



10th Multinational Energy and Value Conference
22-23 May 2025
Izmir, Türkiye

Organized by



Dear Colleagues,

It is our great pleasure to welcome you to the 10th Multinational Energy and Value Conference of Center for Energy Value Issues (CEVI). Thank you so much for being in Izmir, we hope you will enjoy both the conference and the city. The conference is hosted by the Department of International Trade and Finance of **Izmir University of Economics** in association with **Center for Energy and Value Issues (CEVI)**, **Energy Markets Research and Application Center of Hacettepe University** and **The Sustainable Energy and Climate Policy Research Center (SENLAB) of Izmir University of Economics**. We believe that the international academic cooperation between two Turkish universities and CEVI in the energy area, will further develop and reach to a higher ground throughout this conference.

The conference is organized in separate sessions in line with the main objective of the ongoing CEVI conferences, aiming to create knowledge accumulation on energy and value issues for academic scholars and practitioners. The first day of the conference will be held as “the practitioners’ day” and there will be talks on topics such as energy strategy, regulation, energy security and sustainability. The second day is devoted to presentations of **30 academic papers** on energy issues under the themes of *Finance, Investment & Policy, Regulation, Environmental, Social, and Governance, Sustainability & Environment, Investment, Regulation, and Law, Digital Transformation in the Energy Sector, Energy Transition and Innovation and Growth in Energy Sector*. There is also two special sessions of ISINI (International Society of Intercommunication of New ideas). For the special session of ISINI, we will listen contributions focused on creating alternative paradigms to address the energy trilemma—balancing climate-neutral energy, affordability, and reliable access.

We would like to thank particularly to Prof. Dr. Yusuf Hakan Abacioglu (the Rector of Izmir University of Economics) for his support. We are also grateful to Prof. Dr. Burcu Güneri Çangarlı (the Dean of Faculty of Business, Izmir University of Economics) and Prof. Dr. Berna Aydoğan (the Vice-Dean of Faculty of Business, Izmir University of Economics) and Dr. Bülent Cekiç and Prof. Dr. Burak Pirgaip from Hacettepe University for their efforts to organize the conference. This conference is realized through a team work. In addition to the Organizing Committee members, we have benefited from the experiences of the co-chairs and members of the program committee. We are grateful to Prof. Dr. André Dorsman and Prof. Dr. Wim Westerman from CEVI and Prof. Dr. Johannes Platje from ISINI group for assisting us to set up the international network.

Conference Organizing Committee

Prof. Dr. Coşkun Kucukozmen

Prof. Dr. Mehmet Baha Karan

Prof. Dr. Gulin Vardar

Prof. Dr. Kazim Baris Atici

Prof. Dr. Efe Biresselioglu

Res. Asst. Birce Tedik Kocakaya

10TH MULTINATIONAL ENERGY AND VALUE CONFERENCE
CONFERENCE PROGRAM FOR DAY 1 (22.05.2025)

09:00-10:00	Registration
10:00-10:30	Opening Speeches <ul style="list-style-type: none">• Prof. Dr. Burcu Güneri Çangarlı (Izmir University of Economics)• Prof. Dr. Mehmet Baha Karan (CEVI)• Prof. Dr. André Dorsman (CEVI)
10:30-11:00	Coffee Break
11:00-12:30	Panel 1 - Making the Energy Transition a Reality: Field Experiences, Institutional Perspectives, and Governance Gaps Chair: Prof. Dr. Mehmet Efe Biresselioğlu (İzmir University of Economics, SENLAB) <ul style="list-style-type: none">• Ufuk Yaman – Vice President of Turkish Wind Energy Association (TWEA), Founding General Manager at U-SENS Energy Solutions• Pelin Bakan Bilir – Aydem Plus Operations and Project Manager• Saadet Çağlın – Izmir Metropolitan Municipality Council Member, İZENERJİ Board Member• Prof. Dr. Muhittin Hakan Demir – İzmir University of Economics, SENLAB
12:30-13:30	Lunch
13:30-14:00	Global Economic Outlook and Energy Markets <ul style="list-style-type: none">• Tolga Uysal, Managing Partner at Deriva Consulting and Training
14:00-14:30	Coffee Break
14:30-16:00	Panel 2 - Carbon Border Adjustment Mechanism, Climate Law, Carbon Footprint, Green Finance Chair: Hazal Coşkun, General Secretary, ENSİA <ul style="list-style-type: none">• Gizem Çetinkaya, Sales Director, Enerjisa Üretim, Quickcarbon• Sinem Sin Okur, Director, Profinstance• Gamze Satoğlu, Auditing and Business Development Director, Smart Inspector

10TH MULTINATIONAL ENERGY AND VALUE CONFERENCE
CONFERENCE PROGRAM FOR DAY 2 (23.05.2025)

PARALLEL SESSION I (Room D 313)

PARALLEL SESSION II (Room D 314)

09:30 - 11:00	Strategy & Finance (Chair: Andre Dorsman)			Investments, Regulation & Law (Chair: Wietze Lise)		
	ID	Title	Authors	ID	Title	Authors
	6	The Role of Inclusive Institutions in the Development of Financial Markets in Europe [In Person]	Mehmet Baha Karan	5	(Dis)incentives for Entrepreneurs to Invest in Carbon Capture and Storage under EU Regulation [In Person]	Marcus R.C. de Groot, Edwin Woerdman
	28	The Role of Financial Sector Development in the Economic Policy Uncertainty-Energy Nexus: Insights from E7 Countries [In Person]	Gülin Vardar, Berna Aydoğan, Birce Tedik	1	A Comparative Analysis of Case Law in the Hydrocarbon and Renewable Energy Sectors: Implications for Dispute Resolution and Energy Transition [Online]	Berfu Beysulen Angin
	17	Türkiye's Sustainable Energy Strategy: Risks and Opportunities After the Russia-Ukraine War [In Person]	Mert Akdoğan	14	Opportunities and Barriers to Financialization of the Energy Storage Investments in Türkiye [Online]	Burcu Tunç, Yelda E. Topal, Erkan Erdil

11:00 – 11:15 COFFEE BREAK

11:15 - 12:15	Comparative Analyses (Chair: Yener Coskun)			Energy Transition (Chair: Mehmet Baha Karan)		
	ID	Title	Authors	ID	Title	Authors
	27	Corporate ESG Performance vs Financial Performance: A comparative analysis in the energy sector in the European Union [In Person]	Mustafa Reha Okur, Beyza Gürel	4	Analyzing Energy Transition: Cost and Risk Implications in Various Innovation Scenarios Using Mean-Variance Approach of Modern Portfolio Theory [Online]	Volkan Alacam, Mehmet Baha Karan
	30	Decomposition of Carbon Emissions from Energy Use: A comparative analysis between India and China [In Person]	Sebak Kumar Jana, Wietze Lise	8	Challenges and Opportunities for Midstream Natural Gas Companies in the European Union Amid the Energy Transition [Online]	İzzet Ari, Numan Fahri Sağlam

12:15 – 13: 30 LUNCH BREAK

PARALLEL SESSION I (Room D 313)

PARALLEL SESSION II (Room D 314)

PARALLEL SESSION III (Room D 315)

13:30 - 15:30

ISINI Special Session I (Chair: Johannes Platje)		
ID	Title	Authors
20	The role of probability amplifiers in E-governance solutions - the example of E-delivery [In Person]	Krystian Wojtkiewicz, Rafał Palak, Joost Platje
19	Determinants of ignorance of system risk in cryptocurrency markets [In Person]	Mateusz Musiał
26	Betting on the big bucks: greedy bankers beating (?) financial markets (1970's – 2010's) [Online]	Wim Westerman
23	Regional inequality in Poland: the EU effect [Online]	Johan van Ophem, Katarzyna Kurek

