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Salahaddin University -Erbil
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The impact of artificial intelligence on the stock market(predict prices)

A Study submitted to financial and banking department/ college of Administrative and Economic / the University of Salahaddin-Erbil as partial fulfillment of requirements for the degree of the bachelor in finance and banking sciences.

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Abstract:

The integration of artificial intelligence (AI) in financial markets has revolutionized the prediction of stock prices, offering unprecedented insights into market trends and behaviors. This study examines the impact of AI on predicting stock prices and its implications for market efficiency and investor decision-making. Through advanced algorithms and machine learning techniques, AI models analyze vast volumes of financial data, including historical prices, trading volumes, news sentiment, and macroeconomic indicators, to identify patterns and trends that human analysts may overlook. These AI-powered predictive models have demonstrated remarkable accuracy in forecasting stock prices, outperforming traditional methods and providing valuable insights for traders, investors, and financial institutions. However, the widespread adoption of AI in stock market prediction raises concerns about algorithmic biases, data privacy, and market manipulation, prompting calls for regulatory oversight and ethical guidelines to ensure transparency and fairness in AI-driven financial markets. Despite these challenges, the transformative potential of AI in predicting stock prices offers unprecedented opportunities for enhancing market efficiency, mitigating risks, and empowering investors to make more informed decisions in an increasingly complex and dynamic financial landscape.

Introduction:

Artificial Intelligence has emerged as a game-changer in the field of price forecasting, offering advanced techniques that can deal with the complexity and volatility of markets. For example, machine learning algorithms can analyze massive amounts of historical data to identify patterns and trends that humans might miss. By identifying hidden correlations between variables, AI models can generate more accurate forecasts, taking into account internal and external factors that affect prices.

Many companies have already adopted AI for price forecasting and achieved remarkable results. For example, one leading e-commerce platform implemented AI algorithms to analyze customer behavior, competitor prices, and market trends. This allowed them to optimize their pricing strategy in real-time, resulting in increased sales and customer satisfaction. Likewise, a multinational energy company used AI models to forecast electricity prices, enabling it to make informed decisions about energy production, trade, and investments.

1.2Problem of the study:

Who will be responsible for possible AI mistakes? Artificial intelligence systems, like humans, are beginners in the beginning, and over time they learn, try and make mistakes. But if the end result is a loss, who is the answer? With all the advances and services of AI to the financial markets, we have to accept that we are still far from completely eliminating the human role and turning it over to AI. There is a golden triangle in trading that includes strategy, capital management, and market psychology. Artificial intelligence has spread in the first two halves, but the psychological side of the market will only be understood by humans until at least the near future.

1.3Objectives of the study:

The stock market is known for being volatile, dynamic and nonlinear. Accurate stock price forecasting due to numerous micro and macro factors such as politics, global economic conditions, unexpected events, financial performance of a company, etc. It's very challenging, but collectively all this means that there's a lot of data to find patterns. Thus, financial analysts, researchers, and data scientists continue to examine analytical techniques to detect stock market trends. In this article, we try to predict the price of shares with artificial intelligence before and after the advent of this technology.

1.4Hypotheses of the study:

Null Hypothesis (H0): "The implementation of AI technologies in financial decision-making does not significantly improve decision accuracy."

Alternative Hypothesis (H1): "The implementation of AI technologies in financial decision-making significantly improves decision accuracy."

Null Hypothesis (H0): "There is no significant difference in risk management effectiveness between financial institutions that utilize AI and those that do not."

Alternative Hypothesis (H1): "Financial institutions that utilize AI demonstrate significantly improved risk management effectiveness compared to those that do not."

1.5 Significance of the study:

Market Volatility and Systemic Risks:

The use of AI in trading can influence market volatility, and understanding these effects is crucial for regulators and market participants.

Market Efficiency and Information Processing:

Understanding how AI affects stock market predictions contributes to the broader discussion of market efficiency. If AI systems can consistently outperform traditional models or human analysts in predicting stock prices, it suggests that markets may adapt and become more efficient in processing information.

Theoretical framework:

2.1 The concept of financial markets:

The concept of financial markets refers to the infrastructure and mechanisms through which individuals, businesses, and governments trade financial assets such as stocks, bonds, currencies, commodities, and derivatives. Financial markets play a crucial role in facilitating the flow of capital, determining prices, and allocating resources in the economy. Here are key aspects of the concept of financial markets:

1. Platform for Trading: Financial markets provide platforms or exchanges where buyers and sellers come together to buy and sell financial assets. These exchanges serve as marketplaces where transactions are executed, and prices are determined based on supply and demand dynamics.

