuals

Overall though, institutional U.S. investors tend to be more confident than the individual investors for several important reasons involving the factors that enter into their decision making processes and market outlooks. A very big strength that institutional investors have is access to a lot of resources and information. This further depth of analysis helps them to make wise decisions with their investments, and generate a greater feeling of security in about their investments. This diversification helps to ease up the risk faced by fluctuations in the market since it can distributes investments in many asset classes and sectors. Also, the different amount of experience and expertise of institutional investors determines its confidence level. Most institutional investors, such as pension funds, mutual funds and insurance companies, along with some investing on behalf of others, have clearly defined investment strategies and risk management approaches.

Importantly, other strengths realised by institutional investors are the associated decision-making that boosts their confidence due to closely working together. Unlike the small investor who invest independently, institutional investors actively engage in investments with teams of

professionals who come with different and equal opinions. The idea makes it easier for the team to come up with the right decision because everyone has a chance to look at the facts from a different angle than his emotions. Also, institutional investors follow the stock markets and sectors more technically through business intelligence and analytics software that offer them a profound understanding of the market. They use the above stated tools to make real time evaluations on their strategies and thus compounds their explicit dexterity in managing the market hurdles that are inherent in the business.

5.3 Weaknesses and next steps

Besides findings, there are some weaknesses that we use historical data, which might not reflect as fully as possible the evolvement of investor sentiment in response to a completely unknown event - as was the case with the COVID-19 pandemic. Also, there could be potential bias in survey data. Factors, social desirability or recent market experiences for example, can skew the perceptions of confidence, affecting the responses from individual and institutional investors. Besides, the work mostly relies on quantitative measure that might neglect the qualitative element capable of offering richer understanding of an investor's behavior and sentiment.

Future research should try to build the robustness of findings through longitudinal studies that span a larger period including shifts post pandemics. Furthermore, investigation into the place of psychological factors related to investor behavior would be fruitful. Future studies might extend the range to look at differences in reported confidence levels among different markets and cultures such as China stock market.

Appendix

A Additional data details

A.1 survey objective

Thus, the key and starting aim of the present survey is to evaluate and compare the investments' confidence of institutional and individual investors in the U.S. stock market. Through the investigation of the important factors influencing investor confidence, the survey will seek to establish the fundamental perception disparities between men investors and Institutional investors. Information to be gathered to include the influence of resource access, information access, experience, and psychological inputs on the decision-making and the market views of the two groups. Further, the survey aims at determining the impact of some of the recent economic incidences including but not limited to the COVID- 19 pandemic, geopolitical risks as well as fluctuating markets on investors. Finally, the studies will help to determine the nature of the socio-psychological processes influencing the actions of investors and define ways to promote confidence in the stability of the American stock market and make sound investment choices. Through survey data that targets institutional and individual investors, it will be easier to discern the confidence swings and endeavors, create an agreeable conversation about future practices and market conditions.

A.2 sampling frame

The sampling frame for this survey involved two groups: institutional investors and individual investors. For institutional investors, there will be nominees from all the institutional investors including pension funds, mutual funds, hedge funds, insurance firms and investment advisory firms. Such participants will be chosen in relation to the contribution made by these people to the process of decision making on investment as well as in regards to managing assets within the market of the United States' stocks.They will include having a minimum number of asset base as a way of filtering out startups and small hedge fund firms to get only institutional players. For the purpose of sample selection, the sampling frame will allow individual investors irrespective of their level of experience and from various population groups. The target group will be obtained through investment forums, on line investment club groups and twitter and other social media forums with focus on stock market. Having a diverse demographic will ensure that a large pool of perspectives and experiences are captured, this is important when trying to identify what influences the confidence of individual investors. The last number of the sampling frame will clear the representation of both categories, thus a validity of the comparison and analysis of confidence level in the U.S. stock market could be performed.

A.3 sampling methodology

The sampling technique used will be a concurrent mixed- method sampling where both the quantitative and the qualitative sampling methods will be used to get data from both institutional and individual investors. First of all, the institutional investors will be sampled in strata regarding the kind of institution they are (as pension funds, mutual, etc.) and the region they belong to. This would make sure that the electorate would commission across various investment styles and market environments. The institutions will be sourced from industry lists and financial statements and the intended respondents will be: managers or portfolio managers, financial analysts or analysts.

For the individual investors, purposive samples shall be used to get the participants from the investment forums, social media groups specifically, and the investment applications. It enables us cover all type of people as we get to capture different experiences within them and also different levels of confident person. Also, those samples will be collected using snowball sampling which has an initial respondent recommending other potential participants.

The survey will be administered electronically to the participants by e-mail as well as through online survey tools. Boosting the response rates to the questionnaires, follow-up remindings will be sent during the next week after the invitation. The methodology will ensure that responses are going to be collected in a coordinated manner, this will enhance the analysis of the data collected hence making comparisons between the two investor groups easier.

A.4 survey design

The survey tools will include online questionnaires conducted using emails with participants from institutional and individual investors. The first e-mail sent to the receiver will consist of an introduction explaining the main aims of the survey, the time which will be required to complete it and the fact that the sender is committed to their privacy and anonymity. So, to entice more people into responding to the email, it will have points emphasizing the relevance of their contribution to assessing the state of confidence in the market and, consequently, the possible changes in procedures for investment.

The questionnaire will be structured into sections: Detail information, level of confidence, and behavioral analysis of a subject of interest. Demographics will include an assessment of the participant's investment profile, whether an institutionally or an individual investor, and their asset management. In the confidence assessment section, participants' opinion about the Market stability, recent Economic events and the participant Investment outlooks will be explored. The behavioral insights part will discuss influence of psychological factors and information availability over their choices.

