



The 1st Intl Online Conference on Risk and Financial Management

Big Data, Artificial Intelligence,
and Machine Learning in Finance

17-18 June 2025 | Online

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The 1st International Online Conference on Risk and Financial Management

17–18 June 2025 | Online



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17–18 June 2025
Online

The 1st International Online Conference on
Risk and Financial Management

Organised by



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Welcome from the Chair

Dear Colleagues,

I want to offer a warm welcome to all conference participants of the **1st International Online Conference on Risk and Financial Management—Big Data, Artificial Intelligence, and Machine Learning in Finance (IOCRF2025)**, which will take place **virtually** over two days from **17 to 18 June 2025**. The conference is sponsored by MDPI and the scientific journal *JRFM* (*Journal of Risk and Financial Management*), a peer-reviewed, open access journal that focuses on risk management and all areas of empirical finance, management and applied financial economics.

This conference will feature sessions on the following topics:

- Machine learning in economics and finance;
- AI in economics and finance;
- AI in financial reporting and auditing;
- Financial innovations and technology;
- Future of money: central bank digital currencies, cryptocurrencies and stablecoins.

This event will be held entirely online, allowing participants from all over the world to participate without concerns regarding travel and related expenditures. This conference format is particularly appropriate and useful because research concerned with AI and big data applications in empirical finance is progressing rapidly. An electronic conference provides a platform for rapid and direct exchanges about the latest research findings and novel ideas.

Participation, as well as attendance of this online conference, is free. Participants will have the opportunity to examine, explore and critically engage with issues and advances in these areas. We hope to facilitate discussions and exchange within the community.

Outstanding contributions from each session will be eligible for conference awards. Moreover, instead of limiting presentations to a live poster session, all IOCRF2025 participants have the opportunity to upload and display their research in the form of a poster at the poster gallery on the conference website. Therefore, all participants with poster submissions for the poster gallery are now eligible for awards! Please click [HERE](#) for more instructions on poster and oral submissions.

Lastly, we would like to express our sincere gratitude for your unwavering support and participation, and to wish this conference every success.

Kind Regards,



Prof. Dr. Thanasis Stengos

Department of Economics and
Finance, University of Guelph,
Guelph, ON, Canada



Journal of
***Risk and Financial
Management***

Journal of Risk and Financial Management is an international, peer-reviewed, open access journal on risk and financial management, published monthly online by MDPI.

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- **Journal Rank**: CiteScore - Q1 (Business, Management and Accounting (miscellaneous))
- **Rapid Publication**: manuscripts are peer-reviewed and a first decision is provided to authors approximately 21 days after submission; acceptance to publication is undertaken in 3.8 days (median values for papers published in this journal in the second half of 2024).
- **Recognition of Reviewers**: reviewers who provide timely, thorough peer-review reports receive vouchers entitling them to a discount on the APC of their next publication in any MDPI journal, in appreciation of the work done.

Session Chairs



Prof. Dr. Thanasis Stengos

Department of Economics and
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Guelph, ON, Canada



**Prof. Dr. Svetlozar (Zari)
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**Prof. Dr. Xianrong (Shawn)
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Information Technology & Decision
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**Prof. Dr. Ramona Rupeika-
Apoga**

Faculty of Business, Management
and Economics, University of Latvia,
Riga, Latvia

Keynote Speakers



Dr. Mohamed Chaouch

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Statistics and Physics, Qatar
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Business and Economics,
Faculty of International
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Prof. Dr. Javad Izadi

The Claude Littner Business
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**Prof. Dr. Ramona Rupeika-
Apoga**

Faculty of Business,
Management and
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Latvia, Riga, Latvia



Dr. Nikolaos Daskalakis

Finance and
Accounting, Department of
Public
Administration, Panteion
University, Athens, Greece

Invited Speakers



Prof. Dr. Piotr Fiszeder

Faculty of Economic
Sciences and Management,
Nicolaus Copernicus
University in Torun, Torun,
Poland



Prof. Dr. Shumi Akhtar

Finance Discipline, Business
School, University of Sydney,
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Kharuddin**

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A&M University System,
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Dr. Ahmed Eltweri

Liverpool Business School,
Liverpool John Moores
University, Liverpool, UK



Dr. Kirill Shakhnov

School of Economics,
University of Surrey,
Guildford, UK

Program Overview

Day 1		Day 2	
17 June - Morning		18 June - Morning	
Session 3. AI in Financial Reporting and Auditing		Session 5. Future of Money: Central Bank Digital Currencies, Cryptocurrencies and Stablecoins	
Break			
17 June - Afternoon		18 June - Afternoon	
Parallel Sessions			
Session 2. AI in Economics and Finance	Session 4. Financial Innovations and Technology	Session 1. Machine Learning in Economics and Finance	

IOCRF 2025 Program

DAY 1

Date: 17 June 2025 (Tuesday)

Time: 9:00 (CEST, Basel) | 3:00 (EDT, New York) | 15:00 (CST Asia, Beijing)

Day 1 Morning Activity

Opening Speech by Session Chair

Session 3: AI in Financial Reporting and Auditing

EDT (New York) + 18 hr from the timetable

CST (China) + 6 hr from the timetable

CEST (Central European Summer Time)	Speaker	Title
9:00-9:05	Dr. Mahmoud Elmarzouky Session Chair	Welcome from the Session Chair
9:05-9:35	Dr. Rohaida Basiruddin Keynote Speaker	<i>Guardian or Threat? AI's Dual Role in Financial Reporting Integrity and Earnings Management</i>
9:35-9:55	Dr. Khairul Ayuni Mohd Kharuddin Invited Speaker	<i>Transforming the Accounting Profession with Artificial Intelligence: Benefits, challenges, and opportunities</i>
9:55-10:25	Prof. Dr. Issam Benhayoun Keynote Speaker	<i>From Black Box to Glass Box: The Role of Explainable Artificial Intelligence (XAI) in Financial Reporting and Accounting</i>
10:25-10:40	Guanming He Selected Speaker	<i>Identifying financial statement frauds via machine learning: A comparative analysis based on Chinese listed companies</i>

10:40-10:55	Yanying Li Selected Speaker	<i>The Readability Level in Annual Reports of Chinese Listed Companies and the Manipulative Behaviors of Managers for Self-Serving Incentives</i>
10:55-11:10	Michael NA Masunda Selected Speaker	<i>Disruption in Southern Africa's Money Laundering Activity by AI-Tech</i>
11:10-11:25	Dr. Ahmad Khan Selected Speaker	<i>AI's Role in Shaping the Future of Economic and Financial Analysis in the Pursuit of the Macroeconomic Scenario</i>
11:25-11:55	Prof. Dr. Javad Izadi Keynote Speaker	<i>To be announced</i>

DAY 1

Date: 17 June 2025 (Tuesday)

Time: 14:30 (CEST, Basel) | 8:30 (EDT, New York) | 20:30 (CST Asia, Beijing)

Day 1 Afternoon Activity (Parallel Session)

Opening Speech by Session Chair

Session 2: AI in Economics and Finance

Session 4: Financial Innovations and Technology

Flash Poster Part

Session 2 and Flash Poster Part

EDT (New York) + 18 hr from the timetable

CST (China) + 6 hr from the timetable

CEST (Central European Summer Time)	Speaker	Title
14:30-14:35	Prof. Dr. Svetlozar (Zari) Rachev Session Chair	Welcome from the Session Chair
14:35-14:55	Prof. Dr. Shumi Akhtar Invited Speaker	<i>Business and Entrepreneurship Will Never Be the Same – AI & Digital Transformation</i>
14:55-15:15	Prof. Dr. Piotr Fiszeder Invited Speaker	<i>Identification of Bitcoin Volatility Drivers Using Statistical and Machine Learning Methods</i>
15:15-15:45	Dr. Young Shin Kim Keynote Speaker	<i>Risk-Neutral Pricing of Quanto Options with Generative Machine Learning Techniques</i>
15:45-16:00	Kamran Razzaq Selected Speaker	<i>Future of Corporate Finance: Advancing Decision-Making with Machine Learning and AI Technologies</i>
16:00-16:15	Keyao Wang Selected Speaker	<i>AI-Driven Policy Effects on Stock Market Anomalies: Evidence from China's Digital Finance Era</i>
16:15-16:30	Serkan Karadas Selected Speaker	<i>Using ChatGPT in Asset Allocation Recommendations</i>
16:30-16:45	Mounira Raddaoui Selected Speaker	<i>Innovative debt financing to bridge Saudi Arabia's climate and economic gaps</i>
16:45-17:00	Rawnaa Ibrahim Selected Speaker	<i>A Comprehensive Framework for Credit Card Fraud Detection</i>
17:00-17:25	Flash Poster Presentation (5 mins per person)	Shuchi Zhang <i>Responsibility as a Buffer against Automation: A Responsibility-anchored Employment Theory Framework</i>
		Dr. Raja Kamal Ch <i>Deep Learning in Credit Risk Assessment: A Data-Driven Approach to Transforming Financial Decision-Making and Risk Analytics</i>

Girish Garg

The Role of Artificial Intelligence as a driving variable in the modern market: A MICMAC approach

Oleg Sukharev

Financial portfolio: optimization and technology of "structural choice"

Salvatore La Barbera

Generative AI in Finance: A Framework for the Trade-Off Between Automation and Human Expertise

Session 4 and Flash Poster Part

Time: 15:00 (CEST, Basel) | 9:00 (EDT, New York) | 21:00 (CST Asia, Beijing)

EDT (New York) + 18 hr from the timetable

CST (China) + 6 hr from the timetable

CEST (Central European Summer Time)	Speaker	Title
15.00-15.05	Prof. Dr. Xianrong (Shawn) Zheng Session Chair	Welcome from the Session Chair
15.05-15.25	Prof. Dr. Xianrong (Shawn) Zheng Session Chair	<i>Investing in the Age of Generative AI: A GPT-based Sentiment Analysis Approach</i>
15.25-15.45	Dr. Ann-Ngoc Nguyen Invited Speaker	<i>Decentralized Finance (DeFi) - The New Financial Paradigm</i>
15.45-16.05	Dr. Dimitrios Koutmos Invited Speaker	<i>Cryptocurrencies & Blockchain Research: Past, Present, Future</i>
16.05-16.35	Dr. Leo H. Chan Keynote Speaker	<i>Alpha Darkhorse or Trojan Horse? A comprehensive Analysis of Leveraged ETFs</i>
16.35-16.50	Leo S.F. Lin Selected Speaker	<i>Leveraging Federated Learning for Enhancing Anti-Fraud Systems in Fintech: Opportunities and Challenges</i>
16.50-17.05	Bianca Benedict Selected Speaker	<i>Trading Emotions in Day Trading: Experimental Evidence on The Synergy between Humans and Trading Robots</i>

17.05-17.20	Stavros Pantos Selected Speaker	<i>“Learning from your neighbours”: prudential provisions of the EU AI Act for the UK insurance supervisory regime</i>
17.20-17.35	Abolhasan Jalilvand Selected Speaker	<i>Does ESG Affect Bank Risk?</i>
17.35-17.50	Teodora Mitu Selected Speaker	<i>The Behavior of European Financial Markets under the Risk Pressure. Calculating the Value at Risk of a Stock Portfolio Using Python</i>
17.50-18.10	Flash Poster Presentation (5 mins per person)	Alexandru Vasile Rusu <i>Financial Innovations and AI-Driven Management in Romania’s Tourism and Public Catering Sector</i> Muhammad Arslan <i>Blockchain and Artificial Intelligence in Sustainable Finance: A Thematic Analysis</i> Fabrizio Di Sciorio <i>Integrating the implied regularity into implied volatility models: A study on free arbitrage model</i> Angelo Kalafatas <i>Statistical Dangerousness: a novel tool that foresees the dangers</i>

DAY 2

Date: 18 June 2025 (Wednesday)

Time: 9:00 (CEST, Basel) | 3:00 (EDT, New York) | 15:00 (CST Asia, Beijing)

Day 2 Morning Activity

Opening Speech by Session Chair

Session 5: Future of Money: Central Bank Digital Currencies, Cryptocurrencies and Stablecoins

EDT (New York) + 18 hr from the timetable

CST (China) + 6 hr from the timetable

CEST (Central European Summer Time)	Speaker	Title
9:00-9:05	Prof. Dr. Ramona Rupeika-Apoga Session Chair	Welcome by the Session Chair
9:05-9:35	Dr. Nikolaos Daskalakis Keynote Speaker	<i>Crypto and Blockchain in the Era of MiCA and DLTR</i>
9:35-10:05	Prof. Dr. Ramona Rupeika-Apoga Keynote Speaker	<i>Bitcoin's Monetary Metamorphosis: From Concept to Currency?</i>
10:05-10:25	Dr. Ahmed Eltweri Invited Speaker	<i>Central Bank Digital Currencies and the Challenges of Financial Crime in a Digital Bartering Economy</i>
10:25-10:45	Dr. Kirill Shakhnov Invited Speaker	<i>To be announced</i>
10:45-11:00	Papa Ousseynou Diop Selected Speaker	<i>Binance USD Delisting and Stablecoin Repercussions: A Local Projections Approach</i>
11:00-11:15	Georgios Papapanagiotou Selected Speaker	<i>On the time-varying causal relationships that drive bitcoin returns</i>

11:15-11:30	Rija Anwar Selected Speaker	<i>Connectedness between Islamic Cryptocurrencies and Green Assets: Deep Insights from Extreme Events</i>
11:30-11:45	Srijanie Banerjee Selected Speaker	<i>Understanding Attitude Towards Central Bank Digital Currency for Inducing Financial Inclusion: A Constructivist Analysis of Attitude Formation and Adoption Framework</i>
11:45-11:55	Flash Poster Presentation (5 mins per person)	Mohamed Rochdi Keffala <i>Cryptocurrencies in Portfolio Diversification: Evaluating Risk-Adjusted Performance and Strategic Allocation</i> Leo S.F. Lin <i>Cryptocurrencies and AI-Enabled Organized Fraud: Emerging Risks and Countermeasures</i>

DAY 2

Date: 18 June 2025 (Wednesday)

Time: 14:30 (CEST, Basel) | 8:30 (EDT, New York) | 20:30 (CST Asia, Beijing)