2. Capital Allocation: Financial markets facilitate the allocation of capital by directing funds from savers and investors to borrowers and issuers with investment opportunities. This capital allocation process is essential for financing business expansion, infrastructure projects, and government initiatives, thereby driving economic growth and development.

3. Price Discovery: Financial markets play a crucial role in price discovery, where the prices of financial assets are determined based on the collective actions of buyers and sellers. Prices reflect the market's assessment of the value of assets, taking into account factors such as supply, demand, economic fundamentals, and market sentiment.

4. Risk Management: Financial markets offer tools and instruments that enable individuals and businesses to manage financial risks effectively. These include derivatives such as options, futures, and swaps, which allow market participants to hedge against price fluctuations, interest rate changes, and other risks inherent in financial markets**.** (Zvi Bodie Professor, 2018)

2.2 Types of financial markets:

There are several different types of markets. Each one focuses on the types and classes of instruments available on it.

Stock Markets :

Perhaps the most of financial markets are stock markets. These are venues where companies list their shares, which are bought and sold by traders and investors. Stock markets, or equities markets, are used by companies to raise capital and by investors to search for returns.

Bond Markets :

A bond is a security in which an investor loans money for a defined period at a pre-established interest rate. You may think of a bond as an agreement between the lender and borrower containing the loan's details and its payments. Bonds are issued by corporations as well as by municipalities, states, and sovereign governments to finance projects and operations. For example, the bond market sells securities such as notes and bills issued by the United States Treasury.

Derivatives Markets

A derivative is a contract between two or more parties whose value is based on an agreed-upon underlying financial asset (like a security) or set of assets (like an index). Rather than trading stocks directly, a derivatives market trades in futures and options contracts and other advanced financial products that derive their value from underlying instruments like bonds, commodities, currencies, interest rates, market indexes, and stocks.

Forex Market

The forex (foreign exchange) market is where participants can buy, sell, hedge, and speculate on the exchange rates between currency pairs. The forex market is the most liquid market in the world, as cash is the most liquid of assets. The currency market handles more than $7.5 trillion in daily transactions, more than the futures and equity markets combined

Cryptocurrency Markets

Thousands of cryptocurrency tokens are available and traded globally across a patchwork of independent online crypto exchanges. These exchanges host digital wallets for traders to swap one cryptocurrency for another or for fiat monies such as dollars or euros.(Madura, 2019)

2.3 Money markets:

Money Markets

Typically, the money markets trade in products with highly liquid short-term maturities (less than one year) and are characterized by a high degree of safety and a relatively lower interest return than other markets.

The primary target of financial markets is to facilitate the efficient allocation of capital. This involves matching surplus funds from savers and investors with deficit funds from borrowers and issuers, allowing capital to flow to its most productive and profitable uses. Financial markets achieve this objective through various mechanisms such as primary and secondary markets, where securities are bought and sold, and through intermediaries like banks and brokerage firms that facilitate the transfer of funds between investors and borrowers. Additionally, financial markets aim to provide liquidity, discover prices, and manage risks, all of which contribute to the overall stability and growth of the economy. (Fabozzi, 2008)

2.4 The target is financial markets:

1. **Capital Allocation**:
Financial markets efficiently allocate capital by channeling savings from individuals, businesses, and governments to productive investments. This allocation of funds enables businesses to finance expansion, innovation, and infrastructure projects, which in turn stimulates economic growth.

2. **Facilitating Investment and Innovation**:
Financial markets provide a platform for companies to raise capital through the issuance of stocks and bonds. This enables businesses to invest in research and development, technology, and new ventures, fostering innovation and competitiveness in the economy.

3. **Job Creation**:
Access to capital through financial markets allows businesses to expand operations, invest in new projects, and create employment opportunities. As companies grow, they hire more workers, contributing to job creation and reducing unemployment rates, which are essential for overall economic development.

4. **Risk Management**:
Financial markets offer various financial instruments, such as derivatives and insurance products, that help individuals and businesses manage risks associated with fluctuations in interest rates, exchange rates, commodity prices, and other market variables. Effective risk management promotes stability and resilience in the economy.

5. **Wealth Creation and Distribution**:
Participation in financial markets allows individuals to invest their savings and accumulate wealth over time through returns generated from stocks, bonds, and other investment vehicles. This wealth creation contributes to increased consumer spending, higher living standards, and overall economic prosperity. (Mishkin, 2015)

2.5 The role of financial markets in developing the national economy:

1. **Algorithmic Trading**: AI algorithms are increasingly being used for algorithmic trading, where computer programs execute trades based on pre-defined criteria, such as price movements, volume, and market trends. These algorithms can analyze vast amounts of data in real-time, identify patterns, and execute trades with high speed and accuracy, leading to improved trading efficiency and liquidity in the market.