To ensure that the survey is easy to complete, questions in the survey will include multiple-choice questions, Likert scale questions and other general questions.

A.5 survey questions

1. How much are you confident on the stability of current stock market? 5 being highly confident and 1 being the least confident.
2. Which factors do you think play the biggest role in your confidence of the US stock market? (social factors; economic occurrences; market conditions; information availability)
3. In what ways has the COVID-19 impacted your approach to investing and your optimism concerning stock markets?
4. In your opinion, does institutional investors have larger market confidence than individual investors?
5. What do think about the psychological factors such as fear, greed and emotions can impact self-investment decisions?

A.6 survey limitations

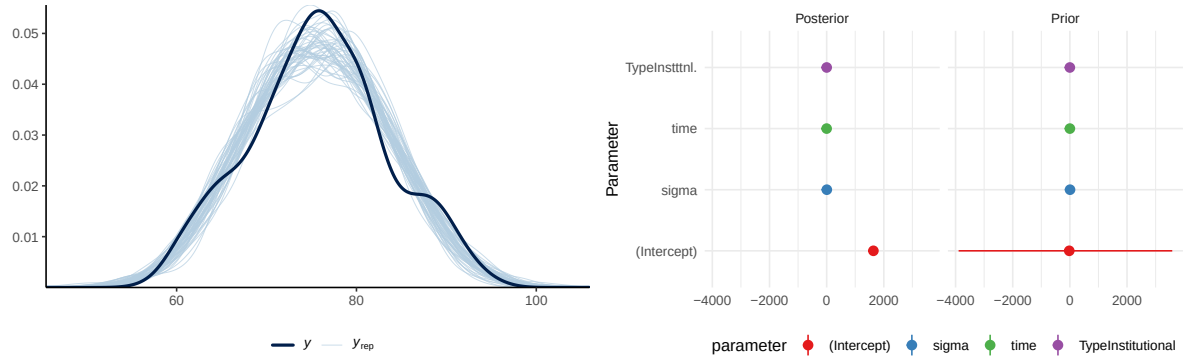
Although this survey is designed to improve the understanding of confidence levels across institutional and individual investors, the following limitations may be experienced. The most active are likely to have strong opinions or experiences; thus, the results are not a true reflection of the investors' database. Also, the survey data gathered are based on the respondents' personal account of their experiences and may hence have distortions. The results may be effected due to response bias especially since respondents may always over report their confidence level as they would not want to present self in a bad light. Therefore, the survey design restricts investigations of the causal relationships between the highlighted factors and investor confidence. This can be so because current market conditions or investor sentiment over a particular period may not be constant and so they are not reflected in the data hence, the completeness of confidence measurements are in problem. Finally, there are a lot of factors outside the domain of investors, like economic conditions, media or social networks, and these factors can influence investment decisions while, in many cases, are not reflected in the survey adequately.

B Model details

B.1 Posterior predictive check

In Figure 3a we implement a posterior predictive check. This shows the posterior distribution of parameters are also close to the normal distribution indcating a valid baysesian model specification.

In Figure 3b we compare the posterior with the prior. This shows that there are indeed different changes of the posterior distribution of parameters compared with the prior ones, this means the baysesian model fits the data and obtained new distribution of parameters which are useful in this case.



(a) Posterior prediction check

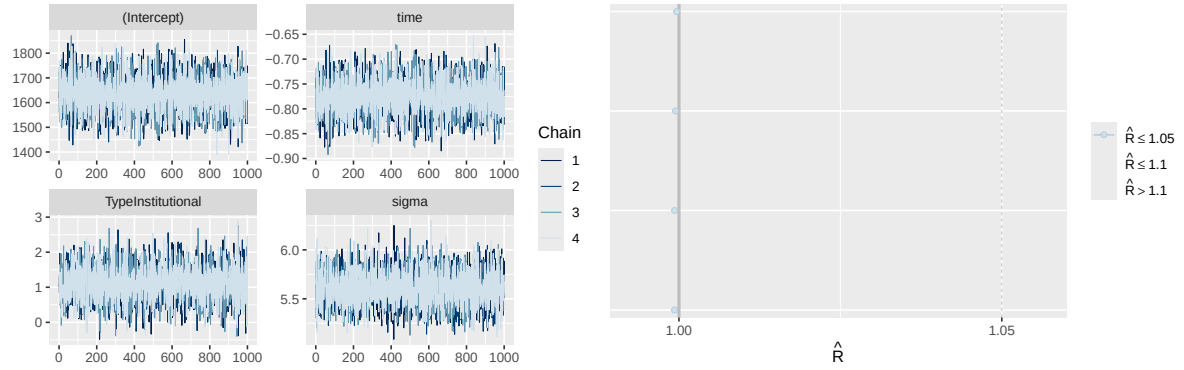
(b) Comparing the posterior with the prior

Figure 3: Examining how the model fits, and is affected by, the data

B.2 Diagnostics

Figure 4a is a trace plot. It shows that all of the parameters are converged after some iterations indicate the estimated results are reliable.

Figure 4b is a Rhat plot. It shows a high value. This suggests that the variation of the outcome variable can be well explained by the predictors and the bayesian model.



(a) Trace plot

(b) Rhat plot

Figure 4: Checking the convergence of the MCMC algorithm

B.3 Train/test splits

The Train/test splits are applied to the data that we randomly use 70% as our training data while the 30% as our testing data. Both of the bayesian and glm models are trained using the 70% training data and then evaluated on the 30% testing data. The RMSE values on the testing data sets for the two models are compared, it was found that bayesian shows a lower RMSE which means that compared with GLM model, the bayesian model has a greater predictive power to predict the US stock market confidence index for institutional and individual investors.

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