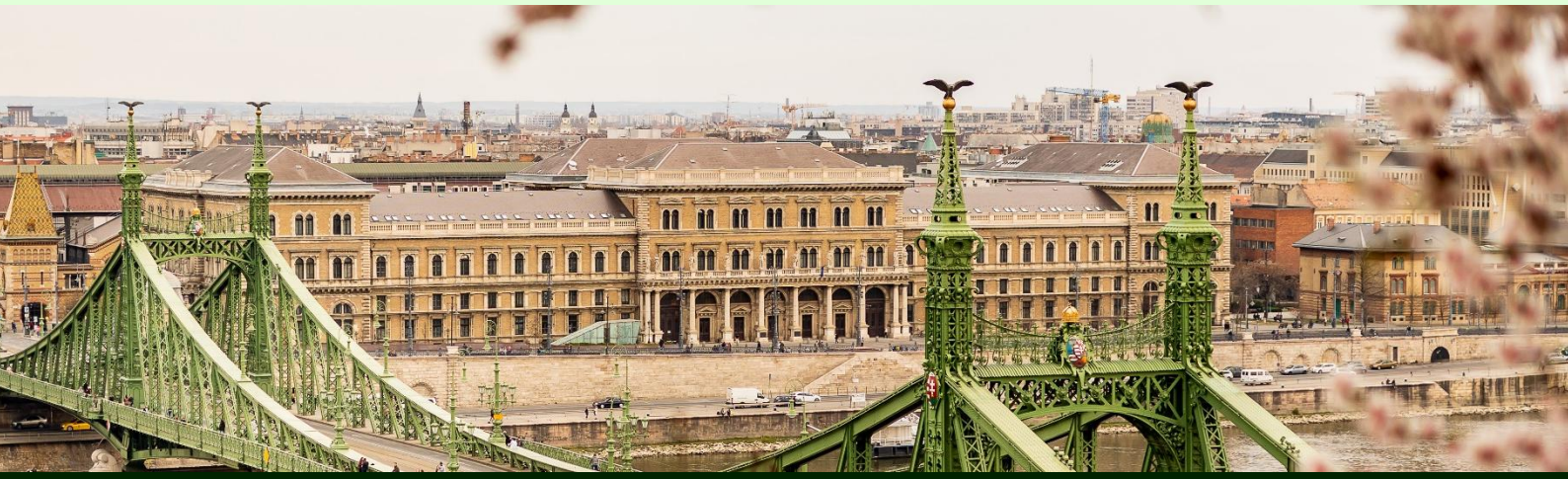
CORVINUS UNIVERSITY of BUDAPEST

17th Annual Financial Markets and Liquidity Conference

2nd – 4th December, 2026

Budapest



BOOK OF ABSTRACTS

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Welcome from the Organizing Committee

Dear Participants,

It is our pleasure to welcome you to the 17th Annual Financial Markets and Liquidity (AFML) Conference, held on 2–4 December 2026 at the Gellért Campus of Corvinus University of Budapest.

The conference brings together researchers and practitioners to discuss financial markets, liquidity and the wider economic consequences of financial decisions. We look forward to exchanging new ideas, examining evidence and strengthening the connections between theory, empirical research and policy.

This year's programme features keynote addresses by Caroline Flammer, Semyon Malamud and Avanidhar Subrahmanyam. The special sessions focus on Liquidity and Systemic Risk; Econometrics and Machine Learning; Global Bond Markets, including liquidity dynamics and currency trends; and Housing Affordability.

Alongside these sessions, regular presentations and flash talks address asset pricing, market microstructure, sustainable finance, climate and biodiversity risk, artificial intelligence, corporate governance, household finance and financial networks. We hope that the range of topics and approaches will create opportunities for lively discussion and new collaborations.

We thank our keynote and invited speakers, presenters, session chairs and participants for their contributions. We are grateful to the Scientific Committee, the conference secretariat and our organizing partners: the Institute of Finance at Corvinus University of Budapest, the Game Theory Research Group at the ELTE Centre for Economic and Regional Studies, the Department of Finance at ESSEC Business School, and the Faculty of Economics at Eötvös Loránd University.

We also thank our sponsors, KELER KSZF, OTP, and Morgan Stanley, for their support of the conference. This conference is supported by the French National Research Agency (Agence Nationale de la Recherche, ANR) under grant ANR-24-CE26-1611 (BLISS project).

We encourage everyone to participate in the discussions, share questions and ideas, and make the most of our time together in Budapest. We wish you an inspiring and rewarding 17th AFML Conference.

Barbara Dömötör (Chair), Péter Csóka (Chair of the Scientific Committee), Ildikó Beri, Tekla Erdélyi-Vas, András Fülöp, Margit Hajnal, Judit Lilla Keresztúri, Anita Lovas, and Kincső Boróka Pénzes.