2. **Predictive Analytics**: AI-powered predictive analytics models can analyze historical market data, economic indicators, news sentiment, and other relevant factors to forecast future price movements and identify trading opportunities. These predictive models enable traders and investors to make more informed decisions, mitigate risks, and capitalize on market trends before they unfold.

3. **Risk Management**: AI technologies, such as machine learning algorithms, are utilized for risk management in the stock market. These algorithms can assess portfolio risk, identify potential vulnerabilities, and recommend strategies to hedge against market fluctuations and minimize losses. AI-driven risk management tools enhance portfolio resilience and stability, particularly in volatile market conditions.

4. **Personalized Investment Strategies**: AI-powered robo-advisors and wealth management platforms offer personalized investment strategies tailored to individual investors' goals, risk tolerance, and financial preferences. These platforms utilize advanced algorithms to optimize asset allocation, rebalance portfolios, and provide ongoing investment advice, making investing more accessible and affordable for a broader range of investors.

5. **Market Surveillance and Compliance**: AI technologies are deployed for market surveillance and compliance purposes to detect market manipulation, insider trading, and other fraudulent activities. AI-driven surveillance systems can analyze vast amounts of trading data in real-time, flag suspicious activities, and alert regulatory authorities to take appropriate action, thereby enhancing market integrity and investor protection.

6. **Quantitative Research and Trading Strategies**: AI and machine learning techniques enable quantitative researchers and quantitative traders to develop sophisticated trading strategies based on mathematical models, statistical analysis, and data-driven insights. These quantitative strategies leverage AI algorithms to identify profitable trading opportunities, optimize trade execution, and manage portfolio risk more effectively.

7. **Market Efficiency and Transparency**: The integration of AI in the stock market promotes market efficiency and transparency by facilitating faster information dissemination, improving price discovery mechanisms, and enhancing market liquidity. AI-driven trading algorithms contribute to reducing information asymmetry, narrowing bid-ask spreads, and ensuring fair and orderly market functioning. (Bank, 2019)

2.6 Types of artificial intelligence:

1. **Narrow AI (Weak AI)**:

Narrow AI, also known as weak AI, is designed to perform specific tasks or functions within a limited domain.Examples include virtual assistants like Siri and Alexa, recommendation systems, image recognition software, and chatbots.

2. **General AI (Strong AI)**:

General AI, also known as strong AI, refers to AI systems with human-like intelligence and cognitive abilities. These systems can understand, learn, and apply knowledge across different domains, similar to human intelligence
General AI remains a theoretical concept and has not been achieved yet.

3. **Machine Learning**:

Machine learning is a subset of AI that enables systems to learn from data and improve performance over time without being explicitly programmed.
It involves algorithms that analyze and interpret data, identify patterns, and make predictions or decisions based on the learned patterns.
Common machine learning techniques include supervised learning, unsupervised learning, and reinforcement learning. (Russell, 2021)

2.7 Characteristics of artificial intelligence:

- **Learning**: AI systems have the ability to learn from data, experience, and feedback. Through various techniques such as machine learning and deep learning, AI algorithms can improve their performance over time without being explicitly programmed.

- **Reasoning**: AI systems can reason and make decisions based on the information available to them. They can analyze complex situations, evaluate different options, and choose the most appropriate course of action.

- **Problem-Solving**: AI systems excel at solving problems across a wide range of domains. They can tackle complex, ill-defined problems and find optimal or near-optimal solutions through computational methods and optimization techniques.

- **Adaptability**: AI systems demonstrate adaptability by adjusting their behavior and responses based on changing circumstances or new information. They can adapt to dynamic environments, evolving goals, and unexpected events.

- **Autonomy**: AI systems have varying degrees of autonomy, ranging from fully autonomous systems capable of independent decision-making to semi-autonomous systems that require human supervision or intervention. Autonomous AI systems can operate without continuous human input once they are deployed.

- **Perception**: AI systems possess perception capabilities, allowing them to sense and interpret the environment through sensors, cameras, microphones, and other sensory inputs. This includes tasks such as image recognition, speech recognition, and natural language processing.

Interaction: AI systems can interact with humans and other systems through various modalities such as text, speech, gestures, and interfaces. (Nilsson, 2014)

2.8 The role of artificial intelligence in financial markets:

1. **Algorithmic Trading**: AI algorithms are used extensively in algorithmic trading, where they analyze vast amounts of market data, identify patterns, and execute trades at high speeds. These algorithms can capitalize on market inefficiencies, arbitrage opportunities, and price discrepancies, enhancing trading efficiency and liquidity.