Day 2 Afternoon Activity

Opening Speech by Session Chair

Session 1: Machine Learning in Economics and Finance

Flash Poster Part

EDT (New York) + 18 hr from the timetable

CST (China) + 6 hr from the timetable

CEST (Central European Summer Time)	Speaker	Title
14:30-14:35	Prof. Dr. Thanasis Stengos Session Chair	Welcome by the Session Chair
14:35-15:05	Dr. Mohamed Chaouch Keynote Speaker	<i>Functional conditional volatility modeling with missing data</i>
15:05-15:35	Prof. Dr. Alexandra Horobet Keynote Speaker	<i>The ESG-Finance Nexus: A Sectoral Perspective Using Random Forests</i>
15:35-15:50	Fennee Chong Selected Speaker	<i>Predicting Residential Housing Prices using Machine Learning Approach</i>
15:50-16:05	Manuel Salas-Velasco Selected Speaker	<i>Evaluating the Effectiveness of Chatbots in Financial Education for Postgraduate Decision-Making</i>
16:05-16:20	Fabrizio Di Sciorio Selected Speaker	<i>Identifying Market Dynamics Through the Hurst Exponent</i>
16:20-16:35	Julien Chevallier Selected Speaker	<i>Navigating international stock markets using nonlinear quantitative investing methods</i>
16:35-16:50	Akash Deep Selected Speaker	<i>Risk-Adjusted Performance of Random Forest Models in High-Frequency Trading</i>
16:50-17:05	Annalisa Ferrari Selected Speaker	<i>Decoding ESG's Impact on Conditional Beta: Insights from Eurostoxx 600</i>
17:05-17:20	James W. Kolari Selected Speaker	<i>A Quantum Leap in Asset Pricing: Explaining Anomalous Returns</i>

17:20-17:40	Flash Poster Presentation (3 mins per person)	Mogari Ishmael Rapoo <i>An empirical mode decomposition based support vector regression hybrid model: A combined model for foreign direct investment forecasting</i> Pinar Deniz <i>Who is leading in the Communication Tone? Wavelet Analysis for the Fed and the ECB</i> Rakshith Bhandary <i>Predicting Education Loan Repayment: a Sem-Ann Integrative Modeling Approach</i> Javid Huseynov <i>Graph- and machine-learning-based framework for short-selling risk assessment</i> Tianrong Zhuang <i>Comparing the predictive abilities of artificial intelligence and traditional finance models</i> Peujio Fozap Francis Magloire <i>Hybrid Machine Learning Models for Long-Term Stock Market Forecasting: Integrating Technical Indicators</i>
17:40-17:45	Closing speech by Prof. Dr. Thanasis Stengos IOCRF 2025 Conference Chair	

Session 1. Machine Learning in Economics and Finance

sciforum-120563: “Predicting Education Loan Repayment: A Sem-Ann Integrative Modeling Approach”

Rakshith Bhandary *

Manipal School of Commerce and Economics, Manipal Academy of Higher Education, Manipal, 576104, India

Education loans complement human capital development, and with successful recovery, they become self-sustainable. This recovery can be enhanced if defaults can be predicted accurately, which would also optimize the capital reserve requirements. Hence, this study aims to evaluate the attitudinal factors in educational loan repayment by integrating willingness with the ability of the borrower. This study follows a multi-method approach to testing the antecedent attitudinal variables of education loan repayment intention. A search of the literature finds themes for framing the hypothesis, which is tested quantitatively using partial least squares–structural equation modeling (PLS-SEM), and the prediction accuracy is calculated using artificial neural network (ANN) and deep neural network (DNN) modeling in multiple stages. Credit reporting and perceived quality of life were the two most significant variables in the PLS-SEM model integrated with the ANN model in multiple stages that resulted in increased prediction accuracy at each stage. The prediction accuracy of the ANN model before the integration of SEM was 87%, and after the final-stage SEM-ANN integration, it increased to 90%, while it increased from 89% to 93% after single-stage deep learning (DL) integration. Therefore, multi-stage SEM-ANN-DL integration improves the prediction accuracy for defaults. Improvements in the prediction accuracy can help financial institutions to plan their loan recovery and calculate the optimum capital reserve requirements for provisioning for non-performing assets.



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sciforum-118330: A Comparative Analysis of Machine Learning Algorithms in Technical Trading Strategies

Yeswanth S *

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This study explores the integration of machine learning (ML) techniques into technical trading strategies, evaluating their performance against traditional methods across diverse financial markets. It employs key technical indicators like Moving Averages, the Relative Strength Index (RSI), and other analytical tools to boost prediction accuracy. Historical market data, sourced from the yfinance library, forms the basis for designing and testing these strategies, enabling a detailed assessment of the profitability and effectiveness of ML-enhanced approaches. The research aims to showcase machine learning's ability to uncover intricate patterns and relationships in financial data—insights often missed by simpler, conventional systems—thereby improving forecasting precision.

By merging ML models, such as neural networks or decision trees, with established trading indicators, this work seeks to transform trading from a field reliant on specialists' intuition into a more data-driven discipline. This hybrid approach combines human expertise with algorithmic power, aiming to maximize profits and efficiency. The study uses yfinance-extracted data to simulate and validate strategies, demonstrating how ML can detect subtle market trends that traditional methods overlook. This shift promises to enhance decision-making by grounding it in empirical analysis rather than subjective judgment.

The implications of this research are significant. It bridges the gap between human instincts and advanced computational techniques, introducing innovative strategies that could reshape financial trading. By improving prediction accuracy and optimizing outcomes, ML-integrated systems offer a competitive edge, potentially revolutionizing how markets operate. This study not only highlights the practical benefits of combining machine learning with technical analysis but also sets the stage for broader adoption of such technologies in mainstream finance, paving the way for smarter, more adaptive trading practices.



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sciforum-119834: Comparing the predictive abilities of artificial intelligence and traditional finance models

Tianrong Zhuang *

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This study investigates the forecasting accuracy of stock prices and indices in two developed countries, the UK and the US, and two developing countries, China and India, covering a range of market capitalisations, spanning large-, mid-, and small-cap companies and indices. This study is based on data collected over a period of 13 years. I deploy Particle-Swarm-Optimised Radial Basis Function Neural Networks (i.e., PSO-RBFNNs) and compare their performance with that of the traditional RBF Neural Network (i.e., RBFNN) model and two benchmark econometric models: the ARIMA model and the Holt-Winters model. This study employs technical indicators. The results show that in developed countries, econometrics models often perform better than neural network models, except for the US small-cap stock index S&P 600, while the PSO-RBFNN model outperforms the traditional RBFNN model in the vast majority of cases due to the optimisation of the parameters of the RBFNN model by the particle swarm optimisation algorithm. In emerging market data, neural network models outperform econometric models, while PSO-RBF performs better than or similarly to RBF in the vast majority of cases. As observed from the results, neural networks are able to provide better predictive performance for data containing complex nonlinear patterns and relationships to some extent.



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sciforum-119559: Hybrid Machine Learning Models for Long-Term Stock Market Forecasting: Integrating Technical Indicators

Peujio Fozap Francis Magloire *

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Stock market forecasting is a critical area in financial research, yet the inherent volatility and non-linearity of financial markets pose significant challenges for traditional predictive models. This study proposes a hybrid deep learning model, integrating Long Short-Term Memory (LSTM) networks and Convolutional Neural Networks (CNNs) with technical indicators to enhance the predictive accuracy of stock price movements. The model is evaluated using the Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and R^2 score of the S&P 500 index over a 14-year period. The results indicate that the LSTM-CNN hybrid model achieves superior predictive performance compared to traditional models, including Support Vector Machines (SVMs), Random Forest (RF), and ARIMA, by effectively capturing both long-term trends and short-term fluctuations. While Random Forest demonstrated the highest raw accuracy with the lowest RMSE (0.0859) and highest R^2 (0.5655), it lacked sequential learning capabilities. The LSTM-CNN model, with an RMSE of 0.1012, MAE of 0.0800, MAPE of 10.22%, and R^2 score of 0.4199, proved to be highly competitive and robust in financial time-series forecasting. This study highlights the effectiveness of hybrid deep learning architectures in financial forecasting and suggests further enhancements through macroeconomic indicators, sentiment analysis, and reinforcement learning for dynamic market adaptation. It also improves risk-aware decision-making frameworks in volatile financial markets.



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sciforum-120636: Navigating international stock markets using nonlinear quantitative investing methods

Julien Chevallier *

Paris VIII Vincennes Saint-Denis University

This research investigates the application of multiple solver engines to enhance the optimization of nonlinear programming models, focusing on Evolutionary Strategies. These strategies mitigate the limitations of other optimization techniques, offering a robust approach to complex problems. Quadratic programming is especially beneficial as it allows for more flexible modeling compared to linear programming, accounting for correlations between asset pairs. This paper explores various algorithms for solving quadratic optimization issues, particularly in the financial sector using the mean-variance Markowitz model. The quadratic framework integrates risk factors through a quadratic term in the objective function.

Nonlinear optimization poses significant challenges, with the absence of universal solutions underscoring the importance of understanding the problem at hand to select appropriate methods and parameters. A key difficulty is the tendency of many algorithms to get trapped in local optima, leading to suboptimal results. Evolutionary Strategies, employing iterative trial and error and randomization, help address this by improving the likelihood of finding global optima, although they typically work slower than deterministic solvers. This research highlights Particle Swarm Optimization as an effective solver.

Data from 15 major international stock market indices, covering Europe, Asia, and North America from January 2020 to December 2024, are used to construct a buy-and-hold portfolio over a five-year horizon. Portfolio performance is evaluated using metrics, such as Portfolio Return (mean), Risk (standard deviation), Sharpe Ratio, Treynor Ratio, Sortino Ratio, Omega Ratio, Systematic Risk (Beta, Jensen's Alpha), Portfolio Drawdown (Calmar Ratio), Value at Risk (VaR), Expected Shortfall (ES), and distribution characteristics like Skewness and Kurtosis, to provide a comprehensive analysis of performance.



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sciforum-119257: A Quantum Leap in Asset Pricing: Explaining Anomalous Returns

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We extend asset pricing studies by comparing the ability of multifactor models to explain large numbers of anomalous portfolio returns. Surprisingly, standard Fama and MacBeth (1973) cross-sectional regression tests show that a lesser known two-factor model, dubbed the ZCAPM by Kolari, Liu, and Huang (2021), well outperforms prominent multifactor models in terms of explaining anomaly returns on an out-of-sample basis. In empirical tests, we utilize online databases of anomalies recently made available by researchers. Chen and Zimmerman (2022) provided an open source database with 161 long/short anomalies in the U.S. stock market. Also, Jensen, Kelly, and Pedersen (2023) furnished an online database containing 153 long/short anomalies in 93 countries, including the U.S. Based on 133 anomalies in the former study and 153 anomalies in the latter study with return series available from July 3, 1972 to December 31, 2021, we investigate a combined dataset of 286 anomalies. We find that, with the exception of the ZCAPM, prominent multifactor models do not explain anomalous portfolio returns. In contrast, the ZCAPM does a much better job of explaining them. In standard Fama and MacBeth (1973) cross-sectional regression tests, factor loadings for the ZCAPM are more significant than well-known multifactor models. Also, the goodness-of-fit, as estimated by R² values, are much higher for the ZCAPM than other models. Further graphical tests compare the mispricing errors of different models with respect to anomalous portfolios. We find that the ZCAPM exhibits much lower mispricing errors than other models. We conclude that anomalous returns are anomalous for the most part with respect to prominent multifactor models but not the ZCAPM.

By implication, our evidence supports the efficient-market hypothesis of Fama (1970, 2013) rather than the behavioral hypothesis. As such, stock returns are closely related to systematic market risks.



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sciforum-120074: An empirical-mode-decomposition-based support vector regression hybrid model: a combined model for foreign direct investment forecasting

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Foreign direct investment (FDI) is a key economic phenomenon and a key driver of economic growth, thereby making its accurate forecasting crucial for policymakers and investors. It further brings capital, technology, and expertise into emerging markets, fostering job creation and innovation. The current study compares four machine learning models—support vector regression (SVR), a Deep Neural Network (DNN), empirical-mode-decomposition-based SVR, and an empirical-mode-decomposition-based DNN—to improve the forecasting accuracy for foreign direct investment using the exchange rate and gross domestic product as the independent variables. The empirical mode decomposition technique is applied to decomposing the series into intrinsic mode functions (IMFs) before feeding it into the machine learning model(s). The models' forecasting performance is evaluated using the mean squared error (MSE), the root mean squared error (RMSE), the mean absolute error (MAE), the mean absolute percentage error (MAPE), the symmetric mean absolute percentage error (SMAPE), and the mean bias deviation (MBD). The results demonstrate that the EMD-based SVR model outperformed all of the other models, achieving the highest accuracy due to its ability to filter noise and capture economic noise. Furthermore, it is shown that decomposition-based hybrid models are effective in financial forecasting, and they provide valuable insights for economic decision-making. Future research could explore other machine learning models and add more macroeconomic variables.



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sciforum-120654: Application of Alternative Credit Score Evaluation Methods with Machine Learning

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Abstract

Traditional credit assessment methods rely on individuals' credit history and their interactions with financial institutions. However, these methods are insufficient for individuals, leading to limitations in financial inclusion. The integration of alternative financial data sources enables more comprehensive and accurate credit risk predictions. This study will examine the role of mobile payment history, bill payments, and e-commerce behavior in credit risk assessment. Open data sources will be utilized to enhance financial inclusion and improve credit evaluation processes.

In this study, the World Bank Global Financial Inclusion Database, the Brazil Open Data Portal, and the UK Open Banking API will be used as data sources. The World Bank database will be employed to analyze financial accessibility. The Brazil Open Data Portal will provide comprehensive insights into e-commerce behavior, while the UK Open Banking API will supply extensive data on digital banking transactions.

To process these data sources, Logistic Regression, Decision Tree, and XGBoost algorithms will be used. Logistic Regression will be applied to provide interpretable results for binary classification tasks. Decision Tree will be used to better understand dataset structures and efficiently process information from alternative data sources. XGBoost will be used to achieve high accuracy in large-scale datasets. As a result of this study, we aimed to analyze alternative credit score evaluation methods with Machine Learning.



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sciforum-120373: Decoding ESG's Impact on Conditional Beta: Insights from Eurostoxx 600

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This study explores the relationship between environmental, social, and governance (ESG) factors and systemic risk, measured through conditional beta, in a sample of Eurostoxx 600 firms from 2015 to 2021. Using machine learning models, including Random Forest and XGBoost, we examine how ESG dimensions interact with the financial performance across six major super-sectors. Our findings reveal significant sectoral heterogeneity. Environmental investments increase the short-term risk in Industrial and Consumer Discretionary sectors due to the compliance costs and market volatility, while governance plays a key role in Energy and Utilities, where regulatory requirements can heighten the systematic risk. In contrast, ESG factors have a lower impact in the Financial and Real Estate sectors compared to that in the other super-sectors, where existing regulations may mitigate additional ESG-driven risk, though governance remains the most influential pillar. In the Healthcare sector, environmental initiatives appear to reduce risk by strengthening reputational capital and investor confidence, while social and governance factors increase short-term volatility. These insights suggest that ESG does not function as a universal risk mitigator but reshapes the risk exposure depending on the industry dynamics and regulatory constraints. Our results provide guidance for investors and policymakers in integrating ESG considerations into financial risk models and highlight the need for sector-specific ESG strategies to enhance the accuracy of risk assessments.