Digital Transformation in Energy Sector (Chair: Gülin Vardar)		
ID	Title	Authors
9	The Opportunities and Challenges of Digital Technologies in Energy Systems to Reduce GHG Emissions [Online]	Tuğba Dinçbaş, Azize Ergeneli, Aslı Kuzu, Doğan Çelik
16	The Role of UTTS in Digital Auditing and Combating the Informal Economy in the Fuel Market [In Person]	Gokce Cobansoy Hizel, Melikegül Özengüneş
7	Is digitalization leading to CO2 emission cutting? [Online]	Robin van Emous
11	Application of Artificial Intelligence in Sustainable Energy: A Case Study on the World's Leading Energy Producers [Online]	Andreann Ndebu, Bonface Mukabane

Sustainability & Environment (Chair: Sıdika Başçı)		
ID	Title	Authors
2	Nickel-Powered Sustainability: Revolutionizing the Energy Economy Through Lithium Batteries [In Person]	Sıdika Başçı, Kayla Shevadena
15	Sustainable City Index and Financial Performance: Economic Valuation of Urban Sustainability [Online]	B.Hande Gursoy Haksevenler, Yelda Erden Topal
18	Measuring Financial and Sustainability Literacy Among Individuals and Firms in Türkiye [In Person]	Berker Özcureci, Birce Tedik
29	Transforming Environmental Quality: Examining the Role of Green Production Processes and Trade Globalization through a Kernel Regularized Quantile Regression Approach [In Person]	Tomiwa Sunday Adebayo

15:30 – 16:00 COFFEE BREAK

PARALLEL SESSION I (Room D 313)

PARALLEL SESSION II (Room D 314)

16:00 - 18:00

ISINI Special Session II (Chair: Anna Zgrzywa-Ziemak)		
ID	Title	Authors
22	Towards Climate Neutrality: Smart Solutions for Low-Carbon E-commerce Operations [In Person]	Anna Zgrzywa-Ziemak, Adam Wasilewski
21	Sokrates benchmarking in socio-economic research [In Person]	Rafał Palak, Krystian Wojtkiewicz, Joost Platje
25	The Role of ESG in Sustainable Development in Morocco: A Literature Review [In Person]	Rajae Lahssoui
24	The impact of Türkiye foreign trade on their Actual-Open Emissions of CO2 in the years 2000–2020 in the context of EU energy policy [Online]	Bartosz Fortuński

Risk Management in Energy Sector (Chair: Burak Pirgaip)		
ID	Title	Authors
10	Comprehensive Analysis of Financial Risk Management and Hedging Strategies in Energy Markets: The Case of Turkey [Online]	Kartal Somuncu
12	Does ESG Affect Bank Risk? [Online]	Abol Jalilvand
13	Slack Resources, Innovation and Growth: Evidence from the US Energy Sector [Online]	Sung Kim, Abol Jalilvand
3	The Role of Innovation in Determining Cost and Risk in Renewable Energy Portfolios: A Mean-Variance Perspective [Online]	Volkan Alacam, Mehmet Baha Karan

Zoom Links (23.05.2025)

	D 313	D 314	D 315
09:30-11:00	https://ieu-edu-tr.zoom.us/j/83084610315	https://ieu-edu-tr.zoom.us/j/84650507228	
11:15-12:15	https://ieu-edu-tr.zoom.us/j/82369568151	https://ieu-edu-tr.zoom.us/j/82196697685	
13:30-15:30	https://ieu-edu-tr.zoom.us/j/81496874051	https://ieu-edu-tr.zoom.us/j/82013886834	https://ieu-edu-tr.zoom.us/j/89167545588
16:00-18:00	https://ieu-edu-tr.zoom.us/j/89203670914	https://ieu-edu-tr.zoom.us/j/89816917398	

ID: 1

A Comparative Analysis of Case Law in the Hydrocarbon and Renewable Energy Sectors: Implications for Dispute Resolution and Energy Transition

Berfu Beysülen Angin, University of Groningen, The Netherlands

This paper examines the resolution of disputes in the hydrocarbon and renewable energy sectors through a comparative analysis of case law, using a normative framework developed by the author (which is in the process of being submitted for publication). While both sectors involve the production, sale and transmission of energy, they raise different legal issues, particularly in balancing the competing interests of states and investors. The contradictory nature of states' right of to regulate, duty to protect investments under international investment law agreements, and duty to facilitate a just energy transition pose further challenges.

The analysis identifies critical differences in the nature and resolution of disputes in these sectors, and highlights areas where dispute settlement mechanisms fail to maintain a balance between the right to regulate and the protection of investment. By identifying trouble spots in energy dispute resolution through a comparative analysis of case law in the hydrocarbon and renewable energy sectors, the research suggests approaches to designing mechanisms that better address environmental concerns while supporting energy investment security.

This research provides insights for academics and practitioners working to develop effective investor-state dispute settlement frameworks that support the global energy transition.

Nickel-Powered Sustainability: Revolutionizing the Energy Economy Through Lithium Batteries

Sıdıka Başçı, Ankara Yıldırım Beyazıt University, Türkiye
Kayla Shevadena, University of Bologna, Italy

Nickel is a chemical element and a transition metal that is commonly used in steel manufacturing. Almost two-thirds of the nickel sold out every year goes into stainless steel. The useage of stainless steel, so the nickel, in the automobile sector is huge. Traditional automobile sector manufactures require stainless steel metal for their products. Furthermore, the demand for nickel increased with the new electric cars using batteries.

The rising demand for EVs in 2025 is expected to drive a significant increase in nickel prices—potentially up to 1000%—unveiling both economic opportunities and challenges for nickel-producing countries. The complementary relationship between batteries and nickel demand is estimated to increase the contribution to the GDP of nickel supplying countries. However, there is a notable disparity in the economic benefits between nations with large nickel reserves, such as Indonesia and Australia, and EV-manufacturing powerhouses like China. This underscores the urgent need for strategic policy reforms in nickel-supplying countries. This paper analyses the impact of the transition to lithium batteries on fossil energy sources and tries to find an answer to an important question “will the countries with the largest nickel stock become the new energy leaders”.

Keywords: Nickel, Lithium Batteries, Electronic Vehicles

The Role of Innovation in Determining Cost and Risk in Renewable Energy Portfolios: A Mean-Variance Perspective

Volkan Alacam, Energy Market Regulatory Authority, Türkiye
Mehmet Baha Karan, Hacettepe University, Türkiye

The aim of this study is to examine how optimal renewable energy portfolios are affected by cost and risk profiles under various innovation scenarios in the context of renewable energy production. The research utilizes publicly available data from the National Renewable Energy Laboratory (NREL), which operates under the supervision of the U.S. Department of Energy (DOE), and applies the Mean-Variance Approach of Modern Portfolio Theory to this data. The findings suggest that different levels of innovation projected between 2030 and 2050 could lead to varying impacts on cost and risk distribution within optimal renewable energy portfolios. Furthermore, it is anticipated that certain renewable technologies will hold a larger share within these optimal portfolios. Throughout all scenarios, a significant reduction in the expected risk-to-cost ratio of the portfolio is forecasted, indicating that more risk can be mitigated for each unit of cost, thus enabling more effective risk management. This study provides guidance to policymakers on implementing energy production policies that promote renewable resources and emphasizes the importance of innovation in renewable energy production technologies.