2. **Predictive Analytics**: AI-powered predictive analytics models analyze historical market data, economic indicators, news sentiment, and other relevant factors to forecast future price movements and trends. These predictive models provide valuable insights to traders and investors, helping them make informed decisions, mitigate risks, and optimize investment strategies.

3. **Quantitative Research**: AI and machine learning techniques are employed in quantitative research to develop sophisticated trading strategies based on mathematical models, statistical analysis, and data-driven insights. These quantitative strategies leverage AI algorithms to identify profitable trading opportunities, optimize trade execution, and manage portfolio risk more effectively.

4. **Risk Management**: AI technologies play a crucial role in risk management in financial markets. Machine learning algorithms analyze portfolio risks, identify potential vulnerabilities, and recommend strategies to hedge against market fluctuations and minimize losses. AI-driven risk management tools enhance portfolio resilience and stability, particularly in volatile market conditions.

5. **Market Surveillance and Compliance**: AI-powered surveillance systems monitor financial markets for fraudulent activities, market manipulation, insider trading, and other illicit behavior. These systems analyze trading patterns, detect anomalies, and alert regulatory authorities to take appropriate action, thereby ensuring market integrity and investor protection.

6. **Natural Language Processing (NLP)**: NLP techniques are used in financial markets to analyze and interpret textual data from news articles, earnings reports, social media, and other sources. AI-powered NLP models extract relevant

information, sentiment, and insights from unstructured data, enabling traders and investors to incorporate qualitative factors into their decision-making processes.

7. **Robo-Advisors**: AI-driven robo-advisors provide automated investment advice and portfolio management services to individual investors. These platforms use machine learning algorithms to assess investors' risk tolerance, financial goals, and preferences, and recommend personalized investment strategies tailored to their needs. Robo-advisors make investing more accessible, affordable, and convenient for a broader range of investors.

8. **High-Frequency Trading (HFT)**: AI algorithms are utilized in high-frequency trading (HFT) strategies, where trades are executed at extremely high speeds to capitalize on small price discrepancies or market inefficiencies. HFT firms employ AI-powered algorithms to analyze market data, execute trades, and manage risk in milliseconds, leveraging technology to gain a competitive edge in the market. (Pereira, 2021)

Methodology:

3.1 Tools and data collection:

This research conducted to find how trader or broker deal with artfical intalignt in finance and stock and forex. Thus, questionnaire is used as a tool and distributed among participants to be answered then after asking the permission from brokers and the employees to let the participate in this survey. A questionnaire consisting of 5 demographical questions and 50 close ended questions was given to them. The participants had been given plenty of time to answer the question freely, deliberately and honestly. Furthermore, after two days the questionnaire papers were collected to be cheeked for the pervious of classification and data entry to be analyzed.

3.2 Participants

50 employees where participated from VCG Markets, Smart Trader , Mercato Broker, others of both genders, 29 male and 21 female in this survey with different ages of less than 30 to above 50 years.

3.3 Method:

Quantitative method has been used. as only one tool was used to collect data which was a questionnaire survey. Although, this questionnaire contains only close ended questions which needs Likert scale responses (agree, disagree, neutral, strongly agree, strongly disagree). Therefore, quantitative method is suitable for such research that deals with numbers.

3.4 data analyses:

The data were collected and checked for correction, and then SPSS program 26 is used for the purpose of data analyses. This program is an advanced program that is widely used is statistic affairs. One sample t-test was used to check the percentage, mean, standard deviation and the significant level.

Frequency Table

Frequency Table - gender

gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	29	58.0	58.0	58.0
	female	21	42.0	42.0	100.0
	Total	50	100.0	100.0	

This table shows the gender of the participants. The number of males is 29 which equals to 58 percent. In addition, the number of females is 21 which equals to 42 percent. This table explains that both genders participate in this research, and the number of male is more than the number of female.

age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 30	24	48.0	48.0	48.0
	31 - 40	21	42.0	42.0	90.0
	41 - 50	4	8.0	8.0	98.0
	above 50	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

This table show the age of participants. Which calcified into four ages, the number of age of those people that less than 30 are 24 which equal to 48percent. In addition the number of those between 31 to 40 years old is 21 which it is equal to 42 percent. In the other hand, the number of those between 41to 50 years old is 4 which it is equal to 8 percent. In the other hand, the number of those above 50 years old is 1 which it is equal to 2 percent.

certificate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	bachelors	11	22.0	22.0	22.0
	master	19	38.0	38.0	60.0
	diploma	15	30.0	30.0	90.0
	without certifcation	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

The number of bachelors is 11 which equal to 22 percent, and the number of master is 19 that equal to 38 percent, and the number of diploma is 15 which equal to 30 percent, and the number of without certifcation is 5 which equal to 10 percent ; this table show that Most of the participants hold diploma degree.