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sciforum-119509: Developing a Multifaceted Central Bank Communication Dataset for Natural Language Processing-Driven Economic Analysis

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Central bank communication is a pivotal component in supporting economic and monetary policy in many countries. The efficacy of central bank communication affects market perception and the credibility of monetary policy, thus necessitating analytical tools to assess it. This study seeks to develop a dataset called CentralBankCorpus, the first multi-faceted dataset in Indonesia designed to comprehensively analyze monetary policy and central bank communication. This study employed a document analysis method with a labeling technique. It began by collecting official Bank Indonesia communication documents by means of transcription and scrapping. The collected data were further pre-processed and labeled with six linguistic tags. The dataset yields the CentralBankCorpus, comprising nearly half a million linguistically tagged tokens, spanning economic agent, topic, sentiment, transparency, key terms, and economic impact. This dataset will profoundly influence multiple facets. Academically, it will serve as the primary reference for NLP-focused research in economics, public policy, and organizational communication. Practically, it can assist Bank Indonesia in comprehending and addressing public perceptions of their policies, hence enhancing institutional accountability. This research ultimately endorses Bank Indonesia's digital transformation through innovative application of NLP technology. Furthermore, it addresses a gap in the literature and contributes significantly to Indonesia's economic development, while enhancing the nation's role in the use of modern technology for policy communication at a broader level.



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sciforum-117664: Evaluating the Effectiveness of Chatbots in Financial Education for Postgraduate Decision-Making

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An experiment was conducted at the University of Granada (Spain) to evaluate the effectiveness of different methods for delivering financial education for postgraduate decision-making. The participants were final-year undergraduate students at the University of Granada Business School. They were divided into three groups: one received financial education through a chatbot, another received education through traditional videos, and a control group did not receive any educational intervention.

The financial education provided in both formats, through the chatbot and video, consisted of two main modules, with a total duration of approximately 15 minutes. The first module focused on teaching the students how to calculate the economic feasibility of investing in a master's degree using the Net Present Value criterion. The second module focused on showing students how to finance their master's degree investment through a postgraduate student loan. It explained a reasonable amount based on the expected income, interest rates, and repayment terms.

The first group, which interacted with the chatbot, received information in an interactive and personalized manner, allowing them to ask questions and receive immediate responses in a conversational format. The second group, which used traditional videos, received the same information but in a more passive format, without the ability to interact directly. The control group did not receive any specific training, serving as a baseline for comparison.

After the intervention, the financial knowledge of all of the participants was assessed through an objective test. The results showed that both the chatbot and video groups scored higher on the financial knowledge test compared to the control group, indicating a positive impact from the financial education. However, the students who received education through the chatbot performed significantly better than those who used the videos. This suggests that the personalized interaction and real-time query resolution provided by the chatbot offered an additional educational advantage over the video format.



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sciforum-120071: Exchange rate risk and gender differences in remitting behavior of intra- European migrants

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This paper contributes to the growing yet limited literature on intra-European remittances, focusing on ten countries: four Nordic countries, three Baltic countries, the United Kingdom, Ireland, and Germany. We find that amount of remittances is positively associated with the volatility of the exchange rate in the residence country vs euro, suggesting that exchange rate risk aversion is one of the drivers of remitting behavior. We use the World Bank estimates of bilateral remittances for 2010–2017 and distinguish naturalized migrants from those holding the citizenship of their country of origin. The positive association between remittances and the volatility of the exchange rate is confirmed by a wide range of panel data methods, including Poisson models with multiple absorbed fixed effects, loglinear mixed effects models, as well as generalized least square estimates for models with heteroskedastic and correlated panels. The control variables include the stock of migrants, PPP-adjusted per capita income in the migrants' country of residence and country of origin, and time fixed effects. More detailed specifications reveal that the above-mentioned association is positive only where/when at least one-third of the stock of working-age migrants are females, otherwise remittances are negatively associated with the volatility of the exchange rate in the residence country vs euro. This is consistent with an assumption that female migrants try to avoid the exchange rate risk by remitting more from countries (and/or in times) with higher exchange rate volatility, while male migrants are willing to accept this risk waiting for a better exchange rate.



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sciforum-115994: Graph- and machine-learning-based framework for short-selling risk assessment

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We present a novel framework that integrates graph analytics with machine learning to assess the factors influencing the short-selling of publicly traded company shares. This approach centers on constructing a knowledge graph representing selected companies in the banking sector, along with their corporate and individual owners as nodes connected by weighted ownership relations. By extracting network-based features such as the PageRank centrality alongside traditional financial indicators like firm size, ownership concentration, and insider trading activities, this framework identifies and ranks the factors that drive short-selling behavior.

This study employs a regression analysis using models such as random forests, support vectors, and neural networks to quantify the relationship between these features and the short-selling position averages and standard deviations. Features like the largest shareholder's stake and the Herfindahl–Hirschman Index (HHI) capture the concentration of ownership, while normalized insider trading data provide insights into market sentiment and stock volatility. A comparative analysis using the Shapley Additive Explanation (SHAP) values reveals that although liquidity-related measures are key predictors of the average short-selling positions, the ownership concentration and insider trading are also influential, especially in explaining fluctuations in short-selling activity.

Overall, these results underscore the transformative potential of combining a graph-based network analysis with machine learning techniques to enhance financial risk modeling and governance transparency. This integrated framework not only improves the detection of governance vulnerabilities but also offers valuable insights for regulators and investors. Future research could extend this approach to other sectors with complex ownership networks, further refining the predictive accuracy by incorporating real-time data and additional alternative data sources.



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sciforum-118878: Identifying Market Dynamics Through the Hurst Exponent

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This study investigates financial market dynamics by analyzing historical crude oil price data through the **Hurst exponent**, a measure of long-term dependence in time series. The objective is to assess the persistence and volatility structure of the market and to evaluate the predictive capability of the Hurst exponent in identifying distinct volatility regimes.

First, the study estimates **realized volatility** and the **time-varying Hurst exponent** to characterize market behavior. A **K-means clustering algorithm** is then employed to classify observations into three volatility regimes: **low, moderate, and high**. The predictive power of the Hurst exponent is assessed by training and evaluating multiple machine learning models, including **logistic regression, random forests, XGBoost, LightGBM, and support vector machines (SVMs)**.

Empirical findings indicate that the Hurst exponent serves as a robust indicator of market turbulence. Among the models tested, **LightGBM** achieves the highest predictive performance, with an **accuracy of 88%**. Further optimization using **Optuna's Bayesian hyperparameter tuning** enhances the model's performance, increasing accuracy to **91%**. The model demonstrates high sensitivity in detecting high-volatility periods (**recall = 1.00**), although its precision in classifying these phases (**0.80**) suggests a degree of false-positive predictions.

To ensure the robustness of the results, a **rolling-window validation** strategy is implemented, preserving the temporal structure of the dataset. Additionally, **isotonic regression** is applied to refine the calibration of predicted probabilities, improving their reliability.

The findings of this study underscore the **Hurst exponent's effectiveness as a market efficiency and volatility indicator**. By integrating statistical methods with machine learning techniques, this research provides a **systematic framework for anticipating periods of financial instability**, particularly in commodity markets such as crude oil. The proposed methodology offers valuable insights for risk management, portfolio allocation, and financial market forecasting.



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sciforum-120671: INFLATION AND NIGERIAN STOCK MARKET PERFORMANCE (1990–2022)

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This study examines the relationship between inflation and the performance of the Nigerian stock market from 1990 to 2022, using market capitalization and consumer price indices (CPIs) as key variables. Employing an ex post facto research design, this study utilizes secondary data from the Central Bank of Nigeria (CBN) Statistical Bulletin (2022) and applies multiple regression analysis using the Ordinary Least Squares (OLS) method. The findings reveal a negative correlation between inflation and market capitalization, with the results indicating that the headline CPI (HCPI), core CPI (CCPI), and food CPI (FCPI) significantly impact stock market performance. Additionally, this study identifies structural constraints, including high tax rates, insider trading concerns, and limited market depth due to the "buy and hold" strategy, which hinders stock market growth. The research underscores the necessity for policy reforms aimed at enhancing market efficiency, improving investor confidence, and ensuring macroeconomic stability. These findings contribute to the ongoing discourse on inflation's impact on Nigeria's financial markets and provide valuable insights for policymakers and investors in mitigating inflationary risks while fostering economic growth. Based on these findings, it is recommended that the Central Bank of Nigeria (CBN) implements policy tools to control inflation and prevent it from eroding stock gains. Additionally, the government should focus on reducing inflation and poverty through improved living standards and infrastructure development to support economic stability and market performance.



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sciforum-119641: Leveraging Machine Learning Programming Algorithm for Predicting Credit Default among Nigerian Micro-borrowers

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The high rate of credit default among micro-borrowers in developing economies highlights the limited predictive capacity of traditional risk assessment methods. This study, therefore, aims to predict credit or loan default among micro borrowers in Abeokuta town, Ogun State, Nigeria using STATA-based Least Absolute Shrinkage Selection Operator (*LASSO*) as a machine learning (ML) programming algorithm. A random sample of 384 microfinance customers was selected for the cross-sectional study employing a simple structured questionnaire as the data instrument. *LASSO* estimation in STATA 12.1 statistical software at a 5% significance level shows that macroeconomic indicators (inflation and state of economy) and socio-political factors (such as borrower's income, paid employment status and security) play significant roles in predicting loan default among micro-borrowers. The results produced by the *LASSO* estimator have higher regression coefficients than traditional logistic regression and perform better. Therefore, the study affirms that the ML programming algorithm provides greater predictive capabilities of credit default among micro borrowers in the metropolitan city of Abeokuta, Nigeria. This finding implies that financial institutions in the study area when leveraging the importance of ML algorithms can be proactive in risk management and optimize their resources through efficient allocation of funds among borrowers. To this end, the study suggests that financial institutions in Nigeria especially microfinance banks should explore the application of ML algorithms for advanced predictive and analytical capabilities of complex patterns of teeming prospective borrowers' information.



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sciforum-120441: MACHINE LEARNING FOR NON-PERFORMING LOAN PREDICTION: ENHANCING CREDIT RISK MANAGEMENT

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Non-performing loans (NPLs) hurt financial institutions by raising risks, decreasing cash flow, and lowering capital, making it critical for lenders to evaluate credit risk appropriately. With the increasing complexity of credit risk assessment, machine learning algorithms have become essential for the early detection and mitigation of non-performing loans (NPLs), allowing financial institutions to make better decisions to lower credit risk by properly forecasting NPLs. Compared with traditional statistical models, machine learning algorithms are better at predicting default probabilities and identifying patterns. In order to predict non-performing loans (NPLs), this study examines the efficacy of seven machine learning algorithms: Random Forest, Decision Tree, Lasso Regression, Support Vector Machine (SVM), Bidirectional Long Short-Term Memory (BiLSTM), Light Gradient Boosting Machine (LightGBM), and Extreme Gradient Boosting (XGBoost). The analysis is conducted using a dataset from the DSE-listed commercial banks of Bangladesh, covering the period from 2013 to 2023. Various performance matrices, such as the mean absolute error (MAE), mean square error (MSE), root mean squared error (RMSE), and mean absolute percentage error (MAPE), are used to train and assess the accuracy of the models. The empirical results show that while BiLSTM shows promise in capturing temporal relationships in loan performance, ensemble learning models—specifically, XGBoost and LightGBM—display stronger predictive competencies when compared to conventional tree-based classifiers. By providing insightful information for researchers, banking institutions, and legislators on how to improve risk assessment frameworks, this comparative analysis adds to the expanding reservoir of work on machine learning applications in financial risk management.



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sciforum-116549: Machine Learning in Economics and Finance: From Text to Insight

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Introduction:

This study adopts underexploited global data from key institutions like the United Nations and International Monetary Fund to enhance practical applications of machine learning methods for economic and financial investigations. This study applies advanced sentiment analysis technologies to novel textual documents in order to clarify their influence on asset and energy market directions. This study leads with standard prediction methods in machine learning technologies that address present research questions and develop progressive knowledge on worldwide economic and financial systems.

Methodology:

First, we cleaned and pre-processed the dataset. This study used current natural language processing algorithms to conduct sentiment analysis of textual documents from which interesting features were produced. The extracted results became part of three machine learning models that combined regression analysis with decision trees and neural networks. Multiple performance indicators and logical processing mechanisms guided the study to evaluate models while safeguarding both data confidentiality and model privacy.

Findings:

The findings revealed that the sentiment data from IMF and UN textual content demonstrate substantial forecasting power for energy and commodity market movements, proving that ML techniques surpass previous prediction approaches. Neural networks surpassed the evaluated methods by achieving better accuracy to show their capacity to decode and prognosticate complicated market behaviours.

Conclusion:

Empirical applications that cover alternative data sources allow financial experts to achieve an improved comprehension of global market functions. The system boosts decision-making capabilities through targeted analytical instruments that display optimal performance across various economic indicator datasets. This groundbreaking study extends beyond traditional financial analysis that depends on traditional banking records through examinations of nonstandard ML methods combined with noncommercial data resources. This research finds new machine learning applications across corporate finance, governance, and behavioural finance that fill existing study voids and broaden both economic and financial knowledge.



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sciforum-120451: Pair Trading a Sparse Synthetic Control

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Financial markets frequently exhibit transient price divergences between economically linked assets, yet traditional pair trading strategies struggle to adapt to structural breaks and complex dependencies, limiting their robustness in dynamic regimes. This paper addresses these challenges by developing a novel framework that integrates sparse synthetic control with copula-based dependence modeling to enhance adaptability and risk management. Economically, our approach responds to the need for strategies that systematically identify latent linkages while mitigating overfitting in high-dimensional asset pools. The sparse synthetic control methodology constructs a parsimonious synthetic asset via an ℓ_1 -regularized least squares optimization, automatically selecting a sparse subset of influential assets from a broad donor pool while maintaining interpretability and computational efficiency. Empirical application to S&P 500 constituents demonstrates that relatively few donor assets (27 in our case) suffice to create effective synthetic controls. By embedding this within a copula-based dependence framework, we capture non-linear and tail dependencies between target and synthetic assets. Our analysis reveals that elliptical copulas, particularly the Student's t specification, provide the best fit for modeling return dependencies, highlighting the importance of accommodating tail dependence in pair trading strategies. Trading signals, grounded in the relative mispricing between these assets, employ a cumulative index that resets after position closures to isolate episodic opportunities, with disciplined entry rules requiring concurrent misalignment signals to filter noise. The empirical results demonstrate the superior performance of our integrated approach across diverse market conditions. The best-performing copula specification, N14, achieves an annualized return of 17.26% and a Sharpe ratio of 3.97, with moderate volatility (4.35%). Notably, all tested copula specifications deliver positive risk-adjusted returns, underscoring the robustness of our framework. Future research directions include exploring time-varying copulas, extending the framework to multiple target assets, and incorporating transaction costs for practical implementation.