Organizing Committee, 17th AFML Conference

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Keynote Speakers

Blended Finance: Scaling Sustainable Investing in Emerging and Developing Economies

Caroline Flammer

Mobilising private capital at scale is critical to financing sustainable development, particularly in emerging and developing economies (EMDEs), where it is needed most. This lecture explores the opportunities and barriers to scaling sustainable investment, including the role of risk perceptions and market frictions. It then explores how blended finance can be structured to deploy catalytic capital more effectively, mitigate investment risks, and mobilize private investment at scale.

Large (and Deep) Factor Models

Bryan Kelly, Boris Kuznetsov, Semyon Malamud, Teng Andrea Xu

We show that a deep neural network (DNN) trained to construct a stochastic discount factor (SDF) admits an additive decomposition separating nonlinear characteristic discovery from the pricing rule that aggregates them. This decomposition yields a linear factor representation governed by the Portfolio Tangent Kernel (PTK), which summarizes the network's learned features. In population, the implied SDF converges to a ridge-regularized version of the true SDF, with the degree of regularization determined by spectral complexity. Empirically, using U.S. equity data, the PTK representation delivers economically and statistically significant performance gains, while rising spectral complexity imposes tighter limits on finite-sample pricing.

Asset Prices with Affect Investing, Gambling, and Overconfidence

Jiang Luo, Shuoge Qian, Zheng Qiao, Avanidhar Subrahmanyam

Investors do not just seek returns; they also seek excitement and invest in firms they like. Accordingly, we study markets in which some investors trade due to a gambling motive and an affect heuristic, and are overconfident. We provide survey evidence supporting these motives' relevance and construct a tractable multi-asset model that combines such reasons for trade. In our setting, gambling increases the volume of trade and amplifies the drift following public signals. Expected returns decline with the strength of the affect heuristic, particularly when the propensity to gamble is high. Empirical results support these predictions.

Speakers

A Stable Solution for Debt Forgiveness in Financial Networks with Default Costs

Péter Biró, Di Feng, András Terjék

We study coordinated debt forgiveness in financial networks with default costs. A forgiveness solution called Clearing Without Default Costs (CWDC) reduces each defaulting bank's liabilities to the payments it would make absent default costs. We show that the CWDC is group stable, i.e., no coalition can profitably deviate. Also, under a no-front-running condition, CWDC is a coalitional Nash-in-Nash equilibrium that is robust to the choice of disagreement specification. The no-front-running condition is the exact threshold for an efficient equilibrium in a creditor coordination game with stag-hunt structure, where the binding constraint falls on the smallest creditor. When this condition fails, a self-financing transfer scheme, funded by the default-cost savings that forgiveness generates, restores the CWDC as an equilibrium.

Algorithmic Signal Aggregation and the Limits of Market Efficiency

Hongcheng Xu

This paper studies how algorithmic signal aggregation affects price efficiency in a competitive equilibrium with heterogeneous beliefs. Quant funds use an online learning algorithm to reallocate capital across heterogeneous experts, influencing prices through informational reallocation. I show that performance-based learning does not in general implement the efficient aggregation of information: by minimising regret, it induces equilibrium weights that deviate from the efficient allocation. This wedge generates a non-monotone effect of quant capital on price efficiency. At low levels, quant entry improves efficiency by deepening markets and correcting misallocation; at high levels, it overconcentrates informational influence, moving weights away from the efficient allocation and increasing pricing error. The key insight is that better prediction does not imply better prices: algorithms can learn to forecast well while distorting the aggregation of information in equilibrium.

Analyzing Financial News with NLP for Enhanced Financial Risk Detection: Evidence from Mexican Financial Markets (2012–2025)

Abril Palacios, Liduvina Cisneros

We construct a multilabel BERT-based classifier to assign financial news to specific markets—equities, FX, derivatives, debt, banking institutions, and country risk—and then assign a sentiment within each market. By integrating these market-targeted sentiment measures into regime-sensitive GARCH models and comparing them against Banco de México's Financial Market Stress Index, we find clear regime-dependent effects: pessimistic news generally increases stress while optimistic news tends to reduce it, with the strongest effects observed during high-volatility regimes. Crucially, our sentiment-augmented models outperform traditional baselines, reducing out-of-sample volatility forecast errors (RMSE) in the Foreign Exchange Market and in the Stock Market. The analysis reveals heterogeneous transmission channels; notably, the FX market exhibits the highest sensitivity to negative news shocks during turbulent periods. These findings confirm that disaggregating news by market and regime provides superior early warning signals for financial stability monitoring compared to broad market sentiment indicators.

