The Performance of AI-based Investment Strategies versus Traditional Investment Strategies for Indian Households

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Abstract

This study aims to compare the performance of AI-based investment strategies with traditional investment strategies for Indian households. It investigates the risk and return associated with both types of strategies and examines the factors influencing their performance. AI-based investment strategies utilize machine learning algorithms and deep learning models to analyze extensive data sets, claiming to offer improved risk management and higher returns. Traditional strategies rely on fundamental analysis and market trends, considered safe and reliable. The study employs a mixed-methods approach, collecting primary data through a questionnaire and conducting secondary data analysis from various sources. Statistical techniques such as regression analysis and hypothesis testing will be utilized for data analysis. The findings will provide insights into the performance of AI-based strategies and contribute to the existing literature, assisting households in making informed investment decisions. The study also explores the theoretical foundations of efficient market hypothesis, behavioral finance, portfolio theory, machine learning, algorithmic trading, and big data, suggesting that AI-based strategies may have the potential to outperform traditional strategies. Empirical research is required to validate these theories and determine the effectiveness of AI-based strategies for Indian households.

Keywords: Performance Analysis, Indian Households, Artificial Intelligence, Machine Learning.

Introduction

Investment is an important aspect of financial planning for households, especially in a developing country like India. With the growth of the Indian economy and the availability of various investment options, households have been investing in traditional investment strategies such as equity and fixed income instruments for many years. However, with the advent of technology, new investment strategies based on Artificial Intelligence (AI) have emerged, which claim to provide better returns and risk management.

The purpose of this study is to investigate the performance of AI-based investment strategies versus traditional investment strategies for Indian households. The study will compare the risk and return of both types of investment strategies and analyse the factors that influence their performance.

The use of AI in investment strategies has gained attention in recent years due to its potential to provide superior performance over traditional methods. AI-based investment strategies use machine learning algorithms and deep learning models to analyse vast amounts of data and identify investment opportunities. These strategies claim to provide better risk management and higher returns than traditional investment strategies.

Traditional investment strategies, on the other hand, rely on fundamental analysis and market trends to identify investment opportunities. They are based on historical data and are influenced by economic and political factors. These strategies have been used by households for many years and are considered safe and reliable.

The study will use a mixed-methods approach, which includes primary data collection through a questionnaire and secondary data analysis from various sources such as financial reports, research papers, and government publications. The study will analyse the data using statistical techniques such as regression analysis and hypothesis testing.

The findings of this study will provide valuable insights into the performance of AI-based investment strategies versus traditional investment strategies for Indian households. The study will also contribute to the existing literature on investment strategies and provide recommendations for households to make informed investment decisions.

Efficient Market Hypothesis: The Efficient Market Hypothesis (EMH) suggests that stock prices already reflect all available information and that it is impossible to consistently outperform the market using any investment strategy. However, some argue that AI-based investment strategies have the potential to find hidden patterns in the data that can provide an advantage over traditional investment strategies.

Behavioural Finance: Behavioural finance suggests that investors are not always rational and may make decisions based on emotions, cognitive biases, or other psychological factors. AI-based investment strategies may be better equipped to make rational, data-driven decisions and avoid these biases.

Portfolio Theory: Portfolio theory suggests that diversification can help to reduce risk and increase returns. AI-based investment strategies may be better equipped to identify and manage risk in a diversified portfolio, leading to better performance compared to traditional investment strategies.

Machine Learning: Machine learning is a subset of AI that involves the use of algorithms to learn patterns in data and make predictions or decisions based on that learning. AI-based investment strategies often use machine learning algorithms to analyse vast amounts of data and identify patterns that can be used to make investment decisions.

Algorithmic Trading: Algorithmic trading is the use of computer algorithms to execute trades automatically based on pre-defined rules or strategies. AI-based investment strategies often rely on algorithmic trading to implement investment decisions in real-time, which can help to reduce transaction costs and improve performance.

Big Data: Big data refers to the large, complex data sets that are often used in AI-based investment strategies. These data sets can include a wide range of financial and economic data, as well as news and social media data. The use of big data in investment strategies may provide a more comprehensive view of market trends and investment opportunities, leading to better performance compared to traditional investment strategies.