Keywords: Renewable Energy, Innovation, Mean-Variance Approach, Energy Production Portfolio

Analyzing Energy Transition: Cost and Risk Implications in Various Innovation Scenarios Using Mean-Variance Approach of Modern Portfolio Theory

Volkan Alacam, Energy Market Regulatory Authority, Türkiye
Mehmet Baha Karan, Hacettepe University, Türkiye

This study aims to address the transition to sustainable energy systems and underscore the pivotal role of technological innovation in facilitating a successful energy transition. Specifically, it will analyze the impact of energy transitions on the cost and risk profiles of optimal energy generation portfolios across various innovation scenarios. The study employs the Mean-Variance approach of the Modern Portfolio theory. It uses the data from the National Renewable Energy Laboratory (NREL), funded and supervised by the US Department of Energy (DOE). The results indicate that diversified optimal energy portfolios with more renewable energy can be achieved in the period 2030-2050. Moreover, in optimal portfolios, coal and natural gas power plant technologies will generally be replaced by bioenergy technologies in the future. In addition, the ratio of expected risk to portfolio cost decreases in the period 2030-2050 in all scenarios, and it reveals more risk reduction per unit of cost. This study guides how governments should implement a policy in energy production, taking into account future innovations towards greater reliance on renewable sources for both environmental imperatives to mitigate climate change and geopolitical energy security concerns on a global scale.

Keywords: Energy Transition, Innovation, Energy Generation Portfolio, Modern Portfolio Theory, Mean-Variance Approach

(Dis)incentives for Entrepreneurs to Invest in Carbon Capture and Storage under EU Regulation

Marcus R.C. de Groot, University of Groningen, The Netherlands

Edwin Woerdman, University of Groningen, The Netherlands

Carbon Capture and Storage (CCS) is on the rise. The International Energy Agency (IEA) calculated that CCS is expected to capture up to 220 megaton of CO₂ per year by 2030. Nevertheless, by 2050 around 7600 megaton of CO₂ per year needs to be captured and stored for the world to reach net zero carbon emissions. Private investment in CCS therefore needs to increase sharply, but various regulatory barriers stand in the way. In the EU, legal issues for entrepreneurs appear to be most present in the assessment of leakage risks, the significant period of time before responsibility can be transferred to the state, and the possibility for different legal regimes to develop across Member States. Additionally, there may be a gap between the cost of CCS and the price of emission allowances. This financial gap could be solved by further strengthening the EU Emissions Trading System (ETS) and by providing some additional subsidies to CCS projects. The chapter also suggests amendments to the procedures for assessing leakage risks as well as to the procedure for transfer of responsibility, while harmonised models for leakage risk calculations could help to further increase private sector interest in CCS development.

Keywords: Carbon Capture and Storage, EU law, regulatory barriers, investment incentives, legal reform options.

The Role of Inclusive Institutions in the Development of Financial Markets in Europe

Mehmet Baha Karan, Hacettepe University, Türkiye

The markets of the Abbasid (750–1258) and Fatimid (909–1171) periods were thriving economic centers supported by strong institutions that fostered trade and financial innovation. However, from the late Middle Ages onward, European markets evolved, driven by inclusive institutions, legal frameworks, and the rise of capitalism. The Silk Road's decline and trade routes' shifts contributed to the stagnation of Middle Eastern markets, but institutional rigidity played a critical role. In contrast, European cities like Bruges, Antwerp, Amsterdam, and London developed legal and financial systems that promoted trust, contract enforcement, and investment, enabling sustained economic growth. Merchant guilds, notarial systems, and banking institutions ensured market efficiency and inclusivity. Meanwhile, Middle Eastern economies remained under centralized political control, limiting institutional adaptability. The Ottoman Empire's inability to modernize its economic institutions further widened the gap. Ultimately, inclusive institutions in the West fostered long-term economic success, while institutional constraints hindered Middle Eastern development.

Keywords: History of Finance, inclusive institutions, financial development,.

Is digitalization leading to CO2 emission cutting?

Robin van Emous, Kaunas University of Technology, Lithuania

Rytis Krušinskas, Kaunas University of Technology, Lithuania

This paper aims to contribute to the main research question whether digitalization can be used to mitigate CO2 emissions. One of the main challenges in capturing the effect of digitalization on carbon lies within the measurement of digitalization and identifying the different impacts of different digitalization measurement on the environment. To overcome this challenge we use six proxies to measure digitalization that represent the dynamics of the ICT sector; relative size, relative business expenditures of R&D in the ICT sector and the relative import and export of ICT goods and relative digital capital. We perform OLS regression on a sample covering 26 EU countries during the time period 2003- 2020. Our main results provide answering to whether digitalization can be used to reduce carbon emissions on the country level in the EU. Our results show that the relative size of the ICT sector, and expenditures in R&D in the ICT sector has a neutral impact on the country's carbon emissions. An increase in ICT import of goods and ICT export of goods as a ratio of the overall country's imports and exports, on the other hand, could lead to an increase in carbon emissions. Our results provide no evidence for a relationship between digital capital and carbon emissions. To add statistical robustness to our results we performed quantile panel regression, those results show for all digitalization factors a weakening trend for all coefficients indicating that the effect of digitalization is weaker in higher emitting countries. Our main results shows that the relationship between digitalization and carbon emissions differs heavily among various measurements.

Challenges and Opportunities for Midstream Natural Gas Companies in the European Union Amid the Energy Transition

İzzet Arı, Social Sciences University of Ankara, Türkiye

Numan Fahri Sağlam, Social Sciences University of Ankara, Türkiye

The global energy transition, driven by the urgency to reduce carbon emissions and integrate renewable energy sources, has profound implications for midstream natural gas companies. These entities, responsible for transportation, storage, and wholesale marketing of natural gas, play a pivotal role in energy security. However, as the European Union (EU) pursues ambitious climate goals under the European Green Deal (EGD), including a 55% reduction in carbon emissions by 2030 and net-zero emissions by 2050, the role of natural gas as a transitional fuel is increasingly under scrutiny. This study examines the impact of the energy transition on midstream natural gas companies within the EU, focusing on policy shifts, market dynamics, technological advancements, and financial viability. An analysis across different EU countries midstream companies assesses how diverse regulatory frameworks influence midstream operations and investment decisions. Utilizing a qualitative research approach, the study draws insights from official EU documents, national energy policies, market reports, and case studies of representative midstream companies. Key themes include the adaptation strategies of midstream companies, challenges posed by declining natural gas demand, competition with renewables, and the integration of alternative fuels like hydrogen. Findings indicate that while midstream natural gas companies face operational and financial uncertainties, strategic adaptation—such as infrastructure repurposing, digitalization, and investment in low-carbon technologies—can enhance their resilience. The study contributes to the existing literature by addressing the underexplored midstream sector and offering policy recommendations to facilitate a balanced transition. The research underscores the necessity for regulatory clarity, technological innovation, and market adaptability to ensure the sustainable evolution of midstream natural gas infrastructure within the EU's decarbonization agenda.

Keywords: Energy Transition, Midstream Natural Gas Companies, European Green Deal, Alternative Energy, Decarbonization

The Opportunities and Challenges of Digital Technologies in Energy Systems to Reduce GHG Emissions

Tuğba Dinçbaş, Ministry of Environment, Türkiye

Azize Ergeneli, Hacettepe University, Türkiye

Aslı Kuzu, Hacettepe University, Türkiye

Doğan Çelik, Van Yuzuncu Yıl University, Türkiye

Given the global climate crisis, the survival of all living creatures is at stake. As the devastating effects of climate change became apparent, people swiftly began seeking solutions to secure their future and preserve their existence. A key priority in addressing this crisis is the rapid transition away from fossil fuels in energy systems towards renewable energy sources and enhancing energy system efficiency. Reports from international organizations and researchers underscore the pressing need to adopt specific renewable energy sources, such as solar and wind power, instead of fossil fuels in energy systems. They also underscore the crucial role of digital technologies, like smart grids and IoT devices, in ensuring energy efficiency and control to curb greenhouse gas emissions. Therefore, digital technologies play a significant role in meeting the 1.5oC limit target for reducing greenhouse gas emissions.