Asset-Price Inflation in Australia

Jonathan A. Batten, Igor Lončarski, Peter G. Szilagyi, Hanxian Zhou

We examine how far the cost of acquiring Australian assets has moved relative to consumer prices since decimalisation in 1966. The Asset Inflation Gap measures cumulative asset-price appreciation relative to the CPI and is constructed on a common basis for housing, equities, gold and the silver content of the 1966 Australian fifty-cent coin. We compare the gaps with earnings, household income, bank deposits, and government bonds, and separate the housing gap into changes in real rents and valuation. All four asset prices outgrew the sixteen-and-a-half-fold increase in consumer prices over 1966–2025. Housing appreciated by an average of 2.7 percent a year in real terms, with a gap consistent with a random walk with positive drift. However, its pace ranged from close to zero over 1973–1987 to more than five percent a year over 1995–2005 and was associated with mortgage rates and mortgage credit. Relative to earnings and income per head, nearly all of the increase in house prices occurred after 1997; relative to income per household, about two thirds. House prices rose 8.5 times relative to after-tax bank deposits, while accumulated government bond returns kept pace with housing through 2020. Both rent series attribute nearly all real house-price appreciation since 1992 to a higher price-to-rent ratio.

Beyond Connectedness: Network Power and Shareholder Dissent

Yerzhan Tokbolat, Philip Fliers, Moldir Mukan

Using a comprehensive dataset of director election votes in UK-listed firms between 2000 and 2022, we examine how director networks shape shareholder dissent. We find stronger opposition to directors embedded in powerful network positions, while roles associated with information collection or dissemination attract only lower or insignificant dissent. Exploiting the strengthening of the UK's Combined Code on Corporate Governance in 2010 as an exogenous shock to the salience of director re-elections, we show that these effects emerge once annual re-elections become routine. Governance reforms thus have the potential to activate shareholder scrutiny of informal, network-based influence. We also document systematic heterogeneity in dissent across dimensions of compensation, director tenure, entrenchment, socioeconomic status, age, gender, and nationality.

Big Data and Relationship Banking with Naivety and Adverse Selection

John Thanassoulis, Tamas Vadasz

We develop a model of credit market competition allowing for both adverse selection and client naivety. The insider bank benefits from relationship banking data, but the presence of naivety weakens its incentive to use the data to lower prices. We show that in the competitive equilibrium technological improvements (e.g. big data, AI) in the insider's screening ability lower bank profits and raise consumer surplus if a high proportion of the insider bank's clients are naive. When instead most clients are sophisticated, the welfare effect depends on which screening error the technology reduces: consumers gain more from better clearing of low-risk borrowers than from better detection of high-risk ones, and over an intermediate range of naivety only the former helps them. Only banks with a sophisticated clientele benefit from, and are motivated to invest in, technology that permits more accurate screening through relationship banking data.

Biodiversity Washing in the Mutual Fund Industry: Evidence from EU-Domiciled Funds

Matthias Horn, Igor Lončarski

We examine whether biodiversity-labeled mutual funds truly invest in firms with a lower biodiversity footprint. To test that, we match the 2022–2024 holdings of 35 actively managed EU-domiciled funds to Iceberg Data Lab's Corporate Biodiversity Footprint to find that their footprint does not differ from the footprint of a passive MSCI World benchmark or matched conventional active peers. Fund flows do not follow a better footprint, and the 5.8% annual return difference between high- and low-footprint funds reflects size and value exposure rather than a biodiversity premium. Moreover, a holdings-based decomposition of returns shows a small, yet significantly negative effect of the engagement channel, while the biodiversity footprints of all firms evolve similarly. Finally, the reported biodiversity metrics of analyzed funds improve under the SFDR but similarly do so for conventional index funds. We claim that biodiversity washing is a mismatch between a disclosure regime reporting improvement in the biodiversity footprint which is not matched by the firm-level data.

Climate Policy Uncertainty and Financial Volatility: A Smooth-Coefficient GARCH Approach

Armin Pourkhanali, Jonathan A. Batten

This paper develops a smooth-coefficient GARCH framework designed to capture gradual structural change in financial market volatility associated with evolving policy environments. Rather than treating volatility dynamics as governed by fixed parameters or abrupt regime shifts, the proposed model allows all conditional variance coefficients to vary smoothly with an observed state variable. This specification accommodates nonlinear state dependence without imposing discrete breaks or latent regime processes, while preserving the familiar GARCH recursion and economic interpretability. We establish the theoretical foundations of the estimator, including existence, identification, and asymptotic properties, and evaluate its finite-sample performance through Monte Carlo simulations. The framework is applied to equity returns in the United States using a climate policy uncertainty index as the conditioning variable, enabling a state-dependent characterization of volatility persistence and long-term risk. The empirical results show pronounced and systematic variation in volatility dynamics across policy uncertainty states, providing statistically significant departures from constant-parameter specifications. In out-of-sample forecasting exercises, the smooth-coefficient GARCH model delivers consistent improvements in volatility forecasts relative to standard constant-parameter and alternative time-varying specifications across multiple loss criteria. Thus, the results indicate that modeling volatility as a function of observable policy states offers a credible and parsimonious approach to capturing risk under gradual structural change. The proposed framework is therefore well suited for analyzing financial volatility in environments shaped by persistent and evolving sources of uncertainty, such as climate policy.