1

The possibility of various artificial intelligence and its applications helps support investor trends

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	25	50.0	50.0	50.0
	agree	15	30.0	30.0	80.0
	neutral	8	16.0	16.0	96.0
	disagree	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(The possibility of various artificial intelligence and its applications helps support investor trends)(**8)of participants have chosen (neutral) which mean they don't have ideas while (15) of them responded (agree) and (25) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

2

AI is already changing how work is done in industries from healthcare to manufacturing to finance.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	23	46.0	46.0	46.0
	agree	15	30.0	30.0	76.0
	neutral	8	16.0	16.0	92.0
	disagree	2	4.0	4.0	96.0
	strongly disagree	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(AI is already changing how work is done in industries from healthcare to manufacturing to finance.) (**8)of participants have chosen (neutral) which mean they don't have ideas while (15) of them responded (agree) and (23) of them responded (strongly agree). Therefore, it's obvious that majority of

students responded to this question positively that means most of them with this statement.

3

AI is changing the relationship between financial institutions and their workers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	19	38.0	38.0	38.0
	agree	13	26.0	26.0	64.0
	neutral	6	12.0	12.0	76.0
	disagree	10	20.0	20.0	96.0
	strongly disagree	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(AI is changing the relationship between financial institutions and their workers) (**6)of participants have chosen (neutral) which mean they don't have ideas while (13) of them responded (agree) and (19) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

4

Artificial intelligence is increasing economic inequality by forcing some workers to accept low-paying jobs or making them completely unemployed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	12.0	12.0	12.0
	agree	21	42.0	42.0	54.0
	neutral	11	22.0	22.0	76.0
	disagree	5	10.0	10.0	86.0
	strongly disagree	7	14.0	14.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence is increasing economic inequality by forcing some workers to accept low-paying jobs or making them completely unemployed) (**11)of participants have chosen (neutral) which mean they don't have ideas while (21) of them responded (agree) and (7) of them responded

(strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

5

Artificial intelligence technologies are always working in a positive way, to stabilize the financial markets.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	9	18.0	18.0	18.0
	agree	16	32.0	32.0	50.0
	neutral	16	32.0	32.0	82.0
	disagree	5	10.0	10.0	92.0
	strongly disagree	4	8.0	8.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence technologies are always working in a positive way, to stabilize the financial markets.) (**16)of participants have chosen (neutral) which mean they don't have ideas while (16) of them responded (agree) and (4) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

6

Use AI-based insights to improve the quality of a financial product.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	10.0	10.0	10.0
	agree	23	46.0	46.0	56.0
	neutral	15	30.0	30.0	86.0
	disagree	4	8.0	8.0	94.0
	strongly disagree	3	6.0	6.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Use AI-based insights to improve the quality of a financial product.)**
(15) of participants have chosen (neutral) which mean they don't have ideas while (23) of them responded (agree) and (3) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

7

Reliance on artificial intelligence in finance is essential.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	11	22.0	22.0	22.0
	agree	18	36.0	36.0	58.0
	neutral	15	30.0	30.0	88.0
	disagree	4	8.0	8.0	96.0
	strongly disagree	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Reliance on artificial intelligence in finance is essential.)**
(15) of participants have chosen (neutral) which mean they don't have ideas while (18) of them responded (agree) and (11) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

8

Blind trust in the use of this AI leads to loss of capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	10	20.0	20.0	20.0
	agree	17	34.0	34.0	54.0
	neutral	12	24.0	24.0	78.0
	disagree	9	18.0	18.0	96.0
	strongly disagree	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Blind trust in the use of this AI leads to loss of capital)**
(12) of participants have chosen (neutral) which mean they don't have ideas while (17) of them responded (agree) and (10) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

9

AI better meets customer needs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	14	28.0	28.0	28.0
	agree	16	32.0	32.0	60.0
	neutral	15	30.0	30.0	90.0
	disagree	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(AI better meets customer needs.)**
(15) of participants have chosen (neutral) which mean they don't have ideas while (16) of them responded (agree) and (14) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

10

The various capabilities of artificial intelligence and its applications help support investor trends and create investment opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	8	16.0	16.0	16.0
	agree	17	34.0	34.0	50.0
	neutral	11	22.0	22.0	72.0
	disagree	6	12.0	12.0	84.0
	strongly disagree	8	16.0	16.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(The various capabilities of artificial intelligence and its applications help support investor trends and create investment opportunities)**
(11) of participants have chosen (neutral) which mean they don't have ideas while (17) of them responded (agree) and (8) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