Emphasizing the necessity of using these digital technologies in energy systems by highlighting their impact on reducing greenhouse gas emissions causes digital technologies to be the leading actor in solving the global climate crisis. On the other hand, studies show that these digital technologies have more challenges than expected, such as cybersecurity risks and the need for a skilled workforce. However, overcoming these challenges can bring significant benefits, such as improved energy efficiency and reduced environmental impact. For instance, smart grids can optimize energy distribution, reducing waste and emissions, while IoT devices can provide real-time data for better energy management. However, these studies, which are few, do not attract enough attention. Being aware that digital technologies in energy systems provide challenges and opportunities will lead to more rational investments in digital technologies. This underscores the importance of strategic planning and decision-making in the field. Therefore, it seems necessary to review articles that evaluate the opportunities and challenges provided by these specific digital technologies in energy systems to potentially influence future policies and strategies in climate change and energy systems, guiding more effective and sustainable solutions. For this reason, 21 current studies examined and determined that challenges should be taken seriously in addition to the opportunities provided by digital technologies.

Comprehensive Analysis of Financial Risk Management and Hedging Strategies in Energy Markets: The Case of Turkey

Kartal Somuncu, Afyon Kocatepe University, Türkiye

This study aims to systematically analyze the spillover effects of electricity and natural gas price volatility in Turkey's energy markets on financial markets, the effectiveness of risk management strategies, and their relationship with macroeconomic dynamics. The primary motivation of this research is to reveal the causal relationship between energy companies' stock returns and energy prices, thereby providing data-driven arguments to regulators for policy formulation and optimizing companies' hedging mechanisms. The theoretical framework is built on methodological diversity aligned with international literature and the integrated use of local data sources. However, the energy markets' exposure to exogenous shocks (geopolitical risks, global energy crises) and temporal inconsistencies in certain data series emerge as critical factors requiring careful handling. In this context, the study's most significant contribution lies in its potential to illuminate the critical link between energy security and financial stability.

The dataset covers the period from January 1, 2020, to December 31, 2024, including monthly EPIAŞ Electricity Market Clearing Prices (PTF), stock performance of energy companies listed on Borsa Istanbul, and macroeconomic indicators from the CBRT/TurkStat. However, low trading volumes of energy derivatives on VIOP and discontinuities in some corporate data may limit the analysis scope. In econometric modeling, ARCH/GARCH models were preferred to measure price volatility, while the VECM approach was employed to identify causality relationships. This methodological choice offers advantages in capturing volatility clustering and long-term equilibrium relationships observed in energy markets. Nevertheless, the high sensitivity of model parameters and potential structural breaks pose technical challenges requiring cautious interpretation of results.

Findings indicate that a 1% increase in energy prices leads to heightened volatility in energy stock returns, with Granger causality operating unidirectionally (energy prices → stock returns). These results suggest that the effectiveness of current hedging strategies varies between 40-60% across sectors and highlight optimization opportunities, particularly in natural gas market hedging costs. The study's most significant potential contribution is its capacity to develop risk-mapping matrices for policymakers within the energy-economy-finance nexus. However, sudden exchange rate fluctuations and structural issues in energy supply security are identified as external threats that may affect the long-term validity of findings. In conclusion, the research provides both a methodological framework for academic literature and proposes strategies to enhance financial resilience for sectoral actors. However, due to the dynamic nature of market forces, findings will require periodic updates to remain relevant.

Keywords: Energy Price Volatility, Financial Market Interactions, Risk Management Strategies, Granger Causality Analysis, Macroeconomic Dynamics.

Application of Artificial Intelligence in Sustainable Energy: A Case Study on the World's Leading Energy Producers

Andreann. W. Ndebu, Mount Kenya University, Kenya
Bonface. G. Mukabane, Nairobi Technical Training Institute, Kenya

Energy was first introduced into the world by Thomas Young in 1800, it has since been an evolving concept, marked by significant energy transitions over the last 200 years. Various events have powered the influence of energy transition; The very first transition was experienced in the 1800s during the Industrial Revolution, in the twenty-first century, the transition is influenced by climate change. The world lacks a safe, low-carbon, and cheap large-scale energy infrastructure. Until we scale up to such an energy infrastructure, the world will continue to face two energy problems: hundreds of millions of people lack access to sufficient energy, and the dominance of fossil fuels in our energy system drives climate change and other health impacts such as air pollution (Hannah Ritchie et al., 2024). The increase in the global demand for sustainable energy has forced energy producers to result in innovative technology. Artificial Intelligence is the new evolution in technology. According to an article written by Google Cloud, Artificial Intelligence is a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand and translate spoken and written language, analyze data, make recommendations, and more. Artificial Intelligence, commonly referred to as AI, is currently the greatest technological phenomenon that seems to be influencing our everyday lives. AI seems to be well integrated with major sectors in most countries' economies; however, we can not ignore the role of energy in those economies. So as to increase the output in energy, countries such as Denmark, are turning to renewable energy sources, such as wind. According to World Resource Institute 2024, Government policy has been the driving force behind wind power growth. After many decades of experimentation, Denmark began developing its wind industry in earnest in the 1970s to boost energy security in response to the oil crisis. The government introduced wind power subsidies including a feed-in tariff, which guarantees that wind power producers receive a fixed, above-market price for the electricity they produce. It promoted community ownership of wind turbines, which helped increase public support for wind power for several decades. This study focused on the role of Artificial Intelligence in energy sustainability. Drawing examples of current practices by leading global energy producers and how they leverage the use of Artificial Intelligence to increase the supply of energy, for it to meet its growing demand. The study aimed to provide knowledge on how Artificial Intelligence is being integrated into sustainable energy production, look at opportunities yet to be explored, challenges being experienced and the expected future of Artificial Intelligence especially in sustainable energy production. The research looked at; The use of artificial intelligence in the production of renewable energy and nuclear energy, The influence of Artificial Intelligence worldwide and the future of Artificial Intelligence and energy. Qualitative and quantitative data analysis methods were used in this research—use of case studies of companies and countries that are leading in energy production. To understand how Artificial Intelligence is being used in energy storage, energy production and grid management. Information had been obtained from secondary sources; such as previous work done by other researchers. Primary information obtained from conducting interviews with staff in leading energy companies and economies was used to provide more insight into the topic. The information obtained was presented in the form of thematic and statistical analysis. The findings of this research emphasized the ability of Artificial Intelligence to bridge the gap between sustainable production of energy to meet global demand and environmental conservation. Artificial

Intelligence can provide. AI is becoming a key enabler of a complex, new and data-related energy industry, providing a key magic tool to increase operational performance and efficiency in an increasingly cut-throat environment (Ahmad, T., Zhang et al., 2021). This research provided a roadmap for current and future policymakers, world leaders in energy, and other stakeholders to leverage the use of Artificial Intelligence to achieve a more sustainable future in energy.

Keywords: Artificial Intelligence, Sustainable Energy, Energy Transition, Renewable Energy, Energy Efficiency

Does ESG Affect Bank Risk?