Common Ownership and Systemic Risk in Banking

Thomas Gehrig

In this presentation I propose three basic axioms for measuring common ownership based purely on the ownership distributions: symmetry, normalization, and orthogonality. Combining a fourth, structural axiom with normalization yields a characterization of cosine similarity as the only commonality measure that satisfies all axioms. This measure is free of potential endogeneity concerns that plague standard popular measures applied in empirical research. I also discuss how the basic axioms relate to popular measures of common ownership used widely in empirical research. Finally, I apply our preferred measure to analysing the effect of common ownership on systemic risk in the banking industry. Common ownership appears as a major destabilizing source of capital shortfall for European banks while it tends to reduce capital shortfall and stabilizes the banking system in the case of the US.

Cross-Fund Flows: The Funding Side of Fund Networks

Hannes Wilke

Cross-fund subscriptions and redemptions are a growing feature of the investment fund landscape, with direct implications for funding stability and the transmission of liquidity risk. Using supervisory data on German funds, I document that these cross-fund flows create a funding-side network that actively channels liquidity between funds. I find that these direct fund-to-fund flows can (i) substantially exceed funds' cash buffers, (ii) provide partial liquidity insurance by absorbing idiosyncratic shocks, but also transmit and amplify funding pressure across the network, especially during systemic liquidity distress episodes, and (iii) interact with monetary policy, as tightening prompts funds to rebuild cash and withdraw liquidity from the network. Funds held by other funds are particularly fragile, facing elevated downside flow risk. Overall, cross-fund flows represent a new and significant channel through which liquidity shortages and surpluses propagate in non-bank financial networks.

Do Green Bonds Change How Banks Lend? Evidence from Post-Issuance Credit Allocation

Frank Bruckbauer, Karolin Kirschenmann, Steven Ongena, Carola Theunisz

Green bonds are an increasingly important source of sustainable bank funding, yet little is known about how their issuance affects banks' subsequent lending. Using green bond issuance by European banks matched with syndicated loans and borrowers' environmental performance, we trace the pass-through from sustainable funding to corporate lending and borrower emissions. Following green bond issuance, banks become more likely to provide sustainability-related loans to firms that are already relatively green, both within existing relationships and when forming new ones. However, issuing banks take smaller shares in these loans. At the portfolio level, the increase in sustainability-related lending is accompanied by a decline in conventional lending, such that issuing banks do not expand their own overall syndicated lending to greener firms. Environmental improvements are concentrated among greener firms receiving sustainability-related loans from green-bond-issuing banks. Overall, our findings show that green bond issuance changes how issuing banks structure their lending.

Dollarization Waves: New Evidence from a Comprehensive International Bond Database

Swapan-Kumar Pradhan, Eswar Prasad, Előd Takáts, Judit Temesvary

We investigate how the US dollar's prominence in the denomination of international debt securities has evolved in recent decades, using a comprehensive global data set with far more extensive coverage than data sets used in prior literature. We find no monotonic dollarisation or de-dollarisation trend; instead, the dollar's share exhibits a wavelike pattern. We document three dollarisation waves since the 1960s. The last wave, following the global financial crisis, lifted the dollar's share nearly back to its level at the euro's launch in 2000. Our findings are robust to composition and currency valuation effects as well as alternative data definitions.

Down Payments, Deferred Homes: How LTV Restrictions Reshape Household Consumption

Yann Cerasi, Gazi Kabas, Steven Ongena, Kasper Roszbach

We study how households adjust consumption following the introduction of a loan-to-value (LTV) restriction. Using population-wide electronic expenditure records and administrative data, we find that renters increase consumption after the policy, the opposite of the intended saving response. As home purchases become more difficult, prospective buyers delay both homeownership and the savings needed for a down payment. This effect is robust to renter-only comparisons and is strongest in regions where the LTV restriction is more likely to bind. At the same time, the policy operates as intended among renters who transition into homeownership under the constraint, as these homebuyers reduce consumption before buying and keep it persistently lower thereafter. Our findings show that borrower-based macroprudential policies can reshape intertemporal behavior in unintended ways, with important implications for homeownership, aggregate demand, and the transmission of housing regulation to the real economy.

Dynamic Portfolio Choice Across the Return Distribution

Jozef Barunik, Lukas Janasek, Attila Sarkany

Using recursive quantile preferences, we characterize dynamic portfolio policies for investors targeting different regions of the payoff distribution and implement them in a multifactor setting through reinforcement learning. Out of sample, the resulting policies exhibit a systematic downside–upside trade-off: downside-focused investors sacrifice upside exposure to protect adverse outcomes, while upside-oriented investors maintain greater risk exposure. When volatility is elevated and downside risks diverge across factors, quantile-sensitive policies reallocate risk in ways that standard volatility management does not capture. We further find that differences in tail preferences have substantially larger effects on overall portfolio risk than differences in the valuation of future payoffs, although the latter can alter state-dependent allocations. These findings identify when volatility management approximates tail-sensitive portfolio choice and when distributional considerations become economically relevant.