Overall, these theoretical foundations suggest that AI-based investment strategies may have the potential to outperform traditional investment strategies, particularly in the context of efficient markets, behavioural finance, portfolio theory, machine learning, algorithmic trading, and big data.

However, empirical research is needed to test these theories and determine whether AI-based investment strategies are indeed more effective than traditional strategies for Indian households.

2. Literature Review

Sl. No.	Title and Authors with Publishing Date	Objectives	Results
1	"Comparing the performance of AI-bas[ed] investment strategies with traditio[nal] investment strategies" by Fan, X., Liao, [] & Yu, W. in 2020	The objective of this paper [is] to compare the performan[ce] of different AI-bas[ed] investment strategies w[ith] traditional investme[nt] strategies.	The results indicate that AI-bas[ed] investment strategies outperfo[rm] traditional strategies in terms of ris[k] adjusted returns in the Chinese sto[ck] market.
2	"Investigating the efficacy of AI-bas[ed] investment strategies for retail investors" [by] Rajagopal, S., & Patil, S. in 2020	The objective of this paper [is] to investigate the efficacy [of] AI-based investme[nt] strategies for retail investor[s]	The results suggest that AI-bas[ed] strategies are effective in generati[ng] returns and outperform traditio[nal] investment strategies in the Ind[ian] stock market.
3	"A comparative study of AI-bas[ed] investment strategies and traditio[nal] investment strategies in the US sto[ck] market" by Zhang, Y., Wang, Y., & Lu, [] in 2021	This paper compares [the] performance of AI-bas[ed] investment strategies w[ith] traditional investme[nt] strategies in the US sto[ck] market.	The results suggest that AI-bas[ed] investment strategies outperfo[rm] traditional strategies in terms of ris[k] adjusted returns and tradi[ng] efficiency.
4	"The impact of AI on investment decisi[on] making in Indian households" by Bhatnag[ar] R., & Malhotra, A. in 2021	The aim of this paper is [to] explore the impact of AI [on] investment decision-maki[ng] in Indian households.	The results suggest that AI-bas[ed] investment recommendations [are] perceived to be more accurate a[nd] trustworthy than those made by hum[an] financial advisors.
5	"A systematic review of AI-bas[ed] investment strategies" by Rizwan, M., [&] Abbas, A. in 2021	The objective of this paper [is] to provide a systema[tic] review of the literature on A[I]-based investment strategies	The results suggest that there is [a] growing interest in this area, with m[ore] studies focusing on machine learni[ng] algorithms and deep learning mode[ls].

Methodology

Research Design: The study is designed as a quantitative research study where the responses collected through the questionnaire will be analysed using statistical methods to draw inferences and conclusions. The study aims to compare the performance of AI-based investment strategies versus traditional investment strategies for Indian households.

Sampling: The sample for the study includes 40 respondents who have filled out the questionnaire. The sampling technique used is convenience sampling, where respondents were selected based on their availability and willingness to participate in the study.

Data Collection: The data for the study was collected through a structured questionnaire. The questionnaire was designed to collect demographic information about the respondents, their investment experience, and their perceptions of AI-based investment strategies.

Data Analysis: The collected data was analysed using descriptive statistics and inferential statistics. Descriptive statistics will be used to analyse the demographic characteristics of the respondents and their investment experience. Inferential statistics will be used to test the hypothesis that AI-based investment strategies outperform traditional investment strategies.

Hypothesis Testing: The hypothesis of the study is that AI-based investment strategies outperform traditional investment strategies. The hypothesis will be tested using a t-test, which will compare the mean returns of the two investment strategies.

Ethical Considerations: The study was conducted following ethical principles and guidelines. Informed consent was obtained from all the respondents, and their privacy and confidentiality were ensured throughout the study.

Limitations: The study has several limitations, including the small sample size, the use of convenience sampling, and the self-reported nature of the data collected through the questionnaire. Overall, the methodology used in the study aims to provide insights into the performance of AI-based investment strategies versus traditional investment strategies for Indian households. By using a quantitative research design and analyzing the collected data using statistical methods, the study aims to draw valid and reliable conclusions about the relative performance of the two investment strategies.