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sciforum-120200: Predicting Residential Housing Prices using Machine Learning Approach

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Real estate is an asset class that plays a crucial role in home ownership, economic stability, wealth accumulation, and investment portfolio management. Therefore, predicting prices and future market trends is important for home buyers, investors, and policymakers as they help in making informed decisions. Machine learning (ML) has emerged as a useful tool for predictive modeling in financial decisions. The primary objective of this study is to compare and identify the ML algorithms which provide the most accurate predictions for residential housing prices. To achieve this objective, we utilized the Housing Price Index (HPI) from Canada and Australia to analyze performance and influencing factors in this study. Key economic indicators included in the dataset are price-to-income ratio, population growth, interest rates, yield of the 10-year government bond, household real disposable income, and the impact of Covid-19. The data collected span from September 2003 to December 2022, encompassing an analysis of market fluctuations for both markets for approximately two decades. Multiple machine learning algorithms for predictive modeling were used in this study, including K-Nearest Neighbors (KNN), Decision Tree, Random Forest, Bayesian Regression, and Extreme Gradient Boosting (XGBoost). We evaluated model performance and standard error metrics using Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R-squared (R^2) to measure accuracy. The results indicated that Bayesian Regression outperformed all other algorithms, followed by XGBoost, for all datasets in terms of accurate prediction. Overall, our study demonstrates the potential of integrating machine learning into real estate analytics and highlights its importance for improving investment strategies and decisions in the residential housing market.



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sciforum-118174: Risk Management Model Interplay for Maturity Improvement: An Ultra Microfinance SOE Holding Perspective

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The Government of Indonesia as the controlling shareholder sets a target for SOE risk management maturity by 2024 to reach a score of 4.2 on a scale of 1 - 5. Risk management plays a role in minimising risks in realising post-corporate action synergies, such as the establishment of the Ultra Micro SOE Holding in Indonesia. This study examines how the elements of SOE risk management, namely risk governance, risk management frameworks and processes, and internal control systems work to improve risk management maturity and provide strategic implications for allocating risk management resources effectively. The Structural Equation Modelling (SEM) approach was chosen to map the influence of complex interactions among these elements in improving risk management maturity. The results show that all risk management elements are reliable in the proposed risk management maturity improvement model. The majority of hypothesis testing results of the influence relationship between elements in the model are significant. Allegedly, the influence relationship between framework elements with risk management processes and processes with risk management maturity was not significant. It can be concluded that the proposed risk management maturity improvement model can work effectively, so the implementation strategy can be developed by taking into account these findings. Further research is needed to better understand the complex dynamics involving risk management process elements in the construct, identify other variables that mediate the relationship between the framework and risk management processes, or other contextual factors that influence this relationship as well as identify other factors that may have a more significant influence on the effectiveness of risk management processes.



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sciforum-119938: Risk-Adjusted Performance of Random Forest Models in High-Frequency Trading

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Despite the theoretical limitations posed by the Efficient Market Hypothesis, technical indicators remain widely used in high-frequency trading (HFT). However, their effectiveness at minute-level frequencies, where market microstructure effects dominate, remains underexplored. This study evaluates the role of traditional technical indicators in Random Forest Regression (RFR) models using minute-level SPY data across 13 distinct configurations.

Our analysis reveals a significant divergence between in-sample and out-of-sample performance. While models demonstrated strong in-sample performance (R^2 : 0.749–0.812), their predictive power collapsed in out-of-sample testing, often yielding negative R^2 values. Feature importance analysis shows that price-based features overwhelmingly drive model decisions, accounting for over 60% of importance, while widely used technical indicators such as RSI and Bollinger Bands contribute only 14–15%.

Although integrating technical indicators slightly improved risk-adjusted metrics—yielding Rachev ratios between 0.919 and 0.961—models incorporating these indicators still underperformed a simple buy-and-hold strategy, generating negative returns between -2.4% and -3.9%. These results suggest that traditional technical indicators may be more effective for risk management than for return prediction in HFT settings.

Our findings underscore the importance of adaptive feature selection and regime-specific modeling over reliance on conventional technical indicators. Moreover, the stark contrast between in-sample and out-of-sample performance highlights the necessity of rigorous out-of-sample validation in algorithmic trading research. This study contributes to ongoing discussions on the limitations of technical indicators in HFT and provides insights for both practitioners and researchers aiming to develop more robust predictive models in high-frequency market environments.



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sciforum-119722: Who is leading in Communication Tone? Wavelet Analysis for the Fed and the ECB

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In this paper, we examine the interdependence of the communication tones of the Fed and the ECB, arguably the two most influential central banks (CBs). The interdependence of monetary policies is expected as price fluctuations may spill over between countries or country blocks via trade links or other events such as global economic crises, pandemics, etc. We examine the relationship between the two CBs in the time and frequency domains, which we believe is crucial to scrutinizing the dynamics over the long time horizon, which is susceptible to transitions using wavelets that allow for short-, medium-, and long-term linkages to be revealed. Furthermore, we measure sentiments (tones) of the two CBs using two complementary methodologies in the analysis of economic and financial texts, i.e., a lexicon-based approach and FinBERT as a transformer-based approach. Our empirical findings suggest that the relationship between the two CBs is dynamic in the time and frequency dimensions, and there is no static leading role assigned to any of the CBs. Moreover, the lexicon-based and transformer-based algorithms are relatively similar in the medium run, which may suggest that alternative methodologies are also complementary. To the best of our knowledge, our study is the first to scrutinize the relationship between the communication tones of two CBs taking into account the dynamics in the time and frequency dimensions and using both lexicon-based and transformer-based methods.



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Session 2. AI in Economics and Finance

sciforum-116191: Generative AI in Finance: A Framework for the Trade-Off Between Automation and Human Expertise

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The adoption of generative AI technologies in the financial sector is transforming operational processes, decision-making, and customer interactions. While these innovations enhance efficiency, they also raise a critical question: how can financial institutions balance automation with the value of human expertise? This study proposes a novel framework categorizing applications of generative AI in finance along two dimensions: the degree of automation and the value added by human intervention. The framework, developed through a comprehensive literature review, is validated with case studies in areas such as portfolio management, compliance, and risk assessment. It categorizes applications into four quadrants, balancing low and high levels of automation and human expertise. The findings highlight the potential of hybrid models (Quadrant 4), where advanced automation is combined with human oversight, offering the greatest efficiency and accuracy. For instance, a fintech company implementing AI-driven compliance tools with human supervision enhanced error detection in regulatory filings while maintaining compliance standards. This research provides a structured framework for integrating generative AI into financial workflows, helping institutions optimize the balance between automation and human expertise. It offers practical insights for decision-makers and serves as a foundation for responsible AI adoption, ensuring operational efficiency and strategic soundness in an era of digital transformation.



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sciforum-116626: Innovative debt financing to bridge Saudi Arabia's climate and economic gaps

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This study explores the role of innovative debt financing mechanisms in Saudi Arabia's transition towards a sustainable and diversified economy. Specifically, it examines how green bonds and carbon credits are utilized to fund large-scale development projects, such as Neom and the Red Sea development, which focus on renewable energy and environmental sustainability. This research aims to assess the extent to which these financial instruments contribute to the achievement of both economic growth and compliance with the Kingdom's climate commitments, as outlined in Vision 2030.

This research adopts a case study approach, analyzing the impact of green finance on sustainable development initiatives in Saudi Arabia. It further incorporates artificial intelligence tools to empirically assess the relationship between innovative financing and economic growth, providing a data-driven analysis of the effectiveness of these mechanisms in fostering long-term economic and environmental benefits. This study also considers the integration of Islamic finance instruments, such as Islamic bonds, within the framework of dynamic asset pricing models and financial econometrics. This theoretical alignment helps to highlight the potential of Islamic finance to support global sustainability goals, alongside conventional financing methods.

The findings of this research indicate that green finance mechanisms, including carbon credits and green bonds, are essential for financing renewable energy projects and driving economic diversification in Saudi Arabia. Additionally, the integration of Islamic finance tools strengthens the financial infrastructure and enhances the alignment of Saudi Arabia's financing strategies with international sustainability initiatives.

In conclusion, this study demonstrates that innovative debt financing can effectively address Saudi Arabia's environmental and economic challenges. This research underscores the importance of incorporating Islamic finance tools into financial frameworks, offering practical insights for policymakers and financial institutions on how to leverage innovative financing mechanisms to support sustainable development in this region.



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sciforum-120550: The Role of Artificial Intelligence as a driving variable in the modern market: A MICMAC approach

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Purpose:

This research aims to recognise the leading financial technologies presently accessible in the market. Technological advancements such as the Internet of Things, cloud computing, augmented reality, big data, blockchain, smart space, 5G networks, automotive robotic processes, and artificial intelligence have revolutionised traditional business methods. Artificial intelligence (AI) represents a recent instance of an emerging technology with significant potential to impact the marketing field. Marketers worldwide are frantically searching for artificial intelligence (AI) solutions that will allow them to carry out their duties effectively. Conducting an in-depth examination of the pertinent literature can underscore the significance of artificial intelligence (AI) in marketing and suggest prospective avenues for future investigation.

Design/Methodology/Approach:

By utilising the Interpretive Structural Modelling (ISM) technique along with the SmartISM software, one can determine the interrelationships that exist between the variables. MICMAC analysis is used for the purpose of additional variable classification.

Findings:

Artificial intelligence is the independent variable that propels the other variables in the final model. Blockchain, big data, and the Internet of Things have surfaced as significant driving factors. This study's dependent variables comprise augmented reality, automotive, cloud computing, 5G networks, and robotic processes. Smart space, on the other hand, is considered a linkage variable.

Implications:

It is imperative for marketers to comprehend the significance of artificial intelligence, which is a pivotal technology in the present-day landscape and is catalysing diverse technological progressions. It is recommended that marketers incorporate technology into their daily business operations to enhance efficiency in the highly competitive contemporary landscape.

Originality Value:

This study is among the significant ones that underscore the importance of technological progress in the modern marketplace and its impact on the field of marketing. Furthermore, the present study has presented a unique framework that underscores the significance of artificial intelligence.



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sciforum-112297: A Comprehensive Framework for Credit Card Fraud Detection

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Purpose:

This study investigates the practical application of AI techniques in combating CCF within the accounting and finance sectors. It assesses the effectiveness of ML, blockchain, and fuzzy logic in detecting fraudulent transactions, providing insights for fraud examiners, auditors, accountants, bankers, and organizations.

Methodology

A cross-country survey was conducted, involving 403 respondents from various sectors. Data collection included interviews and structured questionnaires analyzed using SPSS.

Sample Composition:

Of the respondents, 40% were from Egypt, 20.6% were from Russia, and 17.1% were from the UK. In addition, 73% were PhD holders, 26.3% were researchers, and 13.6% were bankers.

Reliability and Validity:

Cronbach's alpha coefficient (0.972) confirmed high reliability.

Key Findings:

1. ML's Role in CCFD:

Respondents confirmed that ML enhances fraud detection with an agreement mean of 4.56. ML's ability to process large datasets, detect anomalies, and prevent fraud supports its critical role in financial security.

2. Blockchain's Impact:

Blockchain technology was recognized for enhancing fraud detection with a mean rating of 4.46. Its decentralized nature, secure data exchange, and smart contracts improve fraud prevention mechanisms.

3. Fuzzy Logic in Fraud Detection:

Fuzzy logic was deemed valuable in fraud detection, scoring a mean of 4.37. It effectively processes ambiguous transaction data, reducing false alerts and improving fraud detection accuracy.

We propose a **novel framework** integrating AI, blockchain, fuzzy logic, and IoFS to create a secure, efficient system for detecting and preventing fraud.

1. Data Collection: Transaction data from IoFS, banks, and FinTech platforms are aggregated.

2. Behavioral Analysis: ML algorithms analyze spending patterns and detect anomalies.

3. Fraud Detection: AI compares transactions against historical data, flagging suspicious activities.

4. Fuzzy Logic Processing: Risk scores are assigned based on transaction uncertainty levels.

5. Blockchain Implementation: Smart contracts validate transactions and maintain a tamper-proof ledger.

6. Authentication and Approval: Stakeholders verify flagged transactions via blockchain consensus.

7. IoFS-Based Data Sharing: Real-time fraud data exchange enhances system adaptability.



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sciforum-120644: AI-Driven Policy Effects on Stock Market Anomalies: Evidence from China's Digital Finance Era

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This study investigates the linkage between policy events and abrupt stock market fluctuations in China during 2024, analyzing how regulatory agencies—including the People's Bank of China (PBOC), China Securities Regulatory Commission (CSRC), and China Banking Regulatory Commission (CBRC)—formulate pre-emptive policies to mitigate sudden market volatility, prevent asset bubbles, and curb systemic financial risks. Integrating behavioral finance theory, monetary economics, emergency event theory, and monetary policy frameworks, we redefine "emergency events" within China's institutional context and conduct a micro-level analysis using event study methodology supplemented by a Principal Component BP Neural Network (PC-BPNN) algorithm. Focusing on the Shanghai Composite Index (SCI) as a market proxy, we address three core questions: (1) whether China's monetary policy exerts macro-level intervention effects on stock markets; (2) whether PC-BPNN outperforms existing models in predicting stock prices and deriving normal returns; and (3) whether monetary policy retained significant influence amid frequent 2024 market emergencies.

Methodological innovations include redefining stock market emergencies, applying PC-BPNN for price prediction, and evaluating policy efficacy through event studies. Our key findings reveal the following:

(1) Monetary Policy Effectiveness: China's monetary tools demonstrate measurable macro-level market intervention capabilities, validating their role in market regulation.

(2) PC-BPNN Superiority: The PC-BPNN model achieves higher accuracy in price forecasting compared to traditional methods, establishing its utility for subsequent research.

(3) Policy Attenuation Mechanism: Frequent abnormal market declines in 2015 nullified monetary policy's significance ($p > 0.05$), exposing a self-reinforcing vicious cycle: investor pessimism and distrust reduced policy responsiveness, exacerbating sell-offs and liquidity drain. Concurrently, emergency events amplified negative sentiment, weakening policy transmission and undermining regulatory control, a dynamic that intensified bubble risks while rendering stabilization measures ineffective.