Energy Bills and Mortgage Default Risk: Evidence from an Expenditure Shock

Bálint Várgedő

This paper investigates the impact of building energy efficiency on mortgage default risk using loan-level data from Hungary between 2020 and 2024. Leveraging a unique dataset with Energy Performance Certificate (EPC) labels and an exogenous retail energy price shock, we estimate Cox proportional hazards models and linear probability models to assess credit risk differentials. Default rates on green mortgages secured by energy-efficient properties are lower than those on comparable mortgages. We show that the default risk difference is due to the 2022 residential energy price shock, implying a causal relationship between increased energy bills and default probability. We find that mortgages secured by energy-efficient properties (EPC A–C) exhibit 50 bps lower default risk compared to those with inefficient collateral (EPC G–J) after the shock. The default probability gap widens among lower-income households, consistent with an expenditure-driven default mechanism. Additionally, banks increased interest rates for energy-inefficient mortgages by 4–10 basis points (compared to green mortgages) after the energy price shock. The findings highlight the materiality of climate transition risks in retail credit portfolios and the impact of expenditure-driven shocks on mortgage default.

Equilibrium World Models

Simon Scheidegger, Andreas Schaab

We introduce Equilibrium World Models (EWMs), a deep-learning method for globally solving dynamic stochastic models that feature rare disasters, binding constraints, and counterfactual states. Standard unsupervised neural-network-based solvers impose equilibrium conditions only on states generated by their own simulated policy. Their solutions can therefore be self-confirming: accurate on the simulated path, but untested off it, sensitive to initialization, and costly when expectations must be recomputed at each step. EWMs change the computational representation, not the economics. They enforce the model's exact equilibrium conditions on a broader, model-generated distribution of ordinary, rare, stressed, and counterfactual states. They carry the continuation with a learned surrogate, but certify the resulting policy strictly against the true equilibrium conditions. We provide an error decomposition, an off-path residual bound, and a convergence result linking self-confirming solutions to rational-expectations equilibria. We demonstrate EWMs through a sequence of test cases that isolate the main pathologies of classical deep-learning solvers and then scale them to richer economies. In a rare-disaster Brock-Mirman laboratory, coverage reduces disaster-region residuals by an order of magnitude. In a high-dimensional international real-business-cycle model, classical deep-learning solvers fail from all random starts, whereas EWMs converge from nearly all and evaluate continuations up to two orders of magnitude less often. When actions move transition measures, EWMs use action-conditioned continuations to recover the relevant policy margin. In a heterogeneous-agent economy with aggregate risk, EWMs compress the numerical representation of the wealth distribution by at least 25× while imposing exact full-distribution rational-expectations conditions.

Greenwashing Profitability and the Moderating Effect of Regulatory Stringency

Ágnes Lublóy, Edina Berlinger, Judit Lilla Keresztúri

We first examine whether greenwashing results in increased profitability. Second, we assess whether stricter environmental regulation serves as an effective instrument for combatting greenwashing by reducing the financial gains firms derive from such behaviour. Using an incident-based greenwashing indicator and panel data for 1,215 MSCI World Index constituents (2008–2020) across 23 developed economies, we find that greenwashing is associated with a 72-basis-point increase in return on assets. We establish a causal link between greenwashing and profitability using the average environmental disclosure of industry peers as an instrument. Subsample analyses show that greenwashing enhances profitability primarily for firms operating in lenient regulatory environments. Furthermore, more stringent environmental regulation moderates the positive effect of greenwashing on firm profitability. As regulatory stringency increases, the incremental profitability gains from greenwashing diminish. This moderating effect is robust across subsamples defined by regulatory stringency, underscoring that stricter environmental standards can effectively constrain the financial attractiveness of such practices regardless of the baseline regulatory stringency. From a policy perspective, our findings indicate that progressively stricter, rule-driven environmental regulation plays a central role in limiting the profitability of greenwashing. We recommend that policymakers strengthen and continuously tighten environmental regulation—for example, by treating prior green communication as an aggravating factor in environmental crime enforcement.

Human-AI Interaction and Bank Runs

Anna Bayona, Hubert János Kiss, Ismael Rodríguez-Lara, Alfonso Rosa-García

We study whether interacting with an artificial intelligence (AI) agent rather than a human counterpart affects participants' beliefs and withdrawal behavior in a bank-run game. Participants play either a simultaneous version, which captures pure coordination, or a sequential version, which can result in panic-driven bank runs if depositors withdraw after observing that others do so. We find no evidence that the identity of the counterpart (human vs. AI) affects withdrawal rates or beliefs in the simultaneous game. In the sequential game, participants expect an AI counterpart to be more likely to withdraw than a human counterpart, but we find no statistically significant evidence that counterpart identity affects withdrawal behavior. Overall, the findings suggest that AI counterpart identity can shape beliefs in panic-prone environments, while providing no statistically significant evidence that it changes withdrawal behavior.