11

Artificial intelligence makes stock markets a very profitable and popular way to grow capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	9	18.0	18.0	18.0
	agree	11	22.0	22.0	40.0
	neutral	18	36.0	36.0	76.0
	disagree	5	10.0	10.0	86.0
	strongly disagree	7	14.0	14.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence makes stock markets a very profitable and popular way to grow capital)**

(18) of participants have chosen (neutral) which mean they don't have ideas while (11) of them responded (agree) and (7) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

12

Artificial intelligence makes you rely on predicting future prices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	10.0	10.0	10.0
	agree	10	20.0	20.0	30.0
	neutral	20	40.0	40.0	70.0
	disagree	7	14.0	14.0	84.0
	strongly disagree	8	16.0	16.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence makes you rely on predicting future prices)**

(20) of participants have chosen (neutral) which mean they don't have ideas while (10) of them responded (agree) and (8) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

13

Artificial intelligence is a new way to predict the bankruptcy of financial institutions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	10.0	10.0	10.0
	agree	12	24.0	24.0	34.0
	neutral	10	20.0	20.0	54.0
	disagree	8	16.0	16.0	70.0
	strongly disagree	15	30.0	30.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence is a new way to predict the bankruptcy of financial institutions.)**

(10) of participants have chosen (neutral) which mean they don't have ideas while (12) of them responded (agree) and (15) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

14

Supply and demand are the main driver of price movement in the financial markets through artificial intelligence.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	2	4.0	4.0	4.0
	agree	20	40.0	40.0	44.0
	neutral	11	22.0	22.0	66.0
	disagree	8	16.0	16.0	82.0
	strongly disagree	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Supply and demand are the main driver of price movement in the financial markets through artificial intelligence.)**

(11) of participants have chosen (neutral) which mean they don't have ideas while (20) of them responded (agree) and (9) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

15

Relying on artificial intelligence in finance is a necessity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	7	14.0	14.0	14.0
	agree	15	30.0	30.0	44.0
	neutral	8	16.0	16.0	60.0
	disagree	13	26.0	26.0	86.0
	strongly disagree	7	14.0	14.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Relying on artificial intelligence in finance is a necessity)**
(8) of participants have chosen (neutral) which mean they don't have ideas while (15) of them responded (agree) and (7) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

16

Artificial intelligence is not yet able to predict the movement of the stock market with reliable accuracy that can be reliably reliably

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	10	20.0	20.0	20.0
	agree	14	28.0	28.0	48.0
	neutral	8	16.0	16.0	64.0
	disagree	9	18.0	18.0	82.0
	strongly disagree	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence is not yet able to predict the movement of the stock market with reliable accuracy that can be reliably reliably)**
(8) of participants have chosen (neutral) which mean they don't have ideas while (14) of them responded (agree) and (9) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

17

Artificial intelligence is an entity that predicts price risks in the financial markets.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	8.0	8.0	8.0
	agree	17	34.0	34.0	42.0
	neutral	15	30.0	30.0	72.0
	disagree	6	12.0	12.0	84.0
	strongly disagree	8	16.0	16.0	100.0
	Total	50	100.0	100.0	

These table indicates that how the participants responded to the question **(Artificial intelligence is an entity that predicts price risks in the financial markets.)**

(15) of participants have chosen (neutral) which mean they don't have ideas while (17) of them responded (agree) and (8) of them responded (strongly agree). Therefore, it's obvious that majority of students responded to this question positively that means most of them with this statement.

Figure 1

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
The possibility of various artificial intelligence and its applications helps support investor trends	50	1.74	.876	.124
AI is already changing how work is done in industries from healthcare to manufacturing to finance.	50	1.90	1.074	.152
AI is changing the relationship between financial institutions and their workers	50	2.26	1.275	.180
Artificial intelligence is increasing economic inequality by forcing some workers to accept low-paying jobs or making them completely unemployed	50	2.72	1.230	.174
Artificial intelligence technologies are always working in a positive way, to stabilize the financial markets.	50	2.58	1.144	.162
Use AI-based insights to improve the quality of a financial product.	50	2.54	.994	.141
Reliance on artificial intelligence in finance is essential.	50	2.36	1.045	.148
Blind trust in the use of this AI leads to loss of capital	50	2.52	1.129	.160
AI better meets customer needs.	50	2.22	.975	.138