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sciforum-120009: Climate policy uncertainty and risk connectedness with ESG stock markets: an analysis of asymmetric TVP-VAR

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Climate change is a significant concern in the contemporary world. It has become a critical issue worldwide in countries, organizations, industries, and financial markets. This study investigates the effect of the relationship between climate risks (CRs) and climate policy uncertainty (CPU) on ESG stocks in both emerging and developed markets. Using the asymmetric TVP-VAR technique, this study analyzes the dynamic nature of these connections. Monthly data on climate policy uncertainty and climate risks were obtained from economicpolicy.com, while ESG leader indexes from the S&P 500 were collected for the period 2013–2023. The findings reveal that climate policy uncertainty (CPU) and physical risks (PRIs) exhibit a negative connectedness with ESG stocks, implying that rising uncertainty and physical climate threats negatively impact the performance of ESG stocks. In contrast, transition risks (TRIs) display a positive connectedness with ESG stocks, suggesting that as economies transition toward low-carbon policies and sustainable practices, ESG investments benefit from these structural changes. This study suggests that policymakers and market participants should take proactive measures to mitigate climate policy uncertainty and address physical climate risks to enhance the stability of the ESG market. This is particularly crucial for emerging markets, where these effects may be more pronounced. By managing climate-related risks effectively, policymakers can foster a more resilient ESG investment environment, ensuring its long-term stability and investor confidence in sustainable markets.



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sciforum-116112: Deep Learning in Credit Risk Assessment: A Data-Driven Approach to Transforming Financial Decision-Making and Risk Analytics

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Assessing credit risk has become a key activity in risk management and is particularly relevant for lenders, investors, and overbuilding markets. The purpose of this study is to determine the extent to which new deep learning methods can change credit risk modelling with large data and algorithms because they may facilitate the performance of predictions and risk mitigation techniques. Using advanced neural networks such as CNNs and RNNs, this study analyzes authentication adequacy and default prediction models based on key borrower characteristics, their financial history, and relevant macroeconomic conditions. Deep learning models overcome the limitations of classical statistical methods and improve performance for much more complex tasks, such as classification and regression, in assessing credit risk. Furthermore, solutions to deep learning explanatory difficulties can be developed through the use of XAI methods. Such approaches make it possible for all stakeholders to utilize the results of the model, which, in turn, makes systems more transparent and trusted rather than using incomprehensible artificial intelligence. This study demonstrates how to allocate credit to optimize the default rate; in other words, it demonstrates how to build stronger financial systems. It expresses the significance of AI regarding the use of information within a changing business environment. This study facilitates emerging AI-driven finances by developing the underlying framework of credit risk analysis and its impact on the business world. In so doing, the paradigm of assessing credit risk is altered.



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sciforum-120535: Detecting fraudulent transactions using artificial intelligence algorithms

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Accounting systems are integral to managing financial transactions, and they generate substantial volumes of data as a result. This vast amount of data can create environments conducive to intentional fraudulent activities, particularly in high-dimensional settings where the complexity and volume of information can obscure irregularities. To combat this issue, various methods have been developed to estimate and detect fraudulent transactions within accounting systems. These methods differ widely in their audit processes, scopes, and applications, reflecting the diverse challenges faced in financial oversight.

In recent years, data mining techniques have gained prominence as effective tools for detecting fraud. Their utility stems from the ability to handle large datasets while maintaining a comprehensive audit scope, which is essential for identifying potential anomalies. This study investigated the effectiveness of two specific data mining approaches: artificial neural network and Random Forest methods. Utilizing a dataset comprising 10,000 entries, this study aimed to evaluate how well these methods could detect fraudulent transactions.

The analysis of the test dataset yielded impressive results, with the artificial neural network method achieving an accuracy rate of 90%. Meanwhile, the Random Forest method outperformed it, achieving an accuracy rate of 96.30% in identifying risks associated with fraud or errors. These findings underscore the potential of advanced data mining techniques in enhancing the integrity of accounting systems and improving fraud detection capabilities.



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sciforum-116406: Financial portfolio: optimization and technology of "structural choice"

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This report is devoted to the problem of choosing the structure of financial investments in a portfolio of financial assets, and shows the effect of ambiguity in decisions in the case of maximizing income or minimizing risk. The **purpose** of this study is to demonstrate the characteristic points at which the amount of income and risk are the same for different structures of financial resource allocation. In this case, making decisions without additional criteria becomes a major problem. Its solution is possible according to additional criteria, in particular, using artificial intelligence models when applying the results of the income maximization and risk minimization models. The **research methodology** consists of financial portfolio theory and optimization models, as well as artificial intelligence models. The **result of this research** is a breakdown of the optimization algorithm by introducing artificial intelligence models capable of analyzing a choice at specific points, when the result is not obvious and it is not possible to make an unambiguous decision. Thus, it is possible to obtain scenarios within the framework of the application of new financial technologies for decision-making in the field of financial resource allocation. Artificial intelligence has the function of weighing constraints within the framework of conditional optimization and making a fundamental choice between decision-making criteria, since the latter will depend on the criteria under consideration. Understanding how this will work is a challenge for future developers of artificial intelligence systems, but the current limitations of portfolio selection should undoubtedly be included in its research.



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sciforum-116307: Future of Corporate Finance: Advancing Decision-Making with Machine Learning and AI Technologies

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Introduction:

AI technology is improving business finance by making work faster and smarter. Three tools are used: machine learning (ML), natural language processing (NLP), and robotic process automation (RPA). These technologies process data automatically, predict financial outcomes better, speed up repeated tasks, and help manage financial risks. However, introducing AI systems produces problems because they need good-quality data to work perfectly, and current methods still have strong support from those who do not want to change their way of doing things. This current study will address a research gap by investigating how the latest techniques in AI in finance can help companies better manage themselves, act sustainably, and make smarter decisions.

Methodology:

This study will explore the use of AI in corporate finance organisations through a qualitative research approach. We reviewed the existing literature to determine the common uses of AI in decision-making in finance. To better understand this problem, we will analyse the relevant literature further. In addition, we will conduct at least 10 semi-structured interviews with AI professionals working in the financial industry. A thematic analysis will be performed to identify their in-depth knowledge about AI usage.

Potential Outcomes:

The expected outcomes of advancements in AI are versatile and evolving. Organisations can enhance business and finance operations by using artificial intelligent systems, budgeting, financial analysis and prediction, natural language processing techniques to interpret textual information, and robotic process automation to restructure tedious tasks, minimise errors, and reduce time spent. Adopting cutting-edge AI technologies will automate operations and enable efficient data analysis to enhance decision-making.

Conclusion:

This study will present a holistic view of how AI techniques can improve financial performance, financial organisation, and efficient decision-making in corporate finance. The effectiveness of AI technologies relies on high-quality data and efficient change management, helping business organisations boost efficiency and sustainability.



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sciforum-120497: Interdependencies between AI and Big Data Stocks and Tokens in Extreme Market Conditions : Implications for Portfolio Optimization Strategies

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Abstract : In the rapidly evolving landscape of artificial intelligence (AI) and big data, understanding the financial dynamics between tokens and stocks within these sectors has become increasingly essential for investors and policymakers. This study investigates the connectivity between these asset classes using Quantile-based Vector Autoregression (QVAR) models with "Extended Joint" connectivity and frequency-domain analysis. Covering the period from December 17, 2020 to February 11, 2025, our research reveals significant interdependencies, particularly during periods of heightened market volatility. The findings indicate that major technology stocks, such as those of Microsoft (MSFT) and Amazon (AMZN), act as dominant shock transmitters, exerting substantial influence over other assets. Conversely, AI-focused tokens, including SingularityNET (AGIX) and Numeraire (NMR), primarily serve as shock receivers, responding to, rather than driving, market fluctuations. From a portfolio optimization perspective, AGIX stands out as the most effective hedging asset, followed by NMR and CTXC. These results provide critical insights for investors aiming to enhance diversification strategies and manage risk in AI and big data-related markets. Furthermore, this study contributes to a broader understanding of asset interactions within the digital economy, shedding light on the growing financialization of AI-driven innovations. The findings offer practical implications for institutional and retail investors seeking to navigate this rapidly evolving sector.



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sciforum-120448: Predicting Market Reactions to News: An LLM-Based Approach Using Spanish Business Articles

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In financial markets, news significantly impacts stock prices. Despite the widely postulated "*Efficient Market Hypothesis*," empirical evidence consistently reveals market inefficiencies, particularly when processing complex textual information. Previous research addressing these inefficiencies has predominantly employed dictionary-based methods, sentiment analysis, topic modeling, and more recently, vector-based models such as *BERT*. However, these approaches often lack a comprehensive understanding of textual nuances and typically neglect firm-specific economic shocks, relying excessively on headlines rather than full-text analysis. This paper addresses these limitations by leveraging *Large Language Models (LLMs)* to provide a comprehensive, firm-specific analysis of complete news articles. Using a dataset of Spanish business news from *DowJones Newswires* during a period of heightened uncertainty (June 2020 to September 2021), we apply *LLMs* guided by a structured news-parsing schema. This schema systematically identifies firms affected by news articles and classifies the implied economic shocks by type, magnitude, and direction. Our findings demonstrate that traditional vector embedding-based clustering methods (e.g., *KMeans*) yield unstable article distributions over sequential data splits, resulting in short-lived trading signals and negligible out-of-sample profitability. In contrast, the *LLM*-based methodology produces stable and economically meaningful clusters, generating robust and persistent trading signals. The resulting trading strategy effectively identifies winners and losers, consistently anticipating market trends by comprehending the economic implications of firm-specific shocks. Moreover, the profitability of this approach remains robust across various hyperparameter choices, including holding period lengths and the number of selected clusters. Overall, our results highlight the superiority of *LLM*-based analysis in capturing nuanced, economically relevant information from financial narratives, offering a promising avenue for predicting market reactions to firm-specific news during volatile periods.



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sciforum-120617: Responsibility as a Buffer against Automation: A Responsibility-anchored Employment Theory Framework

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We propose a responsibility-anchored employment theory framework grounded in endogenous responsibility costs. When AI systems replace human labor, runaway risks (e.g., explosions in chemical plants, misdiagnoses by medical robots) create irreversible responsibility gaps; individual corporate owners, neither cognitively nor financially equipped to bear such liabilities, face catastrophic societal damage (environmental destruction, casualties, etc.). By anchoring the balance between automation levels and responsibility-bearing capacity, the model identifies a critical threshold: surpassing the AI-to-labor ratio threshold triggers an responsibility vacuum. A dual institutional mechanism is proposed to resolve this vacuum: governments impose an automation responsibility tax on threshold-breaking firms while redistributing tax revenues as social insurance subsidies to sectors retaining human oversight. Numerical simulations demonstrate that this policy pre-emptively internalizes societal risks, allowing economies to harness AI-driven productivity gains while cushioning the shocks of rapid labor displacement. Specifically, the introduction of the Automation Responsibility Tax would alleviate 30% of unemployment without compromising productivity in the short term following AI-driven replacement. In the long term after AI impacts, under mechanisms addressing responsibility vacuums and social security deficits, it would enhance overall social welfare by 20% at the cost of a 6% reduction in total production. Furthermore, comparative analysis with alternative policies—such as direct taxation on automation volume and government-funded labor training programs—demonstrates the unique effectiveness of the Automation Responsibility Tax framework. This study proves that institutionalized responsibility redistribution is not only an essential pillar of societal stability but also a potential foundational framework for sustainable human–AI coexistence.



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sciforum-112710: Using ChatGPT in Asset Allocation Recommendations

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In this study we examine how ChatGPT makes asset allocation decisions based on simulated data. We feed 100,000 hypothetical investor profiles into ChatGPT and ask it to recommend an asset allocation between a diversified equity fund and a diversified bond fund for each investor (client). We include a rich set of variables for each client such as their age, income, race, risk aversion, financial knowledge, and health. We instruct ChatGPT to act as a financial advisor. However, we do not require it to prioritize any set of variables over others. Our evidence indicates that ChatGPT recommends a higher equity allocation for those with less risk aversion and for those who are more optimistic, confident, and financially knowledgeable. Our evidence does not indicate that ChatGPT uses client demographic data such as age, race, gender, and marital status in forming its recommendations. Our results suggest that ChatGPT may allow investor biases (such as overconfidence) to influence its asset allocation recommendations. ChatGPT may also inadvertently hurt the financial success of clients with less financial knowledge by steering them away from equities. Since it ignores client age, ChatGPT may also recommend allocations that are too conservative for some of the young investors and too aggressive for some of the old investors. This study contributes to the literature on the applications of Artificial Intelligence (AI) to portfolio allocation and household financial management decisions.



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Session 3. AI in Financial Reporting and Auditing

sciforum-110863: Mutual perspectives of clients and auditors on the role of audit quality in fraud detection

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Introduction:

The tendency to obtain private information results from the lack of transparency and reliability of public information, so that capital market participants, in order to obtain reliable information, take into account the auditor's ability to detect fraud in their investment decisions. The purpose of this study is to investigate the role of audit quality in detecting fraud from the perspective of clients and auditors.

Method:

The data required for this study were collected and analyzed using a questionnaire completed by 159 employees of auditing firms and financial managers of companies.

Result:

The results show that auditors and clients have different views on the individual ability and responsibility of auditors to detect fraud. But independent auditors have the same view of the quality of fraud detection. In other words, the expectations of capital market participants to detect auditors' fraud are different in different dimensions and are a function of individuals' knowledge and understanding of the auditors' risks and responsibilities for detecting fraud.

Conclusion:

Auditors are not reluctant to accept additional responsibility for fraud. However, the auditing profession is committed to improving audit methods to detect fraud and to increase efficiency. In other words, by increasing the quality of an organization's audit, auditors are adequately trained and work is planned based on auditors specializing in each industry, which increases the likelihood of fraud detection.



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sciforum-120788: AI's Role in Shaping the Future of Economic and Financial Analysis in the Pursuit of the Macroeconomic Scenario

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This study examines the inherent complexity of artificial intelligence (AI), its influence on economics and finance, and how it has triggered tremendous shifts in the global economic landscape. Thus, it reveals new patterns that have never been seen due to deep learning, artificial intelligence, machine learning, and natural language processing, which are revolutionizing data analysis. In keeping with all of them, it offers numerous advantages, such as the ability to detect delinquent behavior, reduce the risk of adverse effects, perform algorithmic trading, and improve the prediction of the macroeconomic scenario. As an optical illusion of substance in economics, artificial intelligence is a multi-faceted door to subversive studies and analysis using unusual methodologies that question and revise established statistical and economic principles. This is increasingly true when applying artificial intelligence to many problems, from behavioral finance to new forecasting systems, to improve our understanding of global markets. This allows college students to tailor their experiences, conduct real-time data analysis, and apply artificial intelligence to bring theory to the street. This might be useful for scholars too; therefore, all types of future work should cover data privacy concerns, algorithmic bias, and ethical issues. The practical application of artificial intelligence technology in the financial and economic fields is not an isolated technological pursuit but requires interdisciplinary collaboration.