Information Selection and Media Bias: A Theory of Sentiment Analysis

Jinge Liu

Textual sentiment analysis is widely used, yet the economic interpretation of sentiment remains unclear. I develop a theory of media in which outlets selectively report information under content capacity constraints based on endogenous newsworthiness for the receiver's decision problem. The model generates common media bias patterns, including pandering to the audience and sensationalism, where bias reflects the gap between reported content and the full underlying news. It yields an asymptotically explicit sentiment-scoring function linking textual sentiment to an underlying fundamental signal and economic parameters governing content production, providing a structural interpretation of sentiment and highlighting potential measurement issues in empirical work.

Investor Crowding

Patrizia Perras, Niklas Wagner

Asset pricing research provides evidence on the cross-section of asset prices, while it is relatively silent on the potential consequences of the pricing models' postulated differences in expected returns. At the same time, return differences may also result from investor behavior that is characterized by focus of attention on asset subclasses, sectors or even single issues, a phenomenon which we denote as "investor crowding". Realized return differences affect weights and may induce crowding in asset portfolios. We argue that crowding can be costly to investors as it affects the risk-return efficiency of market proxies, potentially causing a negative externality for passive investors. The absence of crowding in a long-run equilibrium can be characterized by a weights martingale condition, which imposes restrictions on risk premia dynamics. As such, static cross-sectional premia are difficult to reconcile with long-run absence of crowding. Suggesting an entropy-based measure of investor crowding, we study observed crowding behavior for the U.S. equity market. Our empirical results reveal that episodes of intense investor crowding are recurrent and that the relation with uncertainty is state-dependent. Uncertainty increases moderate crowding levels, i.e., investors tend to crowd when they are fearful. However, once crowding levels become elevated, uncertainty induces rebalancing away from dominant positions.

Investors' Preference for Continuous and Auction Trading in Securities

Yakov Amihud, Te-Feng Chen, Nanqi Li

This paper studies the effects of transitioning from periodic batch auctions to continuous trading in the Taiwan Stock Exchange options market. Exploiting a setting where options switch trading mechanisms while underlying stocks do not, we identify both direct and spillover effects. We find that trading activity and liquidity increase significantly, accompanied by faster price discovery. Option values rise, consistent with a market-wide liquidity premium, while cross-sectional variation shows that pricing efficiency improves more for actively traded options. Continuous trading also enhances stock price informativeness, as option trading becomes more predictive of future returns. These improvements translate into real effects: firms exhibit higher investment and increased institutional participation. Overall, market design plays a central role in shaping liquidity, efficiency, and real economic outcomes.

Local Signature-Based Expansions and Non-Affine Pricing

Federico Bandi, Roberto Renò, Sara Svaluto-Ferro

We study the local (in time) expansion of a continuous-time process and its conditional moments, including the process's characteristic function. The expansions are conducted by using the properties of the time-extended Itô signature, a tractable basis composed of iterated integrals of the driving deterministic and stochastic signals: time, multiple correlated Brownian motions and multiple correlated compound Poisson processes. We show that these properties are conducive to automated expansions to any order with explicit coefficients and, therefore, to stochastic representations in which asymptotics can be conducted for a shrinking time t that goes to 0, as in the extant continuous-time econometrics literature, but also for a fixed time (such that $t < 1$) with a diverging expansion order. The latter design opens up novel opportunities for identifying deep characteristics of the assumed process. We apply the methodology to deploy closed-form option pricing for non-affine models.

Maker Incentives When the Tick Binds: Evidence from Crypto Perpetual Futures

Wei Li, Guang Zhang

We study maker incentives when quoted spreads are mechanically constrained. Using millisecond order book and trade data from Binance perpetual futures, we show BTCUSDT quotes are at the one-tick minimum for 99.21% of quote time, leaving little scope for displayed-spread compression. We develop a competitive-equilibrium model with fast and slow liquidity suppliers. A qualification expansion lowers participation costs and increases the mass of active makers, while a targeted rebate raises the equilibrium share of fast makers, reducing stale-fill exposure and improving passive-liquidity quality. The evidence matches these predictions. The broad 3 November 2025 eligibility expansion raises Binance's pooled volume share by about 1.0 percentage point, consistent with broader participation. Around the 13 November BTCUSDT-specific 0.05 bp rebate increase, BTCUSDT stale passive-fill shares fall relative to ETHUSDT by 11.2 percentage points at 100 ms, 10.3 at 200 ms, 8.1 at 1 second, and 4.8 at 2 seconds. Realized spreads, passive-fill timing, and restoration severity provide supporting evidence that liquidity quality improves inside the one-tick regime. Maker incentives in minimum-tick markets buy quote monitoring and passive-fill quality, not narrower displayed spreads.

Mortgage Benchmark Design: What If We Linked the Mortgage Rate to the Average Deposit Rate?