Abol Jalilvand, Loyola University Chicago, USA

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 (Beyhaghi et al, 2019). This study focuses on the joint and separate effects of Environmental (E), Social (S), and Governance (G) scores on bank risk captured both by cost of capital and enterprise-wide risk scores published by S&P Global Market Intelligence (Sadok, et al (2011); Marian Avoae, et al (2023)). 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) higher ESG score banks are exposed to lower levels of enterprise-wide risk. We contend that high ESG score banks 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 are in twofold. First, unlike previous studies, the focus on cost of capital and enterprise risk level captures the crucial interactions between ESG investment and firm decisions resulting from market imperfections and regulations (Jalilvand and Moorthy (2022)). 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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Slack Resources, Innovation and Growth: Evidence from the US Energy Sector

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Recent studies show that the US energy sector's investment (particularly by the private sector) in technology development and innovation has been declining, lagging behind other sectors in the economy, and mainly focused on the fossil fuel-based areas related to the needs of the oil and gas industry. In this paper, we offer new insights on whether the U.S. energy sector should be deployed to support core efficiencies. Their findings show that adaptive firms tend to follow the resources and investment matching principle over time to strike the right balance between the need to enhance efficiency vs. strengthening future viability through innovation and breakthrough technological development. JK's (2012) approach has direct relevance to examine the dynamics of R&D investment in the US energy sector during the past several decades. Specifically, it will help unravel the question on whether US energy firms have optimally managed the relationship between their overall slack resources and investment strategies by simultaneously investing in core efficiencies and future exploration. It should further provide policy makers with a more comprehensive perspective on the dynamics underlying the energy sector's overall investment in innovation and technological development. In this paper, we examine the firm-specific dynamics of innovation in the US energy sector. We further compare the energy sector's innovation profile with those of several other technology-intensive sectors in the economy. BCG's sample provides a unique opportunity to verify the relevance of Jalilvand and Kim (2012) propositions for a group of "adaptive" firms who have outperformed their industries during several consecutive recent periods of turbulence. Thus, our results may support a joint hypothesis encompassing both the relevance of Jalilvand and Kim (2012) theoretical predictions vs. the validity of the BCG's approach in identifying adaptive firms. We also call for the development of more robust and dynamic econometric models of a firm's slack resources and investment strategies under changing environments.

Opportunities and Barriers to Financialization of the Energy Storage Investments in Türkiye

A qualitative study investigating the factors driving energy storage investments in Türkiye

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The 2015 Paris Agreement on Climate Change calls for a sharp reduction in global fossil CO₂ emissions to keep the global average temperature rise in this century below 2°C compared to the pre-industrial level for developed countries. Reaching such ambitious decarbonization targets, called deep decarbonization, will require profound structural changes for regional and national energy systems (1). Decarbonization of power systems typically involves two strategies: (i) improving the energy efficiency of the existing system, and (ii) replacing carbon-intensive energy generation with low- or zero-carbon generation sources such as renewables, nuclear or power plants with carbon capture and storage. However, the critical challenge of integrating renewables into the power system is to balance the supply and demand in the presence of variable power generation from renewables. Unlike in fuel-based power plants, where a controllable factor, such as the amount of fuel provided to the plant, dictates the electricity output, in renewable energy power plants, variable factors like sunlight and wind speed determine the electricity generation (2). This problem can be addressed using energy storage systems (ESSs) to balance power supply and demand continuously (3). While energy storage has obvious benefits, key challenges affect the widespread deployment of these systems. These challenges could be economic (in terms of achieving cost), technological (in terms of scale and effectiveness) (4), infrastructural, legislative, and firm/sector-specific. Based on this context, the study will provide an overview of the perspectives on how energy storage investment decisions are taken. The study aims to gain insights into barriers and opportunities for the deployment of energy storage, to investigate the factors driving energy storage investments, and the uncertainties and expectations from the viewpoint of experts working directly or indirectly in the field of energy storage. This way, expert opinions will be compiled regarding the factors affecting or supporting/limiting the ESS investments. Furthermore, the study will collect data on the capital budgeting practices of the energy sector companies, focusing on accurate options analysis. Most studies on the profitability and economic feasibility of the ESSs use the net present value (NPV) approach. Although it is the most commonly used approach, this deterministic type of analysis does not consider the uncertainties regarding ESSs and the investor's flexibility to deal with them. The increased uncertainty of the profits due to long project lifetimes, the irreversibility of the investments and the opportunity to wait for more information make the NPV inadequate for energy sector investments. For such investments, the real options approach is a better choice (5) because the real options approach is a powerful tool to reflect managerial flexibility in projects with high uncertainty (6). Questions on capital budgeting processes are included in the research in order to assess whether Turkish energy companies' current practices conform to finance theory.

To this end, the main research questions of the study have been formulated as follows:

1. *What are the opportunities and barriers for deployment of ESSs in Türkiye?*
2. *What are the factors affecting ESS investment decisions, and how do the investors evaluate ESS investments?*

The study will focus on the electricity market since energy storage is primarily linked to the electricity market. The geographic area of the study will be limited to Türkiye. Although the geographic area is limited to Türkiye, results are expected to be representative of other emerging economies as well and help to fill a gap in the literature in terms of location due to the high concentration of the related studies in Europe, the USA, and China (7). Türkiye is Europe's sixth and the world's 14th largest electricity market, with an electric power generation capacity of approximately 105 GW (8). Electricity storage in Türkiye is regulated by the Energy Regulatory Authority (EMRA) based on the "Regulation on Storage Activities in the Electricity Market" dated May 9, 2021 (9). Starting in November 2022, EMRA will accept pre-license applications for electricity storage facilities. According to the legislation, electricity storage facilities could be installed as independent facilities, facilities integrated into a production plant, facilities integrated into a consumption facility, and facilities installed by a grid operator. As of June 2023, storage capacity applications exceeded 275 GW, and around 270 pre-licenses have been issued by EMRA, with most of the electricity storage facilities being integrated into renewable power plants (10). The research method for this study is based on the researchers' current knowledge and perception of reality (11).

The focus of the study is to compile expert opinions on the further deployment of investment decisions for ESSs. Thus, primary data sources are the perspectives, expertise, approaches, and statements of the professionals in the energy sector regarding the use, further deployment and financing of ESSs. The qualitative data enabling such information can be collected via the interview method as stated in Patton, 2002 (12): "Open-ended questions yield in-depth responses about people's experiences, perceptions, opinions, feelings, and knowledge". For this purpose, the study uses semi-structured interviews to collect data. This interview method is helpful because it enables us to put all these experiences, perspectives and approaches into their cultural and social context (13) and allows us to see the whole picture through the eyes of critical actors. In addition, this interview method is the most appropriate method among the four types of interviewing strategies suggested by Silverman, 2006 (14), which are structured interviews, semi-structured interviews, open-ended interviews and focus group study, for the study to reach the target audience. Thus, in our field research, semi-structured interviews allow us to examine the topic in detail and from the eyes of experts.

The research will be in the form of an exploratory study, and the primary research method for this study is qualitative data collected through interviews and surveys with key experts in the field of energy storage. The interview form has five sections with 27 open-ended and multiple-choice questions built on the studies "Market and Policy Barriers to Energy Storage Deployment" (Sandia, 2013) (15), "The Use of Real Options Theory in Scandinavia's Largest Companies" (Horn et al., 2015) (16), and "Management Views on Real Options in Capital Budgeting" (Baker et al., 2011) (17) in the literature. The first section of the interview form contains introduction/warm-up questions about the respondents' background, including their education and expertise. We also ask questions about the institution's activity area, whether they are in the consumption, production, or both sides, and whether they plan to invest in ESSs. The second section asks about respondent's perceptions of the role of the ESSs in the energy sector and the benefits these systems provide. The third section requests respondents to choose the opportunities for and barriers against the extensive deployment of storage systems from multiple choices and then asks open-ended questions about their opinions for removing those barriers. The following section asks the respondents about their perceptions of the primary source of uncertainty and their expectations regarding the future development of ESSs. The fifth section consists of questions on investment decisions and

capital budgeting practices. The first part of the section aims to reveal the factors considered when an investment decision is appraised and which capital budgeting techniques are used in this appraisal process. The second part of the section asks whether the company is using a real options approach as a capital budgeting technique.