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sciforum-121030: Artificial Intelligence and Machine Learning in Fraud Detection: A Comprehensive Bibliometric Mapping of Research Trends and Directions

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This study presents a bibliometric analysis of emerging trends in applying Artificial Intelligence (AI) and Machine Learning (ML) for financial fraud discovery and deterrence and provides insights for future research. Bibliometric analysis on fraud data analytics is helpful to researchers in getting insights on research trends, research impact and classification. However, research on fraud data analytics using machine learning is limited. The main objective of this quantitative analysis is to explore emerging trends in fraud data analytics and machine learning (ML) for financial crime detection and prevention. Bibliometric data has been collected from the Scopus database. One thousand four hundred eighty-three documents from the SCOPUS database have been analysed using VOSviewer. The data analysis divulges a growing interest in leveraging these technologies to strengthen financial crime detection. Fraud data analytics, Artificial Intelligence and Machine Learning are vital in identifying complex criminal patterns, strengthening companies in preventive vigilance, and ensuring fraud elimination. The study portrays the need for vigorous frameworks for the legislature, real-time analytics systems and more powerful tools and calls for integrating governments, financial institutions, and technology providers to strengthen prevention strategies and tackle financial crimes more effectively. It is recommended that companies should invest on AI & ML for the detection of fraud at the early stages.



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sciforum-112537: Artificial Intelligence—Optical Character Recognition: Resource-Based View of Two Indonesian Companies

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Advancements in Artificial Intelligence (AI), including Optical Character Recognition (OCR), have significantly transformed various industries. In developing countries like Indonesia, the relevance of AI-OCR remains debated due to low labor costs. This study aims to understand the motivations, challenges, and outcomes of AI-OCR adoption in the Procure-to-Pay (P2P) process of two Indonesian companies. Utilizing a qualitative approach grounded in Resource-Based View (RBV) theory, data were collected from 11 respondents, including management accountants, Chief Financial Officers (CFOs), IT personnel, and an AI expert provider. A semi-structured interview was conducted to gather deeper insights. Data analysis was conducted using thematic analysis to identify and interpret patterns and themes related to the adoption of AI-OCR in the P2P process. This study reveals that both companies are motivated by the overall efficiency enhancement of the P2P process despite low labor costs in Indonesia. However, the family-owned company is also driven by sustainability initiatives, aligning with RBV's emphasis on leveraging unique resources. Challenges faced by the companies differ due to business complexity, resource constraints, and resistance to change, which highlight differences in their resource capabilities. The multinational company experienced a smoother implementation of AI-OCR due to strategic alignment and active CFO involvement, illustrating RBV's principles of effective resource management. This study provides insights into motivations like sustainability and challenges like resource constraints. It addresses a gap in the literature by comparing AI adoption in resource-constrained environments, highlighting the role of strategic alignment and management support in successful technology implementation.



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sciforum-119748: Disruption in Southern Africa's Money Laundering Activity by AI-Tech

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The increase in financial illicit activities between South Africa and Zimbabwe borders, which are estimated to lose USD 3.1 billion yearly (SARB, 2024; RBZ, 2023), motivates an AI application that assists the traditional techniques. This research implements FALCON (Financial Anomaly Detection via Contextual Learning Optimized Network), a hybrid architecture of transformer-GNN models developed by South Africa's Financial Intelligence Centre (FIC) as well as Zimbabwe's Reserve Bank (RBZ) and SWIFT. By employing temporal transaction pattern (TimeGAN) and entity mapping based on graphs (GraphSAGE), FALCON detected money laundering techniques with 98.7% accuracy, which surpasses Random Forest (72.1%) and human auditors (64.5%). Additionally, it also lowered the false positives to 1.2% (AUC-ROC: 0.992). After testing the model on 1.8 million transactions (falsified South Africa Central Bank (SARB) CTRs and RBZ STRs) and Ethereum blockchain (Etherscan.io), FALCON uncovered USD 450 million intentionally hidden funds that flowed through 23 shell companies. The model's XAI (SHAP) outputs explainable artificial intelligence are compliant with FATF, meaning no legislative exorbitant scrutiny, which is the requirement to create evidence that can stand in a court of law, which in trial phases had a 92% acceptance rate. The main innovations are the model's capabilities of extending beyond borders, which identifies the SARB-RBZ gap in transactions with 94% precision, masking sensitive (differential privacy, $\epsilon=1.2$) data compliant with the General Data Protection Regulation (GDPR), and processing 2M transactions per second on AWS Graviton3, achieving real-time scalability. As the first AI framework designed for Southern Africa's financial ecosystems, the FALCON AI Framework serves as the gold-standard claimable framework for ethical AI in emerging economies since it is entirely validated on public data. It can be used immediately for Central Bank Digital Currency supervision.



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sciforum-120661: Enhancing Financial Statement Accuracy: The Role of AI in Auditing

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This study examines how Artificial Intelligence (AI) verifies financial statements by using machine learning algorithms together with natural language processing and predictive analytics to spot errors and potential fraudulent activities. AI-based audit systems evaluate financial data accuracy by matching it against historical patterns along with industry standards and regulatory requirements. AI boosts auditing efficiency by using real-time monitoring while reducing human biases in the audit process.

AI-powered financial audits enable organizations to predict and identify financial risks before they escalate by facilitating predictive forecasting beyond basic error detection. AI systems allow for the rapid processing of extensive data sets that traditional techniques cannot match while simultaneously improving transparency and reducing undetected fraud risks. The integration of AI into financial auditing necessitates robust data governance strategies combined with sophisticated cybersecurity protocols and thorough regulatory compliance to address potential algorithmic bias issues and prevent data misinterpretation risks. AI keeps advancing financial auditing even with existing difficulties since it creates a demand for combining machine intelligence with human judgment to achieve precise and trustworthy financial reports. A hybrid mode, combining AI with traditional audit, will be the trend of the future. AI will carry out risk assessments and identify unusual trends in Financial Statements, and auditors will talk with their clients to confirm those high-risk areas and make further investigations.



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sciforum-120488: Firm Performance and Tax Avoidance: AI use as a Moderator

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Artificial Intelligence (AI) has rapidly advanced as a potent tool across diverse sectors. Recently, the utilization of AI tools, such as machine learning, predictive analytics, and natural language processing, has expanded into the realm of tax strategies, specifically focusing on tax avoidance. This study initially examines the impact of tax avoidance on the performance of 125 Saudi listed companies from 2019 to 2023, utilizing Structural Equation Modeling (SEM) to assess the moderating role of AI on the relationship between tax avoidance and firm profitability.

Furthermore, the research delves into whether the integration of AI influences the correlation between firm performance and tax avoidance. The primary findings indicate a significant enhancement in firm performance through the adoption of tax avoidance strategies. This positive correlation is strengthened statistically with the inclusion of AI, confirming the moderating impact of AI. Control variables, such as audit quality and the corporate governance structure of firms (including characteristics of the board of directors and the effectiveness of the audit committee), are integrated into the analysis to elucidate firm performance. The results validate a positive statistical effect of board independence and the effectiveness of the audit committee on firm profitability. Conversely, neither audit quality nor board size demonstrates any influence on firm profitability. By showcasing the moderating role of AI usage in the connection between firm performance and tax avoidance, this study contributes to the existing literature by considering an emerging economy context. The paper carries significant practical implications. Companies can leverage AI technologies to refine their tax planning. Investors are advised to exercise caution when evaluating the financial robustness of companies employing aggressive tax avoidance techniques. Policymakers may consider implementing more sophisticated, AI-driven tools for monitoring and enforcing tax regulations to ensure equity and adherence.



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sciforum-115626: Identifying financial statement frauds via machine learning: A comparative analysis based on Chinese listed companies

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Purpose:

The objective of this paper is to evaluate the effectiveness of the M-score and F-score in detecting financial statement fraud in the Chinese market and to develop machine learning models tailored for detecting such fraudulent activities.

Design/Methodology/Approach:

We utilize the data of fraudulent cases from the CSMAR database for the period 2010-2019 and implement a random sampling by industry to match between fraudulent enterprises and non-fraudulent enterprises. Based on this sample, we first test the effectiveness of M-score and F-score in detecting financial frauds among Chinese listed companies. Next, we construct the machine learning models—Random Forest, Gradient Boosting Decision Tree (GBDT), K-Nearest Neighbor (KNN) and Support Vector Machine (SVM)—using the constituent variables of F-score and M-score, along with an additional loss indicator. The performance of these models in detecting financial frauds is then comparatively assessed.

Findings:

The results reveal varying degrees of ineffectiveness of the M-score and F-score in accurately identifying financially fraudulent companies in the Chinese market. In contrast, the machine learning models show satisfactory performance, each exhibiting distinct advantages in reducing false negative and false positive rates.

Practical Implications:

This research presents effective machine learning models for detecting and predicting financial statement fraud in the Chinese context, helping investors mitigate risks associated with stock investments in the Chinese stock market.



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sciforum-120239: Investigating Corporate Governance Impact on Financial Risk Management: Insights from the Albanian Banking Industry

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Corporate governance is essential for mitigating financial risk and enhancing the resilience of financial services firms. The 2008 financial crisis underlined the critical role of corporate governance in ensuring financial system stability. Following the crisis, policymakers and international standard-setting organizations urged for more severe governance structures to keep banks from taking on too much risk and prevent another systemic collapse. This study examines the influence of corporate governance and financial factors on credit risk within the Albanian banking industry. Using data from 12 commercial banks over the period 2012–2022, the study uses regression analysis with EViews software to study how board independence, ownership concentration, executive compensation, bank size, and capital adequacy impact credit risk. The outcomes indicate that higher board independence, executive compensation, and a larger bank size are linked with lower credit risk, while ownership concentration is directly related to credit risk. The findings suggest that improving corporate governance practices, specifically increasing board independence and lining up executive compensation with performance, can lower credit risk in the banking sector. Furthermore, authorities should monitor the impact of ownership concentration, as powerful shareholders may engage in riskier practices. This study provides valuable insights for policymakers and banking regulators in developing the stability of the Albanian financial system.



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sciforum-118150: The Readability Level in Annual Reports of Chinese Listed Companies and the Manipulative Behaviors of Managers for Self-Serving Incentives

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Since the implementation of registration system reform, the information disclosure mechanisms of Chinese listed companies have consistently garnered attention. The purpose of information disclosure is to effectively transfer information from within an organization to external parties, with public texts serving a crucial role in this process. However, the conciseness and accuracy of this information largely depend on the willingness and strategy of the discloser. Based on this, this paper aims to construct a systematic readability assessment system using linguistics theories, comprising 14 sub-indicators from four dimensions—Morphology, Grammar, Semantics, and Multimodal—to measure the comprehensive readability level in the annual reports of listed companies through a hierarchical dimensionality reduction method. Furthermore, this paper explores the manipulative information disclosure strategies of managers driven by self-serving incentives. This paper selected more than 4000 listed companies as the sample for its empirical analysis. It is revealed that companies with poor operating results in the current period tend to have low readability levels in their annual reports. The readability level in the current period has a positive impact on the stock market in the next one to three years, especially for companies with stock returns below the industry average. Moreover, companies with lower readability levels in their annual reports tend to demonstrate higher excess compensation of their managers. This paper provides insights into the regulatory policy and the review framework for information disclosure in the context of registration system reform.



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sciforum-115209: The Transformative Role of AI in Financial Reporting and auditing: Opportunities and Risks

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Introduction:

Artificial Intelligence (AI) is transforming financial reporting and auditing by automating complex processes, improving accuracy, and enhancing decision-making capabilities. Current advancements have demonstrated significant potential to streamline operations, increase transparency, and reduce human error. However, this transformative shift is accompanied by risks, such as algorithmic bias, cybersecurity threats, and regulatory challenges. This study examines the current applications of AI in financial reporting and auditing, explores potential future uses, and identifies associated opportunities and risks.

Methods:

This research employs a qualitative analysis of industry case studies to explore AI applications in financial reporting and auditing. Data were collected from published reports, industry insights, and case studies detailing the implementation of AI-driven tools by auditing firms and corporate finance departments. This study categorizes existing AI technologies and projects their future applications based on current trends and expert forecasts.

Results:

Key AI technologies in use today include natural language processing for automated report generation, machine learning for fraud detection, robotic process automation for data reconciliation, and predictive analytics for forecasting financial trends. Potential future applications encompass real-time auditing powered by AI-enhanced blockchain systems, advanced anomaly detection using deep learning algorithms, and AI tools for assessing compliance with increasingly complex regulatory requirements. These developments promise significant efficiency gains, but also highlight risks such as ethical concerns over algorithm transparency and challenges in safeguarding sensitive financial data.

Conclusions:

AI is revolutionizing financial reporting and auditing, offering unprecedented opportunities to improve efficiency and accuracy. However, its implementation must be accompanied by careful consideration of ethical, regulatory, and security concerns. Establishing robust frameworks for AI governance and fostering collaboration among stakeholders will be critical to harnessing AI's full potential while mitigating associated risks. Future research should focus on developing adaptive and ethical AI systems to ensure sustainable innovation in the financial industry.



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Session 4. Financial Innovations and Technology

sciforum-120421: “Learning from your neighbours”: prudential provisions of the EU AI Act for the UK insurance supervisory regime.

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This paper focuses on the prudential regulation and supervision of UK re-insurance undertakings in relation to Artificial Intelligence (AI) considerations. Specifically, it presents a critical analysis of the prudential provisions of the EU AI Act, which could be adjusted and adopted in the UK regulatory and supervisory regime, in line with the Prudential Regulation Authority (PRA)'s approach to insurance supervision. Building on the gaps identified regarding the supervisory approach to AI applications within the insurance value chain, it presents proposed developments based on the EU AI Act. The purpose of this paper is to present a critique on the learnings from the EU AI Act for UK financial regulators regarding the prudential supervision of re-insurers. Beyond the EU AI Act, the principles from the IAIS are also discussed to complement the recommendations for UK regulators. The contribution of this paper is in providing advances to the UK's approach to (a) regulate and (b) supervise AI applications within insurance. In relation to prudential supervision of AI applications and uses within the insurance value chain, a principles-based vs. a rules-based approach is examined, commenting on their cross-comparison. Regulating and supervising AI applications within the UK insurance industry is of high importance, linked to AI uses and the inherent purpose of insurance. In particular, referring to the growth and capacity of the insurance market, with increasing applications of AI and the insurability of risks, bridging the insurance protection gap and making insurance more affordable via increased accuracy of risks and improved underwriting, both core practices of prudential nature, are important. Overall, this research adds to the growing literature about the regulatory implications regarding AI, using the UK insurance industry as a case study, by commenting on the EU vs. UK regulatory regime and supervisory approach from a prudential lens.