Edina Berlinger, Barbara Dömötör, Tamás Hák-Kovács

We investigate an endogenous benchmark regime, motivated by the Bulgarian system, where the reference rate for adjustable-rate mortgages is the weighted average of deposit rates across the country. Consequently, deposit pricing also directly affects mortgage revenues, creating a strategic interaction between the funding and lending sides of a bank's balance sheet. In our game-theoretic model, two banks compete simultaneously in the mortgage and deposit markets. Existing mortgage portfolios and deposit franchises separately shape benchmark exposures, lending relationships, and funding needs. Demand for new loans responds to both the common benchmark and relative mortgage rates, while price sensitivities differ across the mortgage and deposit markets. Funding shortages entail additional convex costs. We derive joint best responses and sufficient conditions for the existence and uniqueness of an economically admissible interior Nash equilibrium. A larger legacy mortgage portfolio strengthens direct benchmark-related incentives but does not necessarily increase relative mortgage-pricing power, lending share, profit, or return on equity. Welfare effects can be positive or negative relative to the classic exogenous benchmark regime, depending on model parameters.

On the Uniqueness of Clearing Payments in Financial Networks with Senior Obligations

Péter Csóka, P. Jean-Jacques Herings

We study clearing payments in financial networks with unrestricted real-valued initial endowments. Negative initial endowments represent senior obligations that take priority over liabilities within the network. We provide a necessary and sufficient condition for the uniqueness of the clearing payment matrix. Using the condensation of the liability matrix, we show that uniqueness holds if and only if every terminal cycle contains an agent with non-zero equity or zero asset value at the greatest clearing payment matrix. We show how this characterization relates to existing uniqueness conditions for both non-negative and arbitrary initial endowments. We use our characterization to show that uniqueness of the clearing payment matrix holds for an open set of initial endowments of full Lebesgue measure.

Pricing News and No News with Heterogeneous Beliefs

Can Gao, Brandon Yueyang Han

We present a general-equilibrium model in which investors trade risky assets and derivatives while holding heterogeneous beliefs about news content and news intensity. Hindsight winners become richer, and their beliefs carry greater weight in equilibrium prices. Risky-asset positions vary linearly with subjective return expectations; derivative positions are U-shaped: investors with extreme beliefs, regardless of direction, demand convexity exposure through options. When disagreement is primarily about news intensity, realized news raises implied volatility by increasing the market's wealth-weighted assessment of future event risk. Conversely, quiet periods shift wealth toward investors who believe news is unlikely to arrive, compress risk-neutral tail probabilities, support prices, and make "no news" effectively good news. The persistence of this mechanism depends on the information structure of the news process: discrete news arrivals make intensity disagreement persistent because the per-period wealth-share-decay penalty for incorrect beliefs becomes small; in contrast, a continuous news process induces large and frequent wealth losses via derivative trading for agents with biased beliefs, which also rapidly eliminates intensity disagreement. When disagreement is primarily about news content, news accelerates market selection and induces mean reversion in risk-neutral variance.

Rent Control and Decontrol: Temporary Gains, Persistent Losses

Michael Abel, Luisa Carrer, Jaime Luque

We study a stringent rent control law introduced in 60 municipalities in Catalonia in 2020 and suddenly eliminated in 2022. Using matched rental and sale listings, we find that rents fall by 6–7% after implementation but return to pre-policy levels within a year as rental listings drop by nearly 40%. Sale listings increase by 16–17% and prices decline by 2–3%, with persistent effects after decontrol. Administrative data suggest that landlords reallocate supply from rentals to sales, and rely on contracts exempt from the law or left unregistered. As a result, rent relief is temporary, while losses in property values persist.

Rethinking the Dominance of the United States: Director Elections in Regional Development Banks

Dóra Gréta Petróczy, László Csató

This study investigates the discrepancy between formal voting weights and actual decision-making power in presidential elections in four major regional development banks: the African Development Bank (AfDB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), and the Inter-American Development Bank (IDB). Using cooperative game theory and two widely accepted power measures, the Banzhaf and Shapley–Shubik indices, the analysis reveals that dominant shareholders, particularly the United States, consistently wield disproportionate influence compared to their nominal voting shares.

Returns to Enterprise Systems: The Role of Firm Size and the Age of Workforce

Álmos Telegdy, László Tőkés

We estimate the firm and worker effects of enterprise systems (ES) adoption of Hungarian SMEs, which applied for EU-funded ES subsidies. To address self-selection into the introduction of ES, we compare subsidy winners with rejected applicants—a group that showed the need for the technology and willingness to co-finance it. Difference-in-differences models with firm fixed effects show that ES adoption raises employment and sales but leaves labor productivity unchanged. Large firms have more substantial returns to introducing ES than small firms, which obtain positive returns only if the staff using and operating the ES is young, our proxy for digital skill. Small firms mainly hire administrative staff and raise managerial and administrative wages, while large firms hire production workers and raise wages across most occupations. The results point to skill complementarities as a key constraint on ES returns in small firms.