Hypothesis 2: Null Hypothesis (H0): Adoption of AI-based investment strategies will not lead to improved investment performance for Indian households.

Alternate Hypothesis (HA): Adoption of AI-based investment strategies will lead to improved investment performance for Indian households.

Data Analysis and Interpretation

I had done Crosstabs analysis which Includes Chi-Square and Correlations. It includes the variables Age, Employment Status and Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Age * Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?	40	100.0%	0	0.0%	40	100.0%
Employment_Status * Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?	40	100.0%	0	0.0%	40	100.0%

The "Case Processing Summary" table shows that there were 40 valid cases, meaning that all 40 respondents answered the question. There were no missing values.

Age * Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?

Crosstab

			Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?		Total
			Yes	No	
Age	Under 25	Count	5	5	10
		Expected Count	5.0	5.0	10.0
	25 - 35	Count	1	4	5
		Expected Count	2.5	2.5	5.0
	36 - 45	Count	8	2	10
		Expected Count	5.0	5.0	10.0
	46 - 55	Count	4	4	8
		Expected Count	4.0	4.0	8.0
	Over 55	Count	2	5	7
		Expected Count	3.5	3.5	7.0
Total		Count	20	20	40
		Expected Count	20.0	20.0	40.0

The "Age * Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?" table shows a crosstabulation between the age groups of the respondents and their response to the question. The table shows the observed counts and the expected counts based on the assumption of independence between the two variables. The table indicates that the largest number of respondents who compared their investment strategy with AI-based strategy were in the age group of 36-45, whereas the smallest number was in the age group of 25-35. The chi-square test results indicate that the association between age and the response to the question is not statistically significant at the 0.05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.686[a]	4	.153
Likelihood Ratio	7.111	4	.130
Linear-by-Linear Association	.109	1	.742
N of Valid Cases	40		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is 2.50.

The Chi-Square test is a statistical test used to determine whether there is a significant association between two categorical variables. In this case, the test is being used to determine whether there is a significant association between age and whether the participant has ever compared the performance of their traditional investment strategy with that of an AI-based investment strategy.

The Pearson Chi-Square value of 6.686a with 4 degrees of freedom (df) indicates that there is no statistically significant association between age and the investment strategy comparison at a significance level of 0.05 (p-value=0.153). The p-value is higher than the significance level, which means we cannot reject the null hypothesis that there is no association between age and the investment strategy comparison.

The "Symmetric Measures" table shows the measures of association between the two nominal variables (age and the response to the question). The phi coefficient and Cramer's V indicate a moderate strength of association between the two variables.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.409			.153
	Cramer's V	.409			.153
Interval by Interval	Pearson's R	.053	.157	.326	.746[c]
Ordinal by Ordinal	Spearman Correlation	.060	.162	.370	.714[c]
N of Valid Cases		40			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

The "Symmetric Measures" table shows the measures of association between the two nominal variables (age and the response to the question). The phi coefficient and Cramer's V indicate a moderate strength of association between the two variables.

Employment_Status * Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?

Crosstab

			Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?		Total
			Yes	No	
Employment_Status	Employed full-time	Count	5	5	10
		Expected Count	5.0	5.0	10.0
	Employed part-time	Count	5	4	9
		Expected Count	4.5	4.5	9.0
	Self-Employed	Count	6	6	12
		Expected Count	6.0	6.0	12.0
	Unemployed	Count	2	2	4
		Expected Count	2.0	2.0	4.0
	Student	Count	2	3	5
		Expected Count	2.5	2.5	5.0
Total		Count	20	20	40
		Expected Count	20.0	20.0	40.0

The "Employment_Status * Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?" table shows a crosstabulation between the employment status of the respondents and their response to the question. The table indicates that the largest number of respondents who compared their investment strategy with AI-based strategy were self-employed, whereas the smallest number was unemployed. The chi-square

test results indicate that the association between employment status and the response to the question is not statistically significant at the 0.05 level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.311[a]	4	.989
Likelihood Ratio	.313	4	.989
Linear-by-Linear Association	.130	1	.718
N of Valid Cases	40		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is 2.00.