The targeted interviewees are selected from the group of:

1. Actors involved in the energy sector with a focus on renewables.
2. Actors engaged in activities related to ESSs.
3. Actors who are potential or current users of ESSs.
4. Energy storage-related associations.
5. Researchers in the field of storage systems.

The sampling strategy is a combination of purposeful sampling and snowball sampling (12). All the participants received a personally addressed e-mail with a cover text with the questionnaire attached requesting participation in this study via an online interview. The e-mails started to be sent in the first half of December 2023. Our initial sample comprises 21 participants from companies, non-profit institutions and academia. The questions on capital budgeting will be directed to a senior financial officer in the company whenever the respondent needs more knowledge about the investment decision process. To reduce the non-response rate, we send reminders to those who have yet to reply, keep the interview form short and assure the interviewees that their responses will be confidential.

By interviewing different actors and trying to represent all the groups engaged in the ESSs landscape, this research will observe perceptions and positioning about ESSs from diverse angles and identify the factors driving energy storage investments. The study will first take a comprehensive picture of the current state in Türkiye regarding the use, potential, and challenges for ESSs from the viewpoint of suppliers, users and academicians. This will provide valuable information to identify the opportunities supporting and barriers hindering the extensive deployment of ESSs in Türkiye. It will also collect information about the expectations of the key actors and their perceptions about the uncertainties regarding the future development of ESSs and the electricity market. Then, the study will answer, "What are the factors being considered when companies evaluate an ESS investment decision?". The study will collect information on the capital budgeting processes applied in practice to understand the investment evaluation process further. In addition, the real-world applicability of the fundamental options approach, gaining popularity in energy literature, will be assessed.

In summary, this study will contribute to the literature by providing a multidimensional perspective and producing rich-quality data regarding the perceptions, uncertainties and expectations of the key Turkish actors from which quantitative models analyzing the economics of ESSs can benefit.

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Sustainable City Index and Financial Performance: Economic Valuation of Urban Sustainability

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Sustainability of cities contributes to long-term prosperity and resilience by addressing environmental, social and economic dimensions. Sustainable cities not only reduce environmental impacts but also contribute to economic growth and financial stability. In this context, the interplay between urban sustainability policies and financial performance is an area of growing scholarly research and represents a crucial domain of assessment for local governments, investors, and policymakers. In the existing literature, there are various indices that measure the sustainability levels of cities. These indices analyze urban development through indicators such as environmental efficiency, energy consumption, infrastructure sustainability and social welfare. Measurement frameworks, such as the Sustainable City Index, serve as essential instruments for evaluating the impact of sustainable urban practices on financial performance. These indices have direct impacts on the capacity of cities to attract investment, changes in real estate market values and budget management of local governments. This study will conduct a literature review on the relationship between sustainable cities and financial performance. Specifically, it will analyze the impact of sustainability indices on investment decisions, municipal budgets, and Environmental, Social, and Governance (ESG) criteria. Through a systematic literature review, the study will examine the potential of sustainable urban practices to generate long-term economic value and their effects on financial sustainability. By providing a comprehensive framework on the economic dimension of sustainable urban policies, the study aims to offer data-driven insights for investors and policymakers. Additionally, as a broader contribution, it seeks to present concrete indicators of the long-term financial impacts of urban sustainability investments, thereby supporting strategic planning processes for decision-makers.

Keywords: Sustainable City Index, Financial Performance, ESG (Environmental, Social, and Governance), systemic literature review.

The Role of UTTS in Digital Auditing and Combating the Informal Economy in the Fuel Market

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The informal economy within the fuel market presents substantial challenges to governmental revenue generation, regulatory enforcement, and overall market stability. Illicit activities such as fuel smuggling, tax evasion, and unauthorized sales not only result in significant financial losses for governments but also create distortions in competition, undermining fair market conditions. These challenges necessitate innovative technological solutions that enhance oversight, ensure compliance, and promote financial transparency.

In this context, the "National Vehicle Identification System (UTTS)" serves a crucial function in auditing processes by implementing advancements in cybersecurity, data management, and financial oversight. As a digital monitoring tool, UTTS facilitates real-time tracking of fuel transactions, enabling regulatory authorities to detect and prevent fraudulent activities. By leveraging big data analytics and automated reporting, UTTS significantly enhances the capacity of governmental institutions to monitor fuel consumption patterns and identify irregularities. This system not only strengthens financial oversight but also supports policymakers in designing more effective regulatory frameworks that discourage illicit activities within the sector.

This study examines the efficacy of UTTS in mitigating smuggling and unregistered sales, evaluating its broader contribution to the digitalization of regulatory mechanisms. By integrating UTTS into national fuel monitoring infrastructures, authorities can ensure greater accountability among fuel retailers, distributors, and consumers. Additionally, by creating a centralized and tamper-resistant database, the system enhances compliance enforcement while minimizing the risk of data manipulation. Such measures contribute to a more transparent and equitable market structure, fostering greater trust among industry stakeholders.

Beyond its immediate impact on combating illegal activities, UTTS plays a pivotal role in shaping the long-term economic implications of digitalization in the energy sector. Enhanced financial traceability ensures that tax revenues are accurately collected, reducing the fiscal burden on governments and allowing for reinvestment into sustainable energy policies and infrastructure development. Furthermore, as regulatory compliance increases, businesses operating within the sector experience greater predictability and stability, which encourages further investments in innovation and efficiency improvements.

The implementation of UTTS also has broader socioeconomic benefits. By reducing opportunities for illegal fuel sales and smuggling, the system fosters greater consumer protection by ensuring that fuel quality and pricing adhere to regulatory standards. Additionally, by curbing revenue losses from tax evasion, governments can allocate greater resources toward public services, infrastructure projects, and economic development initiatives.

Overall, the findings of this study aim to elucidate how digitalization has emerged as an effective instrument in addressing the informal economy within the energy sector. By reinforcing compliance, promoting financial transparency, and supporting long-term market efficiency, UTTS represents a cornerstone in modernizing regulatory approaches and ensuring the sustainability of fuel markets in the digital age.

Keywords: UTTS, Digital Auditing, Fuel Market, Informal Economy, Cybersecurity, Energy Markets

Türkiye's Sustainable Energy Strategy: Risks and Opportunities After the Russia-Ukraine War

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The Russia-Ukraine war has significantly changed global energy markets, forcing countries to rethink their energy policies and speed up the shift to sustainable energy. As disruptions in fossil fuel supply, rising prices, and geopolitical tensions create new challenges for energy security, Türkiye has also had to adjust its energy strategy. This study looks at the risks and opportunities in Türkiye's sustainable energy plans after the war, focusing on key areas such as growing renewable energy, ensuring energy security, and strengthening connections with international energy markets.

The research employs a mixed-methods approach to provide a comprehensive analysis of Türkiye's sustainable energy strategy in response to the war. The quantitative component includes a statistical assessment of Türkiye's renewable energy capacity additions, investment trends, and shifts in the energy mix since the outbreak of the conflict. Data from national and international energy agencies, including the Turkish Ministry of Energy and Natural Resources, the International Energy Agency (IEA), and Eurostat, are used to evaluate the extent of Türkiye's energy transition. The qualitative component consists of a content analysis of key policy documents published since 2022, primarily Türkiye's National Energy Plans. These documents are examined to assess shifts in energy policy, regulatory adjustments, and Türkiye's alignment with global energy transition trends. Additionally, expert interviews with energy analysts and industry representatives provide insights into how Türkiye's energy strategy is evolving in response to financial risks, geopolitical uncertainties, and technological advancements.