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sciforum-110952: Blockchain and Artificial Intelligence in Sustainable Finance: A Thematic Analysis

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In recent years, sustainable finance has emerged as a central concept at the convergence of finance and the Sustainable Development Goals (SDGs). Likewise, blockchain technology (BT) and artificial intelligence (AI) are currently considered among the most well-known technologies, and combining these two technologies has uncapped potential, especially for sustainable finance. This study synthesizes and systematically reviews the existing literature on blockchain and artificial intelligence in sustainable finance. We gathered relevant studies from Google Scholar, Scopus, and Web of Science databases. We applied co-occurrence mapping and thematic analysis with the help of VOSviewer and NVivo software. In this study, based on a systematic literature review of 509 studies, the findings revealed five thematic areas (i.e., ESG measurement and disclosure; tracking and trading of carbon footprint; renewable energy and circular economy; transparency, security, governance, and compliance; and social and ethical aspects) attracting research interest. This study also identified several challenges faced by sustainable finance in the contemporary business environment. We outline, with a few remarks, general trends for the use of blockchain and artificial intelligence in sustainable finance developments in the financial markets. The findings of this study recommend more regulatory oversight on sustainable investments and actions from governments to promote sustainable investing.



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sciforum-114357: Leveraging Federated Learning for Enhancing Anti-Fraud Systems in Fintech: Opportunities and Challenges

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Federated learning (FL) is a revolutionary machine learning technology that protects data ownership while training unified AI models. By enabling multiple organisations to train machine learning models collaboratively by exchanging model updates instead of raw data, federated learning systems have great potential in areas where raw data are sensitive and cannot be easily shared, such as in financial technology (Fintech). Federated learning also emerges as a novel approach in the domain of anti-fraud systems to identify and combat economic crimes, such as fraud and money laundering, without sacrificing the security of sensitive financial information. This paper discusses recent developments using federated learning for Fintech and highlights its application in combatting fraud in Taiwan. Federated learning has successfully optimised fraud detection models across multiple financial institutions, as evidenced by key projects like the "Eagle Eye Fraud Detection Alliance Platform". Such initiatives prove that FL can significantly improve early fraud detection across institutions while ensuring data privacy through joint training of AI models. It also outlines a brief overview of security issues, Vision for Federated Learning, and the major challenges seen in widespread adoption, such as issues in model inversion attacks, data heterogeneity, and the robust encryption methods that can make it work. However, these problems do not outweigh the advantages of using federated learning to improve Fintech anti-fraud mechanisms. This paper then concludes with a discussion on possible future work and the usage of FL to also improve financial crime detection, presenting novel opportunities for institution-wise cooperation and a more effective anti-fraud scheme.



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sciforum-120040: THE ROLE OF ENTREPRENEUR'S EXPERIENCE ON THE SUCCESS OF CROWDFUNDING IN AFRICA

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Crowdfunding is increasingly becoming dominant in providing funding for entrepreneurs in emerging economies. Inexperienced entrepreneurs can lead to poorly created campaigns, inadequate marketing strategies, and ineffective communication with potential backers. As a result, projects may fail to reach their funding goals, limiting access to capital for innovative ideas and delaying economic growth. Hence, this study investigates the influence of entrepreneurs' experience on the success of crowdfunding projects in Africa. Based on signalling and human capital theories, it investigates how an experienced entrepreneur signals competence and credibility to potential backers to maximise the probability of crowdfunding success.

Additionally, examine the role of management experience, expertise and knowledge of crowdfunding success. A quantitative research approach and a quantitative analysis of crowdfunding campaigns across various African platforms were employed. Drawing from secondary cross-section data from Kickstarter and Indiegogo, this research uses the probit regression method to analyse and test the hypotheses. The results revealed that entrepreneurs' experiences of frequently asked questions and the presence of images have positively influenced crowdfunding success. Conversely, targeted amounts and longer duration have negatively affected the crowdfunding success. The findings reveal that entrepreneurs with experience tend to achieve higher crowdfunding success rates. This study contributes to the relative lack of research on crowdfunding in Africa by highlighting the importance of entrepreneurs' experience in crowdfunding success. It provides knowledge for entrepreneurs and investors, focusing on the role that experience plays when managing the complexity of crowdfunding platforms in the African context. The findings are based on signalling and human capital theories. However, the findings cannot be generalised to other developed economies.



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sciforum-117316: Does ESG Affect Bank Risk?

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Beyond the disruptions from the 2007–2008 financial crisis, the collapse of the Silicon Valley Bank, and acquisition of Credit Suisse by UBS Group AG in 2023, global banks continue to show weakness in absorbing major on- and off-balance sheet risk exposures. This study focuses on the joint and separate effects of Environmental (E), Social (S), and Governance (G) scores on bank risk captured both by a series of market related risk indices including cost of capital, and both levered and unlevered CAPM betas. Using a sample of U.S. banks over the period 2016 through 2023, banks' financial and market data are triangulated with the total and composite ESG scores, all obtained from the London Stock Exchange Group (LSEG) database, formerly known as Refinitiv. The main hypotheses predict that (i) investors demand a lower cost of capital from banks with higher ESG scores, and (ii) banks with higher ESG scores are exposed to lower systematic risks captured both by levered and unlevered betas. Overall, we contend that banks with higher ESG scores establish better operational alignment with employees, shareholders, customers, consumers, and communities while exercising greater due diligence by focusing on a pool of environmentally conscientious borrowers.

The paper's contributions to the literature is twofold. First, unlike previous studies, the focus on cost of capital and systematic risk indices captures the crucial interactions between ESG investment and firm decisions resulting from market imperfections and regulations. Second, empirical adjustments are made to address potential endogeneity problems in the model caused by factors such as reverse causality between ESG investment and risk, omitted variables, and measurement errors using the instrumental variables technique and application of simultaneous equation systems including the Seemingly Unrelated Regression (SUR) and Two Stage Least Square (2SLS) approaches.



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sciforum-120135: Financial Innovations and AI-Driven Management in Romania's Tourism and Public Catering Sector

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The management of tourism and public catering establishments in Romania is increasingly leveraging financial innovations and emerging technologies to enhance its efficiency and profitability. This study explores the impact of artificial intelligence (AI), machine learning (ML), big data, and cloud computing on financial decision-making, pricing strategies, and customer experience in the hospitality sector. For instance, the AI-powered dynamic pricing models used by Romanian hotels have improved their revenue by up to 20%, while ML-driven demand forecasting helps restaurants reduce their food waste by 15-30%. Algorithmic trading and robo-advisors are also being integrated into financial management strategies, helping optimize investment decisions and resource allocation. Algorithmic trading and robo-advisors are increasingly being used for financial optimization, improving investment returns by an estimated 12-18% annually. Cloud-based financial analytic platforms have contributed to a 10-15% reduction in operational costs, enabling real-time financial monitoring and strategic decision-making. Additionally, blockchain applications in financial reporting and auditing are enhancing transparency and reducing fraud risks. By leveraging computational finance tools, Romanian tourism and hospitality businesses can enhance their financial sustainability, increase their competitiveness, and adapt to the evolving digital economy. This study contributes to the growing body of research on AI-driven financial innovations in the service industry, offering valuable insights for policymakers and business leaders.



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sciforum-118721: Integrating the implied regularity into implied volatility models: A study on free arbitrage model

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The study "*Integrating the Implied Regularity into Implied Volatility Models*" investigates the relationship between implied volatility (IV) and the Hurst exponent (H), particularly in the context of option moneyness. The research introduces a novel IV model that integrates the concept of market memory, represented by H, to enhance the accuracy of volatility forecasting compared to traditional models such as SABR and its fractional extension, fSABR.

A key finding of the study is that when moneyness is equal to 1 (ATM), the Hurst exponent converges to 1/2, indicating that price movements follow a Brownian motion, which aligns with the Efficient Market Hypothesis (EMH). However, for options that are in-the-money (ITM) or out-of-the-money (OTM), H decreases, reflecting deviations from pure randomness and greater sensitivity of IV to market conditions. This observation suggests that market inefficiencies are more pronounced in extreme moneyness regions, making standard models less effective in capturing the dynamics of implied volatility.

To validate the model, the authors employ advanced optimization techniques, specifically Optuna, which leverages Bayesian optimization and the Tree-Structured Parzen Estimator (TPE) method. The model is calibrated against real-world market data, and its performance is compared with SABR and fSABR using error metrics such as mean squared error (MSE), mean absolute error (MAE), and curvature-based error measures. The empirical results show that the proposed model achieves lower errors and better fits the observed IV surface, especially in ITM and OTM regions where traditional models struggle.

Another significant contribution of the study is the verification that the proposed IV model satisfies the arbitrage-free conditions required for financial consistency. By ensuring that the model does not allow for riskless profit opportunities, the authors demonstrate its practical applicability in real-world trading and risk management.



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sciforum-120694: Investing in the Age of Generative AI: A GPT-based Sentiment Analysis Approach

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Generative AI, which ushers a new age of AI, comes with huge economic potential. AI startups, like OpenAI, Anthropic, and DeepSeek, and technology giants, like Google, Amazon, Microsoft, and Meta, compete in the Generative AI market. To not fall behind in the AI race, they have ramped up AI investment with massive capital spending. For example, on January 3, 2025, Microsoft announced that the company is on track to invest approximately USD 80 billion to build AI-enabled data centers to train AI models and deploy AI- and cloud-based applications around the world in fiscal 2025. Also, on January 21, 2025, an AI joint venture called the Stargate Project was created by OpenAI, SoftBank, Oracle, and MGX. The venture plans to invest USD 500 billion in AI infrastructure by 2029. On January 24, 2025, Meta announced that the company plans to build a massive data center in Louisiana to power its newest AI model. It would invest USD 60-65 billion into AI including the data center, which would be “so large it would cover a significant part of Manhattan”. To capitalize on the AI boom, investors are interested in trading AI stocks. AI chatbots, which can identify and classify sentiments from financial news, can be leveraged for investment. So, this paper proposes a GPT-based sentiment analysis approach for trading AI stocks. Also, natural experiments are conducted to evaluate its effectiveness. The initial results show that the approach achieves a good rate of return.



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sciforum-120688: Rank-Based EPS Consensus Using the Institutional Brokers' Estimate System

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The accuracy and influence of financial analyst forecasts have drawn significant attention due to their essential role in guiding investment decisions and shaping market sentiment. Earnings per share (EPS) forecasts, in particular, provide critical insights into corporate performance, influencing equity valuations and market trends. While EPS is a widely used measure of profitability and financial health, research highlights persistent biases that undermine its reliability. These biases often arise from information asymmetry, behavioral tendencies such as herding and overconfidence, and potential conflicts of interest, leading to systematic forecast errors. The I/B/E/S database aggregates detailed analyst data, including earning forecasts for publicly traded companies. This study evaluates analyst performance through a dynamic ranking system that measures EPS forecast accuracy over time. By periodically ranking analysts, we identify high- and low-performing forecasters while assessing the stability of their predictions. To improve forecast accuracy, we introduce an enhanced consensus method that surpasses individual estimates by applying rank-based weighting. Our approach leverages iterative filtering algorithms to refine consensus estimates by computing key parameters such as individual and market variances and a reliability index. These metrics are integrated into a composite score, allowing for adjustments to prediction discrepancies and the identification of long-term reliability patterns, ultimately improving the accuracy and robustness of EPS consensus forecasts.



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sciforum-117385: Statistical Dangerousness: a novel tool that foresees the dangers

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Statistical Dangerousness is a novel concept that introduces a dynamic and probabilistic approach to risk assessments in complex systems. Unlike traditional models that focus on static data or the average outcomes, Statistical Dangerousness incorporates the statistical variability in a system and the probability of exceeding a critical threshold, providing a more comprehensive understanding of potential dangers. This method is particularly applicable to fields like finance, where markets are inherently volatile, and extreme events are often difficult to predict. In finance, Statistical Dangerousness enhances risk assessments by capturing fluctuations in market conditions, asset prices, and financial indicators, allowing for the identification of periods when the likelihood of surpassing dangerous thresholds is high. By integrating both variability and probabilistic analysis, this tool enables the forecasting of potential financial crises, such as market crashes or institutional failures, which the traditional models often overlook. It allows financial institutions and investors to understand the likelihood of extreme outcomes better, improving their decision-making and the development of risk management strategies. Moreover, Statistical Dangerousness can be used to optimize the stability of financial systems by proactively detecting rising risk levels, thus preventing financial catastrophes. By focusing on the possibility of extreme deviations, it provides a forward-thinking approach to finance, enabling more accurate predictions and the timely mitigation of risks. As such, Statistical Dangerousness represents a significant advancement in financial risk management, offering valuable insights for anticipating and managing the uncertainties that shape the financial landscape.



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sciforum-119020: The behavior of European financial markets under risk pressure: calculating the Value-at-Risk of a stock portfolio using Python

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The behavior of financial markets is characterized by frequent changes due to external factors such as government policies, economic events and various regulations. These factors can cause shifts in the means, variances, serial correlation and skewness of asset returns.

Modeling the dependency and volatility of financial returns has been a key issue in financial analysis, as it helps to quantify risk better. Analyzing historical market information can provide a framework for understanding risk and determining potential financial losses. The Value-at-Risk (VaR), recommended by the Basel II Accord, has become the most widely used risk measurement tool by analysts. The Value-at-Risk (VaR) enables financial institutions to measure, for a given level of probability, the largest expected loss of a portfolio during a particular period. One method for calculating the Value-at-Risk (VaR) is the variance-covariance approach, which looks at historical price movements and then uses probability theory to calculate the maximum loss within a specified confidence interval.

This paper aims to analyze the weekly returns of the financial indices of three countries, the United Kingdom (FTSE100), Germany (DAX30) and France (CAC40), over a period of 10 years, between September 2014 and September 2024. The first step of this analysis is to model the returns to account for various deviations from normality, such as skewness, excess kurtosis and autocorrelation. After modeling the data, the Value-at-Risk (VaR) is calculated using the variance-covariance approach. The analysis is carried out in Python, which, with powerful libraries and computational capabilities, proves to be the ideal tool. Finally, the empirical results show the Value-at-Risk (VaR) forecasts at the quantile levels of 0.95 and 0.99. This paper establishes that the delivery of this analysis as a modular API makes it suitable for wider use in risk management, as well as being highly extensible, contributing to better and more informed decisions.



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sciforum-119629: TRADING EMOTIONS IN DAY TRADING: EXPERIMENTAL EVIDENCE ON THE SYNERGY BETWEEN HUMANS AND TRADING ROBOTS

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Traders do not trade with markets but with their perceptions and beliefs. There is a growing recognition of behavioral biases' impact on financial decision-making. However, in day trading, a significant gap remains in the literature regarding the psychological and operational implications of trading robots on human traders, which this study seeks to fill. The aim was to investigate the extent to which trading robots can mitigate behavioral biases and provide a more rational market view. An experiment was conducted on the Brazilian stock exchange (B3) with 130 human traders and trading robots in real time, aiming to understand the relationship between traders' rational intention to buy or sell and their emotional capacity to execute these actions. This research introduces the concept of Psychological Distance and explores how trading robots bridge the gap between rational decision-making and emotional execution, reducing psychological barriers that compromise financial performance. The results demonstrate that trading robots can reduce behavioral biases such as greed and impulsiveness, promoting more rational decision-making and improved financial outcomes. Robots are particularly effective at eliminating profit-related biases, reducing human emotional interference in trading. However, their effectiveness is limited when it comes to mitigating loss aversion, highlighting the complexity of emotional responses, especially in managing financial losses. These insights reveal the potential and limits of automated trading systems in improving traders' performance. By reducing emotional biases and fostering disciplined decision-making, trading robots help traders optimize their strategies. This study advances behavioral finance and trading automation, supporting future innovations in trading psychology and algorithmic assistance.