This is the result of a Chi-Square test. The test compares the observed data to the expected data to see if there is a significant difference. In this case, the test shows that there is no significant difference between the observed and expected data, as the p-value (Asymp. Sig.) is greater than 0.05 (the standard significance level).

Additionally, 6 cells have expected counts less than 5, with a minimum expected count of 2.00. This can be an issue for the reliability of the Chi-Square test, as it assumes that all expected counts are at least 5. However, since the overall p-value is not significant, this is less of a concern in this specific case.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.088			.989
	Cramer's V	.088			.989

Interval by Interval	Pearson's R	.058	.157	.357	.723[c]
Ordinal by Ordinal	Spearman Correlation	.051	.158	.317	.753[c]
N of Valid Cases		40			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

The "Symmetric Measures" table shows the measures of association between the two nominal variables (employment status and the response to the question). The phi coefficient and Cramer's V indicate a weak strength of association between the two variables.

Overall, the results of the survey suggest that there is no strong association between age or employment status and the likelihood of comparing traditional and AI-based investment strategies. Next, I had shown the Regression Analysis for the following variables, Employment Status as the Independent Variable and Usage of AI Investment tool or service, Factors influenced over taking decision of one strategy over another, comfortability of entrusting the AI-given investment decisions, comparison of traditional investment strategies vs AI given investment strategies.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?, What were the factors that influenced your decision to choose one strategy over the other?, Have you ever used an AI-based investment tool or service?, How comfortable are you with entrusting your investment decisions to an AI-based system?[b]	.	Enter

a. Dependent Variable: Employment_Status

b. All requested variables entered.

The "Variables Entered/Removed" table shows that all requested variables were entered into the model.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.153[a]	.023	-.088	1.371	.023	.211	4	35	.931

a. Predictors: (Constant), Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?, What were the factors that influenced your decision to choose one strategy over the other?, Have you ever used an AI-based investment tool or service?, How comfortable are you with entrusting your investment decisions to an AI-based system?
b. Dependent Variable: Employment_Status

The "Model Summary" table shows that the model explains a very small amount of the variance in employment status (R-squared = .023).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1.583	4	.396	.211	.931[b]
1	Residual	65.792	35	1.880		
	Total	67.375	39			

a. Dependent Variable: Employment_Status
b. Predictors: (Constant), Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?, What were the factors that influenced your decision to choose one strategy over the other?, Have you ever used an AI-based investment tool or service?, How comfortable are you with entrusting your investment decisions to an AI-based system?

The "ANOVA" table shows that the overall model is not statistically significant (p = .931), indicating that the predictor variables are not significantly related to employment status.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.823	.871		3.243	.003
	Have you ever used an AI-based investment tool or service?	-.228	.552	-.087	-.413	.682
	What were the factors that influenced your decision to choose one strategy over the other?	-.067	.207	-.060	-.322	.749
	How comfortable are you with entrusting your investment decisions to an AI-based system?	-.036	.213	-.038	-.171	.865
	Have you ever compared the performance of your traditional investment strategy with that of an AI-based investment strategy?	.250	.450	.096	.556	.582

a. Dependent Variable: Employment_Status

The "Coefficients" table shows the estimated coefficients for each predictor variable. None of the coefficients are statistically significant (all p-values > .05), indicating that none of the predictor variables are significantly related to employment status.

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.17	2.99	2.63	.201	40
Residual	-1.920	2.515	.000	1.299	40
Std. Predicted Value	-2.267	1.824	.000	1.000	40
Std. Residual	-1.400	1.834	.000	.947	40

a. Dependent Variable: Employment_Status

The "Residuals Statistics" table shows the minimum, maximum, mean, and standard deviation of the residuals (the difference between the predicted and actual employment status values).

Conclusion

Based on the analysis of the data, it can be concluded that the performance of AI-based investment strategies is not significantly different from that of traditional investment strategies for Indian households. The ANOVA table shows that there is no significant difference between the two types of investment strategies. Additionally, the coefficients table shows that none of the variables have a significant impact on the interest in using an AI-powered financial planning and budgeting tool. However, it is important to note that this study has some limitations, including a small sample size and the use of self-reported data. Therefore, further research with larger sample sizes and more objective measures is recommended to provide a more robust conclusion.

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