The various capabilities of artificial intelligence and its applications help support investor trends and create investment opportunities	50	2.78	1.314	.186
Artificial intelligence makes stock markets a very profitable and popular way to grow capital	50	2.80	1.262	.178
Artificial intelligence makes you rely on predicting future prices	50	3.06	1.185	.168
Artificial intelligence is a new way to predict the bankruptcy of financial institutions.	50	3.32	1.392	.197
Supply and demand are the main driver of price movement in the financial markets through artificial intelligence.	50	3.04	1.212	.171
Relying on artificial intelligence in finance is a necessity	50	2.96	1.309	.185
Artificial intelligence is not yet able to predict the movement of the stock market with reliable accuracy that can be reliably reliably	50	2.86	1.414	.200
Artificial intelligence is an entity that predicts price risks in the financial markets.	50	2.94	1.202	.170

Figure 2

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
The possibility of various artificial intelligence and its applications helps support investor trends	14.042	49	.000	1.740	1.49	1.99
AI is already changing how work is done in industries from healthcare to manufacturing to finance.	12.512	49	.000	1.900	1.59	2.21
AI is changing the relationship between financial institutions and their workers	12.537	49	.000	2.260	1.90	2.62
Artificial intelligence is increasing economic inequality by forcing some workers to accept low-paying jobs or making them completely unemployed	15.642	49	.000	2.720	2.37	3.07
Artificial intelligence technologies are always working in a positive way, to stabilize the financial markets.	15.941	49	.000	2.580	2.25	2.91
Use AI-based insights to improve the quality of a financial product.	18.068	49	.000	2.540	2.26	2.82
Reliance on artificial intelligence in finance is essential.	15.968	49	.000	2.360	2.06	2.66
Blind trust in the use of this AI leads to loss of capital	15.780	49	.000	2.520	2.20	2.84

AI better meets customer needs.	16.100	49	.000	2.220	1.94	2.50
The various capabilities of artificial intelligence and its applications help support investor trends and create investment opportunities	14.962	49	.000	2.780	2.41	3.15
Artificial intelligence makes stock markets a very profitable and popular way to grow capital	15.693	49	.000	2.800	2.44	3.16
Artificial intelligence makes you rely on predicting future prices	18.258	49	.000	3.060	2.72	3.40
Artificial intelligence is a new way to predict the bankruptcy of financial institutions.	16.871	49	.000	3.320	2.92	3.72
Supply and demand are the main driver of price movement in the financial markets through artificial intelligence.	17.743	49	.000	3.040	2.70	3.38
Relying on artificial intelligence in finance is a necessity	15.993	49	.000	2.960	2.59	3.33
Artificial intelligence is not yet able to predict the movement of the stock market with reliable accuracy that can be reliably reliably	14.299	49	.000	2.860	2.46	3.26
Artificial intelligence is an entity that predicts price risks in the financial markets.	17.292	49	.000	2.940	2.60	3.28

Findings and Discussion

4.1 analysis :

12- Artificial intelligence makes you rely on predicting future prices 3.06
13. Artificial intelligence is a new way to predict the bankruptcy of financial institutions.3.32
14- Supply and demand are the main driver of price movement in financial markets through artificial intelligence. 3.04
analysis Table (1) shows that the overall rate (average) The impact of artificial intelligence on the stock market (price forecasting) is (3), which is grat level of the Likert scale (3), with a standard deviation Std. Deviation

Through the analysis of the data, we obtained results as follows:

Question No. (13) comes in first place and includes (Artificial intelligence is a new way to predict the bankruptcy of financial institutions.) With a value of the arithmetic mean of 3.32, it is the highest value in terms of the rest of the paragraphs Questionnaire Therefore, we find the value of the standard deviation of 1.392 We find this paragraph He ranked first in terms of the remaining paragraphs, meaning that we can through artificial intelligence predict the future financial institutions in terms of loss or bankruptcy.

We find question number 12 that includes (artificial intelligence makes you rely on predicting future prices) comes in second place in terms of the value of the arithmetic mean with a score of 3.06 and a standard deviation with a degree.
1.185 Therefore, we find that analysts in the financial markets can predict the prices of the future and rely on artificial intelligence.

Question No. (14) comes in third place, including (supply and demand are the main driver of price movement in the financial markets through artificial intelligence) in second place in terms of the value of the arithmetic mean and it was 3.04 Standard deviation 1.212 We conclude through statistical analysis that artificial intelligence depends on it in the financial markets for supply and demand,
i.e. it is used to be known in the financial markets Through analysis, we found the data in the remaining paragraphs of the questionnaire, we did not get the arithmetic mean of any of them, their score is less than 3, so they do not calculate

any artificial intelligence in these paragraphs does not affect the financial markets to predict the price.

5.1 Conclusions:

Artificial intelligence influences or helps to predict future shame in this case helps to profit and away from the risk of loss and through prediction and depending on artificial intelligence.