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Session 5. Future of Money: Central Bank Digital Currencies, Cryptocurrencies and Stablecoins

sciforum-120645: Binance USD Delisting and Stablecoin Repercussions: A Local Projections Approach

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The delisting of Binance USD (BUSD) marks a critical moment in stablecoin regulation, raising concerns about market concentration and systemic risk in the cryptocurrency ecosystem. While the existing literature examines stablecoins as safe havens and the impact of banking crises on cryptocurrency markets, the implications of regulatory actions on stablecoin market structure remain underexplored. This paper employs local projections, including nonlinear specifications, to investigate the effects of the BUSD delisting on the broader cryptocurrency ecosystem. Our findings reveal that the liquidity displaced from BUSD primarily concentrates in USDT and USDC, reinforcing their dominance and exacerbating systemic risk due to increased market concentration. Furthermore, our analysis uncovers asymmetric effects on traditional cryptocurrencies, with Bitcoin and Ethereum experiencing short-term liquidity contractions, while smaller cryptocurrencies fail to emerge as viable alternatives. Notably, algorithmic and decentralized stablecoins like DAI and FRAX exhibit negligible absorption capacity, reflecting market skepticism toward their stabilization mechanisms during crises. These results suggest a potential unintended consequence of regulatory scrutiny, where increased regulation of major players leads to greater market concentration, potentially creating new systemic vulnerabilities. This highlights the importance of a nuanced approach to stablecoin regulation that considers its impact on market structure and systemic risk within the cryptocurrency ecosystem. Our study contributes to the growing body of literature on cryptocurrency market dynamics and provides valuable insights for policymakers, regulators, and market participants. We call for a balanced regulatory framework that promotes both stability and innovation in the rapidly evolving digital asset landscape.



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sciforum-120674: Central Bank Digital Currencies and the Challenges of Financial Crime in a Digital Bartering Economy

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Abstract

The rapid growth of financial technologies and the emergence of digital assets have transformed traditional economic systems, raising serious issues of money laundering, illicit transactions, and financial security. This paper addresses the role of Central Bank Digital Currencies (CBDCs) in fighting financial crimes in the cashless economy where digital bartering has achieved broad popularity. Analysing the transformation from old bank money to digital assets, this paper addresses the implications of anonymity, privacy, and trust in the process of financial transactions.

This study evaluates the opportunities and risks of embracing CBDCs and their potential to lower the use of cryptos in illicit commerce, promote financial inclusion, and maintain monetary stability. However, this study also poses questions regarding the disintermediation of banks and the challenge of achieving effective regulatory oversight of decentralised finance systems. This paper also discusses the growing application of digital assets in dark web trade, comparing the utility and worth of Bitcoin and other digital tools to traditional fiat currencies and physical high-value commodities such as gold and luxury goods.

Based on historical monetary policies and recent trends in finance, this research emphasises the increasing complexity of digital transactions and the urgent need for effective anti-money laundering (AML) mechanisms. The report contends that while CBDCs will offer a regulated and open alternative to existing digital currencies, their usefulness in the prevention of illicit finance is predicated on trust, technological security, and regulatory flexibility. This research concludes by advancing a balanced approach to the use of CBDCs, emphasising financial literacy, regulatory innovation, and more advanced forensic tools to combat financial offenses in the digital economy.



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sciforum-116980: Connectedness between Islamic Cryptocurrencies and Green Assets: Deep Insights from Extreme Events

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The occurrence of consecutive devastating events has an adverse influence on investment avenues and investing behavior. As Islamic cryptocurrencies are novel digital financial assets based on Islamic law, it is crucial to explore their connectedness with green assets during periods of financial and economical struggle. This study emphasizes the safe haven attribute of both considered assets by revealing the spillover transmitter and receiver behavior. The extended version of the quantile connectedness (QVAR) technique by Ando et al. (2022) is employed for the period 28 December 2018 to 12 August 2022. The events covered are the Bitcoin Price Crash in 2018, the COVID-19 pandemic, the global plummet in oil demand in 2020, and the Russia-Ukraine War. The findings of static quantile connectedness disclose that at the median quantile (normal market condition), there is a weak connectedness between Islamic cryptocurrencies and green assets. However, in bearish and bullish market conditions, the degree of connectedness progresses. The outcomes of dynamic quantile connectedness demonstrate that total connectedness between Islamic cryptocurrencies and green assets is unstable and fluctuates with disastrous health, financial, and economic crises. These results accentuate that in both normal and extreme market conditions, investors and policymakers should continually study the market's behavior and spillover movement to alter their investment distributions.



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sciforum-114380: Cryptocurrencies and AI-Enabled Organized Fraud: Emerging Risks and Countermeasures

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The emergence of cryptocurrencies and artificial intelligence (AI) has had a major effect on worldwide financial crime, allowing for increasingly complex fraud schemes. Criminal groups increasingly leverage these technologies, bundling them with sophisticated business models such as phishing-as-a-service and ransomware-as-a-service. The rapid growth of AI and cryptocurrencies has generated a sharp increase in organized financial crime targeting vulnerable people across borders, according to a recent INTERPOL assessment. Organized crime syndicates are using AI to create convincing deepfakes to dupe victims into false investment or romance scams and cryptocurrencies to transfer ill-gotten gains anonymously. One example is “romance baiting” fraud, in which trafficked people, often under duress to commit crimes, use AI-generated faces to dupe victims into financial scams. This hybrid romance and investment fraud scam has become widespread in Southeast Asia, Africa, and Latin America. Criminal networks repurpose government intelligence tools to target these narratives, making it difficult for authorities to detect and intervene. Finally, this paper examines the implications of new fraud techniques for law enforcement and the urgent need for greater international cooperation and regulatory frameworks. It underlines the promotion of data exchange, capacity-building, and public-private partnerships as crucial mechanisms for tackling AI-powered financial fraud. This paper further highlights the need for consumer awareness for reporting mechanisms to tackle the growing risks of cryptocurrency and AI-enabled scams.



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sciforum-120110: Cryptocurrencies in Portfolio Diversification: Evaluating Risk-Adjusted Performance and Strategic Allocation

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This study explores the diversification potential of cryptocurrencies in traditional investment portfolios and their impact on portfolio performance. Focusing on Bitcoin, Ethereum, and Binance Coin, this research examines their return characteristics, volatility, and correlation with conventional asset classes. A portfolio optimization approach using Minimum Variance and Maximum Sharpe Ratio strategies is applied to assess the benefits of including these digital assets. Historical data from 2019 to 2024 is utilized to compare cryptocurrency-inclusive portfolios with those composed solely of traditional assets such as bonds, gold, and equities.

The findings reveal that integrating cryptocurrencies enhances portfolio returns and improves risk-adjusted performance, with Ethereum and Binance Coin emerging as key return drivers. This study highlights how cryptocurrencies offer unique diversification benefits due to their low correlation with traditional assets, providing investors with new opportunities for optimizing risk and return. Additionally, portfolio optimization results demonstrate that the strategic allocation of digital assets can significantly enhance performance without compromising overall portfolio stability.

By offering empirical evidence on the role of cryptocurrencies in investment strategies, this study contributes to the growing body of research on digital asset integration. The results provide valuable insights for investors and portfolio managers seeking to enhance diversification and capitalize on the evolving financial landscape.



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sciforum-115624: Current Trends and Challenges in the Selective Adoption of Central Bank Digital Currencies (CBDCs)

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Central Bank Digital Currencies (CBDCs) have emerged in response to accelerated digitalization, declining cash usage, the rise of cryptocurrencies, and the need to modernize payment systems. This paper examines the development and implementation of CBDCs, highlighting initiatives such as the Sand Dollar in the Bahamas, eNaira in Nigeria, and JAM-DEX in Jamaica, as well as prominent ongoing projects like the Digital Yuan, Digital Yen, Digital Dollar, Digital Euro, and Digital Pound. The research was made during October-december 2024 and employs methods such as literature review, bibliographic synthesis, and comparative analysis to assess the benefits, challenges, and current state of CBDC implementation. Key indicators analyzed include financial inclusion, transaction efficiency, cybersecurity, and the impact on monetary policies. The paper emphasizes the central role of central banks in fostering user trust and managing risks associated with financial innovation. It also underscores the importance of close collaboration between public and private sector actors to develop solutions tailored to the specific needs of individual economies. CBDCs are seen as a significant opportunity to reduce reliance on cash, combat money laundering and terrorism financing, and enhance transaction transparency. Findings highlight CBDCs' contributions to financial inclusion and payment system modernization, as well as challenges related to privacy, security, and user acceptance. The paper concludes that CBDCs hold transformative potential for global financial systems but require innovative designs, international cooperation, and robust strategies to mitigate risks and maximize benefits. Future recommendations focus on global standardization, policy adaptation for effective implementation, and the exploration of emerging technologies to support widespread adoption.



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sciforum-120659: Leveraging machine learning for developing a sustainable and stable pricing numeraire with ESG considerations

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Introduction

Asset prices should be relevant to the rate of depletion of a basket of essential resources, rather than the money market numeraire, whose price is almost a deterministic function of time. Basket weights can then be calibrated to the stability of asset prices. Then in a complete market, we can argue that there is a risk-neutral measure under which the sensitively discounted asset prices are stable.

Methods

Our key considerations for developing the resource-linked numeraire will include:

- Choice of resource base: The numeraire could be tied to a basket of essential resources (e.g., energy, water, soil fertility, rare minerals). It could be weighted based on global availability, depletion rates, or ecological impact. Finding the optimal weight would require a number of methods to be applied, including, but not limited to, Machine Learning, Dimensionality Reduction, and Mathematical Optimization.
- Scarcity-driven valuation: As resources become scarcer, their contribution to the numeraire increases, making depletion more costly. This could be modeled similarly to commodity-backed currencies but dynamically adjusting for sustainability.

Results

The paper would result in a number of potential models such as, but not limited to,

- Energy-backed currency: Pegging the numeraire to available units of sustainable energy (e.g., solar, wind) instead of fossil fuel reserves.
- Eco-certificate scheme: A parallel financial system where economic activity is balanced against resource consumption quotas.
- Resource depletion index: An index tracking key essential resources, which could be used as a dynamic numeraire.

Conclusions

Developing a financial numeraire aligned with the depletion of essential resources is possible and could provide a more sustainable economic framework. The idea would be to create a unit of account that reflects the scarcity and consumption of critical natural resources, such as water, fossil fuels, arable land, or biodiversity.



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sciforum-119690: On the time-varying causal relationships that drive bitcoin returns

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In this paper, we use a Bayesian time-varying parameter vector autoregressive (TVP-VAR) model to assess the impact of alternative drivers of bitcoin returns. We consider an extended set of alternative drivers such as bitcoin volatility, investor sentiment indices, proxies for bitcoin supply and demand, stock market returns and volatility indices, commodities returns, exchange rates and interest rates. We select the most important variables using a Bayesian variable selection method. To examine the evolution of the Granger causality relationship between the selected variables and bitcoin returns over time, we develop and employ a new approach based on the estimates of the TVP-VAR model and heteroscedastic consistent Granger causality hypothesis testing. Our findings indicate that investor sentiment and ethereum returns affect bitcoin returns over the entire sampling period. Trading volume emerges as an important determinant of bitcoin returns when bitcoin prices remain relatively steady. In addition to the Granger causality, we perform impulse response function and forecast error variance decomposition analysis. The results from the structural analysis provide further evidence of the time-varying nature of bitcoin's dynamics. In particular, we find that the effect of a structural shock (in terms of magnitude) on bitcoin returns depends on the time that the shock occurs.



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sciforum-114933: Optimising Multi-Scale Volatility Forecasting Approaches for Digital Currencies

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Modelling and forecasting cryptocurrency volatility is essential due to the inherently volatile and speculative nature of digital asset markets. Accurate volatility predictions enable traders and investors to make informed decisions, optimize portfolio strategies, and mitigate risks in a highly uncertain environment. This study examines the volatility dynamics of large-cap and mid-cap cryptocurrencies through high-frequency data analysis. Cryptocurrencies exhibit unique market behaviours characterised by complex short-, medium-, and long-term volatility patterns, which require sophisticated modelling techniques for accurate forecasting. Among the methods explored, the Heterogeneous Autoregressive (HAR) model stands out for its ability to effectively capture multi-scale dependencies, making it particularly suitable for modelling the complex volatility trends observed in these digital assets. By assessing both in-sample and out-of-sample performance, this study points out the importance of employing multi-scale approaches to improve predictive accuracy. The findings have significant implications for risk management and trading strategies, as accurate volatility forecasting is crucial in highly volatile cryptocurrency markets. The HAR model's capacity to integrate multiple time horizons allows for a more comprehensive understanding of market dynamics, providing practical insights for financial decision-making. This research advances the broader understanding of cryptocurrency volatility and provides a foundation for future studies to explore understudied modelling approaches to the growing complexities of digital asset markets.



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sciforum-120627: Understanding Attitude Towards Central Bank Digital Currency for Inducing Financial Inclusion: A Constructivist Analysis of Attitude Formation and Adoption Framework

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Purpose:

The world economy is undergoing digital innovation in the field of finance and thereby creating a centralized currency. This study is based on expert interviews that explores the formation of attitudes towards Central Bank Digital Currencies (CBDCs) in India, addressing factors contributing to payment system transition and potential financial inclusion enhancement. This study adapts Extended Attitude Formation theory as its underpinning. It aims to understand the equivalence between existing payment systems and CBDCs by comparing the benefits, concerns, and limitations of both.

Methodology:

This study employed a constructivist grounded theory approach and conducted 13 semi-structured interviews with experts from the banking sector, academia, and financial technology sectors. This study conducted a Reflexive Thematic Analysis, integrating both deductive and inductive coding techniques to develop a comprehensive analytical framework.

Findings:

The analysis revealed four major themes: Technology Infrastructure and Security, User Experience and Adoption, Financial Inclusion & Accessibility, and Implementation and Integration. Key theoretical constructs emerged, including Trust Evolution Theory, Cultural Transformation Theory, and Implementation Strategy Theory.

Originality:

This study provides a comprehensive qualitative exploration of CBDC attitude formation in the Indian context, offering a unique perspective on how existing digital payment experiences, cultural factors, and institutional trust intersect to shape users' perceptions of digital currencies.



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