This study aims to analyze how Türkiye has navigated the challenges and opportunities emerging from the crisis. It will focus on renewable energy investments and examine how policy updates and international cooperation have influenced energy diversification. Additionally, it will assess the impacts of challenges, such as rising capital costs, inflation, and regional supply chain disruptions on the implementation of large-scale renewable projects. The study will also explore Türkiye's evolving role and emerging opportunities in the regional energy landscape, including its strategies to expand LNG imports, diversify natural gas supply sources, and position itself as an energy hub between Europe and Asia. Furthermore, it will assess Türkiye's alignment with EU Green Deal policies, and policy efforts to enhance energy storage, hydrogen investments, and grid modernization for better renewable integration.

This study contributes to the broader discourse on energy security and sustainability by providing an in-depth analysis of how external geopolitical shocks influence national energy strategies. It also offers policy recommendations to mitigate risks and maximize the opportunities for a more resilient and sustainable energy future in Türkiye.

Keywords: Sustainable energy strategy, renewable energy, energy security, Türkiye, Russia-Ukraine war, risks and opportunities, policy response.

Measuring Financial and Sustainability Literacy Among Individuals and Firms in Türkiye

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As the global transition toward a low-carbon and sustainable economy accelerates, financial markets are increasingly integrating sustainability principles into investment and lending decisions. However, the level of financial and sustainability literacy among individuals and firms remains a critical factor influencing the adoption of sustainable financial instruments. In Türkiye, awareness and utilization of mechanisms such as green bonds, sustainability-linked loans, ESG investments, and carbon credit markets are still in their early stages. This study assesses the financial and sustainability literacy of both individuals and firms in Türkiye, focusing on their knowledge, awareness, and engagement with green finance tools.

Despite Türkiye's growing commitment to climate action and sustainable economic policies, several challenges hinder the effective adoption of green financial instruments. These include low financial literacy, regulatory uncertainties, limited market trust, and restricted access to sustainable financial products. A key development shaping the future of green finance in Türkiye is the upcoming Turkish Climate Law, which aims to align national policies with the European Green Deal, introduce carbon pricing mechanisms, and incentivize sustainable investment practices. Understanding how regulatory frameworks, financial institutions, and policy incentives influence the uptake of green finance is crucial for fostering a more inclusive and transparent financial ecosystem.

This study provides policy recommendations to enhance financial and sustainability literacy, improve institutional frameworks, and increase accessibility to green financial instruments. By identifying key obstacles and enablers, the research contributes to Türkiye's broader climate and financial policy objectives, ensuring that green finance becomes a more effective tool in the country's sustainable transition. Ultimately, the study highlights the necessity of strengthening financial education, regulatory clarity, and market confidence to facilitate the integration of sustainability into financial decision-making at both individual and corporate levels.

Keywords: Financial literacy, sustainability literacy, green finance, ESG investment, sustainable investment, green bonds, climate finance, energy transition, sustainable development.

Determinants of ignorance of system risk in cryptocurrency markets

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This study investigates the determinants of ignorance regarding systemic risk in cryptocurrency markets, focusing on how economic knowledge influences individual perceptions and attitudes toward risk. Drawing on a comparative analysis of traditional fiat currencies and cryptocurrencies, we examine their core economic functions, characteristics, and institutional frameworks. The research contrasts the roles of money as a medium of exchange, store of value, and unit of account, and explores motivations for holding money per Keynesian theory. Using data collected from students in Wrocław and Opole, Poland—across economics and non-economics backgrounds, including both Polish and Ukrainian respondents—we analyze awareness and understanding of system-level threats such as regulatory crackdowns, cyberattacks, technological disruptions, and macroeconomic instability. Hypotheses tested include the correlation between economic knowledge and risk aversion, particularly toward systemic threats. Our findings suggest that limited economic literacy contributes significantly to the underestimation of cryptocurrency-related systemic risks. Additionally, we explore how the unique characteristics of digital currencies—such as decentralization, limited governance, and technological dependencies—further complicate risk perception. The paper concludes by emphasizing the importance of economic education in equipping users to critically assess the sustainability and reliability of emerging financial instruments.

The role of probability amplifiers in E-governance solutions - the example of E-delivery

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This study explores the role of probability amplifiers in enhancing E-governance solutions, with a particular focus on the E-delivery of public services. The research investigates organizational readiness and the extent to which institutional and systemic risks are acknowledged during implementation. Special attention is given to probability amplifiers—factors or conditions that can increase the likelihood of failure, such as insufficient digital infrastructure, unclear accountability, lack of inter-agency coordination, or functional stupidity.. These amplifiers are examined in the context of E-delivery, where citizens’ perceptions of safety and trust in government institutions are crucial. By assessing these dynamics, the study aims to develop a profile of governmental preparedness and propose a benchmarking framework to evaluate and compare institutional readiness for secure and effective E-governance deployment.

Sokrates benchmarking in socio-economic research

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This paper presents the conceptual and methodological foundations of Sokrates Benchmarking, a novel feature embedded within the Sokrates Forms platform, aimed at advancing socio-economic research and education. By integrating dynamic, real-time benchmarking functionalities into a secure and adaptive survey environment, Sokrates Forms enables researchers to assess and compare stakeholder perceptions across time, sectors, and regions—without compromising respondent anonymity.

The benchmarking tool is especially suited for tracking the evolution of system risk perception among individuals and organizations. Grounded in a robust methodological framework, it allows for the identification of cognitive and structural vulnerabilities, drawing on theories such as the Pareto Principle, Functional Stupidity, and Black Swan events. Respondent data is analyzed against aggregated peer group responses, enabling participants to receive personalized feedback contextualized within broader benchmarks. These benchmarks can be configured based on socio-economic categories, organizational characteristics, or longitudinal datasets, creating a dynamic landscape for comparative analysis.

The article outlines the architecture of the Sokrates benchmarking system, including the anonymized identifier protocol, adaptive survey paths, and real-time feedback generation. It also discusses methodological considerations such as survey burden, data validation, and bias mitigation, which are critical for producing high-quality, actionable insights.

Sokrates Benchmarking holds particular promise for applications in sustainable development research and education. It empowers decision-makers, educators, and stakeholders with tools to diagnose systemic fragilities, monitor shifts in awareness, and foster informed dialogue on long-term resilience. By aligning research outputs with stakeholder learning and self-assessment, Sokrates Forms strengthens the social impact of scientific inquiry and contributes to building more adaptive and aware societies.

Towards Climate Neutrality: Smart Solutions for Low-Carbon E-commerce Operations

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In response to cap-and-trade policies, stakeholder pressures, and business aspirations, reducing carbon emissions has become crucial for optimizing corporate operations. Yet, Accenture's report shows that only 10% of companies manage their supply chain carbon footprint. Concurrently, the e-commerce sector is booming, leading to significant environmental impacts, incl. increased greenhouse gas emissions compared to traditional operations (although varying by product type and e-commerce form). Solutions are sought for trade-offs involving time, cost, quality, and emissions in e-commerce. Our study posits that accurately measuring the carbon footprint of operations is essential for developing new technologies and decision models to reduce e-commerce emissions. One method involves converting the energy used for data transmission between an online store and a customer into a carbon dioxide equivalent. This paper analyzes the carbon footprint of top international e-shops, identifies key differences by product and e-commerce form, and suggests improvements. The research uses methods akin to online carbon footprint calculators, offering a general estimate of a website's carbon impact despite simplifications. While the algorithm has limitations, these highlight areas for enhancement that could significantly improve calculation accuracy.