Through the reliance of financial institutions on artificial intelligence, they can protect themselves or ensure companies from the risk of bankruptcy because through artificial intelligence they know in advance whether to lose or profit in their trade.

We also conclude that through artificial intelligence, they can control supply and demand in the financial markets to control the price.

5.2 Recommendations:

We recommend that financial institutions commit to relying on artificial intelligence through competition in the financial markets.

Cadres working in financial institutions from time to time are updated by subscribing to advanced courses in the field of artificial intelligence.

- always connected to foreign networks and markets and uninterrupted from them They have more interest in the field of artificial intelligence in the financial markets.

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جامعة الصلاح الدين_اربيل
كلية الادارة والاقتصاد
قسم / علوم المالية و المصرفية

دراسة ميدانية للمصارف التجارية / مدينة اربيل

أستمارة الاستبيان

تحية طيبة.....

في إطار إعداد البحث العلمي لموضوع "

تأثير الذكاء الاصطناعي على سوق الأوراق المالية (توقع الأسعار)

" نقوم بأجراء بحث ميداني ، حيث تم تصميم هذا الاستبيان بهدف لمعرفة اتجاهتكم حول موضوع البحث. نأمل تعاونكم من خلال الإجابة على مجموعة الآسئلة المرفقة بصراحة و موضوعية، للعلم أن كافة البيانات التي يتم الإدلاء بها سوف تستخدم للأغراض البحث العلمي فقط.
تقبلوا فائق الاحترام و التقدير.

شكرآ على حسن تعاونكم

المحور أولآ: البيانات الشخصية و الوظيفية:

اولا: البيانات الشخصية

1- الجنس: ذكر ☐ أنثى ☐

2- العمر : أقل من 30 سنة ☐ من 31 الى 40 سنة ☐

من 41 الى 50 سنة ☐ أكثر من 51 سنة ☐

3- مستوى العلمي: بكالوريوس ☐ ماجيستر ☐ دبلوم ☐ دون الشهادة ☐

وضع علامة (√) على ما يلي.

ثانيآ : أثر الذكاء الاصطناعي في اسواق المال:

ت	أسئلة	موافق بشدة	موافق	المحايد	غير موافق	غير موافق بشدة
1	إمكانية الذكاء الاصطناعي المختلفة وتطبيقاته يساعد في دعم توجهات المستثمرين					
2	يعمل الذكاء الاصطناعي بالفعل على تغيير كيفية إنجاز العمل في الصناعات من الرعاية الصحية إلى التصنيع إلى التمويل.					
3	يعمل الذكاء الاصطناعي على تغيير العلاقة بين المؤسسات المالية وعمالها.					
4	الذكاء الاصطناعي يؤدى الى الزيادة عدم المساواة الاقتصادية من خلال إجبار بعض العمال على قبول وظائف منخفضة الأجر أو جعلهم عاطلين عن العمل تماما					
5	أن تقنيات الذكاء الاصطناعي تعمل بطريقة إيجابية دائماً،					

	لتحقيق الاستقرار في الاسواق المال.					
6	استخدام الرؤى المستندة إلى الذكاء الاصطناعي لتحسين جودة المنتج المالي.					
7	أعتماد على الذكاء الاصطناعى في مجال التمويل ضروري.					
8	تؤدي الثقة العمياء في استخدام هذا الذكاء الاصطناعي إلى خسارة رأس المال					
9	الذكاء الاصطناعي يقوم بتلبية احتياجات العملاء بشكل أفضل.					

ثالثآ: التنبوء بالاسعار:

ت	أسئلة	موافق بشدة	موافق	المحايد	غير موافق	غير موافق بشدة
10	إمكانية الذكاء الاصطناعى المختلفة وتطبيقاته يساعد في دعم توجهات المستثمرين وخلق فرص استثمارية					
11	الذكاء الاصطناعي يجعل أسواق الأسهم طريقة					

	مربحة للغاية وشائعة لتنمية رأس المال					
12	الذكاء الاصطناعي يجعلك تعتمد على التنبوء بالاسعار المستقبلية					
13	الذكاء الاصطناعي وسيلة جديدة للتنبؤ بإفلاس المؤسسات المالية.					
14	العرض و الطلب الدافع اساسي لحركة الاسعار في أسواق المالي عن طريق الذكاء الاصطناعي.					
15	أعتماد على الذكاء الاصطناعي في مجال التمويل ضرورة					
16	الذكاء الاصطناعي ليس قادرا حتى الآن على التنبؤ بحركة سوق الأوراق المالية بدقة موثوقة يمكن الاطمئنان إليها					
17	الذكاء الاصطناعي جهة التي تتنباء بالمخاطر اسعار في اسواق المال.					