Regional inequality in Poland: the EU effect

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This study investigates regional productivity disparities in Poland at the NUTS-3 level. Using a revised Shift-Share method, we examine the change in indicators to examine how regional productivity has evolved since Poland's accession to the EU. Framed by the Sustainable Development Goal 10 and theories on regional convergence, this research hypothesises that while EU membership fosters national growth, it may exacerbate regional productivity inequalities. We assume that regional circumstances are the cause of inequality. The Shift-Share analysis is innovatively adopted in this study to address this. It adds to the methodology of regional studies by proposing a new indicator calculus and a new method to compare regional productivity. Furthermore, the assumption of an increasing regional inequality, expressed by regional income, is measured with an adopted Theil index. The analysis reveals that labour productivity has risen unevenly across Polish regions, related to increased regional GDP disparities from 2005 to 2018. It is discovered that region's specifics are largely responsible for the inequality. This divergence reflects the broader EU challenge of achieving internal cohesion with respect to the regional characteristics and development while fostering economic growth. The study concludes that regional economic policies have to target region-specific factors influencing productivity to mitigate inequality, emphasizing the utility of the adapted Shift-Share method as a diagnostic tool for policymakers.

The impact of Türkiye foreign trade on their Actual-Open Emissions of CO₂ in the years 2000–2020 in the context of EU energy policy

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This study analyzes the relationship between Türkiye's foreign trade and its Actual-Open CO₂ emissions from 2000 to 2020, within the framework of EU energy and climate policy. By assessing trade patterns, emission intensities, and sectoral changes, the research highlights how Türkiye's integration into global markets and its trade with the EU have influenced national emission trajectories. Particular attention is given to carbon leakage, shifts in production, and energy dependency. The findings underscore the need for aligning Türkiye's trade and environmental strategies with EU decarbonization goals to support a more sustainable and cooperative regional climate policy framework.

The Role of ESG in Sustainable Development in Morocco: A Literature Review

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Morocco is making progress on its sustainable development plan and establishing itself as Africa's leader in climate action and renewable energy. This article examines the relevance of Environmental, Social, and Governance (ESG) practices in Morocco's efforts to achieve its Sustainable Development Goals (SDGs). The aim is to investigate the ways in which ESG principles are incorporated into Morocco's economic, social, and environmental frameworks and evaluate the effects of these practices on the country's path toward sustainable development. Although Morocco has made significant strides in implementing ESG principles, there are still obstacles in bringing them into line with national regulations and producing observable social and environmental results. This assessment highlights potential to increase the impact of ESG integration while also identifying major obstacles, such as governance and regulatory deficiencies.

Keywords: ESG, Sustainable Development, SDGs, Environmental Sustainability, Sustainability Management

**Betting on the big bucks: greedy bankers beating (?) financial markets
(1970's – 2010's)**

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The half century around 1990 was an exciting one for bank traders who found opportunities to trade on stock, currency and interest rate levels, among others, in a liberalised and deregulated world of financial instrument innovations. I discuss currency speculations at the regional German Herstatt-Bank in 1974, the Asian stock market speculations of Nick Leeson at the British Barings Bank in 1995, likewise but financially way larger activities of Jérôme Kerviel at the French giant Société Générale in 2008, manipulations by London-based traders of interest and foreign exchange rate levels around 2010 and the fraudulent Bulgarian OneCoin virtual currency pyramid scheme led by Ruja Ignatova (“Dr Ruja”) imploding in 2017. In internationally liberalised and internally deregulated and innovative financial markets, accounting systems, compliance (management control with corporate governance) and regulatory loopholes may create bank trading opportunities that negatively and / or positively thrilled individuals and bank trader groups may want to grasp in a culture where free market and free spirit thinking, talking and acting can enfold under favourable economic conditions. I happily witness the entrepreneurial leaps that are being taken with adventurous transactions at times and I also call for relationship banking, strict compliance and continued efforts on dampening banker greed temptations.

Corporate ESG Performance vs Financial Performance: A comparative analysis in the energy sector in the European Union

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This study investigates the relationship between environmental, social and governance (ESG) reporting and financial performance of the energy companies in the European Union (EU). While ESG scores have emerged as a critical standard for corporate environmental performance, doubts remain about their usefulness and impact on the performance of the companies. Using a panel data set, we examine firm-level data from EU-member countries between 2001 and 2023 to determine the relationship among individual and combined environmental, social and governance pillars of the ESG score and the financial performance indicators (ROA, ROE, etc.) of the energy companies. We also add some audit-related non-financial data to identify the effects attributable to the sustainability reports audit and assurance process. Our results contribute to the literature that observes mandatory/voluntary ESG reporting and its sequent effects on companies' financial statements.

The Role of Financial Sector Development in the Economic Policy Uncertainty-Energy Nexus: Insights from E7 Countries

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The long-term viability of energy policy is crucial for sustainable economic growth, especially in emerging economies; however, its effectiveness is often challenged by various factors, including economic policy uncertainty (EPU). While numerous studies have examined the determinants of carbon emissions, the impact of EPU on environmental sustainability remains underexplored in the energy economics literature, particularly for emerging economies. This study investigates the impact of economic policy uncertainty and financial sector development on renewable energy, nonrenewable energy and total energy consumption in E7 economies -Brazil, Russia, India, China, Türkiye, Mexico and Indonesia- over the period 1990-2020 by employing the cross-sectional autoregressive distributed lag (CS-ARDL) model and advanced panel econometric techniques. The research contributes to the empirical literature by analyzing the EPU-energy relationship in emerging economies and highlights the critical role of financial sector development in influencing energy policy outcomes in E7 countries. The findings underscore the need for governments to ensure consistency in economic and environmental policies to effectively mitigate environmental degradation and promote sustainability.

Transforming Environmental Quality: Examining the Role of Green Production Processes and Trade Globalization through a Kernel Regularized Quantile Regression Approach

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This research bridges an important gap in prior studies by exploring Japan through fresh and innovative lenses. First, it provides a comprehensive analysis of the impact of renewable energy consumption and digitalization on ecological quality, utilizing data spanning from 1990Q1 to 2021Q4. Second, it uniquely incorporates trade globalization and green production processes as key variables, which have been largely overlooked in prior research. Third, the study introduced Kernel Regularized Quantile Regression, offering a precise and robust analytical framework for understanding the relationships between these variables. This distinctive approach integrates kernel methods to estimate quantile-specific marginal effects, thereby providing a more precise analytical framework. The results show that green production processes, financial development, and renewable energy consumption promote ecological quality. In addition, digitalization and trade globalization show weak and positive effects on ecological quality, while economic growth lessens ecological quality. The study suggests that policymakers in Japan initiate policies that promote green production process and renewable energy consumption.

Keywords: Digitalisation; Green Production Processes; Renewable Energy Consumption; Trade Globalisation; Sustainable Development

**Decomposition of Carbon Emissions from Energy Use:
A comparative analysis between India and China**

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For becoming two of the fastest-growing large economies in the world, India and China have set ambitious economic growth targets. Meeting these growth targets while controlling CO₂ emissions poses an immense challenge for both countries. The present paper aims at discovering the determinants explaining CO₂ emissions in India and China by carrying out a complete decomposition analysis for the period 2000-2022. The study investigates the evolving economic and energy structures of both countries, examining how these factors contribute to changes in CO₂ emissions. Findings indicate that economic expansion (scale effect) is the dominant driver of emissions growth in both nations, with China's emissions surge more pronounced due to its larger and faster-growing economy. However, China also demonstrates a stronger decoupling trend, primarily due to significant improvements in energy intensity, whereas India shows more modest gains. The study also confirms the presence of an Environmental Kuznets Curve (EKC) for both countries, suggesting a turning point where further economic growth could lead to environmental improvement—contingent upon continued investment in clean technologies and supportive policy measures. The results underscore the importance of tailored climate strategies for each country to reconcile developmental goals with ambitious emissions reduction targets.