Same Firms, Different Verdicts: ESG Rating Choice and the Measurement of Greenwashing

Praveen Kumar Ashok Kumar, Rafał Sieradzki

This paper measures greenwashing as a continuous Disclosure-Performance Gap (DPG), defined as the standardised divergence between a firm's voluntary environmental disclosure and its realised emissions performance, for 200 large European firms across four carbon-intensive sectors in fiscal year 2023. Using a systematic six-stage model selection process across 421 candidate specifications, estimated by OLS with HC3 robust standard errors, we identify four significant predictors. Index membership strongly widens the gap (+0.78, $p < 0.01$), consistent with institutional ceremonial conformity, and TCFD endorsement points in the same direction. Renewable energy use (-0.31, $p < 0.01$) and environmental capital expenditure (-0.22, $p < 0.05$) significantly narrow it, consistent with signalling theory. Governance and financial variables carry no explanatory power. Results are robust to influence trimming, rank-based recoding of the ordinal disclosure score, and exclusion of the Task Force on Climate-related Financial Disclosures (TCFD) variable. A direct proxy-substitution test on the identical firms reveals that replacing the CDP Climate Score with the LSEG Environmental Pillar Score eliminates the index-membership effect entirely while the renewable energy effect survives, showing that a greenwashing verdict is conditional on the rating lens applied.

Sell, Hold Out, or Accept: The Creditor's Trilemma in Distressed Debt Exchanges

Edward I. Altman, Rafał Sieradzki

This paper provides a comprehensive analysis of Distressed Debt Exchanges (DDEs), which accounted for more than two thirds of all High-Yield Bond and Broadly Syndicated Loan defaults in 2024 and 2025. Examining 284 DDEs from 2009–2022, we find that over 50% of firms experience a second distress event – bankruptcy, missed interest payment, or another DDE – increasing to nearly 60% for the most recent cohort. Median recovery rates rise from 54.5% at the initial DDE to 62% at a subsequent DDE, which we interpret as a Bayesian market update reflecting firms' propensity to restructure repeatedly rather than liquidate. We develop an equilibrium model of creditor decision-making. For small, price-taking investors, selling at the median market price strictly dominates both tendering and holding out, while distressed investors earn positive returns in all scenarios. For large investors, however, market illiquidity eliminates the sell option, reducing the problem to a binary choice. We derive a closed-form threshold showing that holding out is optimal only when the ratio of DDE passage probabilities without ($\pi 0$) and with the large investor's participation (π) exceeds 73.6%, independently of π. The resulting prisoner's dilemma among large creditors, together with illiquidity and bankruptcy risk, explains why more than 90% of creditors accept DDEs despite the apparent advantage of selling. Our framework provides a structural explanation for the rise of coercive Liability Management Exercises and shows that DDEs often postpone rather than resolve financial distress, as two thirds of firms exhibit deteriorating Z-Scores within one year.

The Convenience Yield of Eurosystem-Eligible Corporate Bonds

Cristian Arcidiacono, Boris Hofmann, Max Riedel, Mathias Skrutkowski

The literature has established that safe asset yields embed a convenience yield – a premium investors forgo in exchange for benefits such as liquidity and pledgeability. We contribute to this literature by isolating the component of the convenience yield specifically associated with central bank collateral eligibility. Exploiting the staggered and quasi-random timing with which the ECB adds corporate bonds to its eligibility list over the 2010–2024 period, we document a 7.5–10 basis point increase in convenience yields following the eligibility announcement. We further show that expansions of the eligibility list reduce the convenience yield of the outstanding stock of eligible bonds by approximately 9.4 basis points per billion euros of newly eligible supply, with spillovers propagating broadly and uniformly across issuers, maturities, ratings and countries – suggesting that ECB-eligible corporate bonds function as close substitutes within the collateral pool. Our findings shed light on the functioning of collateral eligibility as an active monetary policy instrument operating through corporate bond markets.

The Latent Factor Space in Short Portfolio Panels

Fabio Trojani

We characterize the latent common factor space in large panels of individual asset returns using a fixed collection of portfolios when the time dimension is short. When portfolio weights are sufficiently rich to span the factor loadings of the underlying assets, portfolio aggregation permits consistent testing of the number of relevant factors and consistent estimation of the factor space in individual returns, including both strong and weak factors. Monte Carlo simulations show good finite-sample performance for panel configurations commonly encountered in empirical studies of individual stocks with short time series. An application to U.S. stock returns identifies more factors than approaches based directly on individual stocks, pointing to the presence of economically relevant weak factors that are difficult to detect at the individual-stock level. These weak factors become particularly prominent after the Great Financial Crisis, especially during periods of divergent monetary policies and substantial fluctuations in energy prices.

The Liquidity State Dependence of Monetary Policy Transmission

Oliver Ashtari-Tafti, Rodrigo Guimaraes, Gabor Pinter, Jean-Charles Wijnandts

We show that monetary policy shocks move long-term government bond yields only when Treasury-market liquidity is high. This state dependence works through real term premia and passes through to mortgage rates. Liquidity is better explained by the risk-bearing capacity of fixed-income arbitrageurs than by macroeconomic conditions. Using transaction-level U.S. Treasury data, we find that high liquidity raises arbitrageurs' gross duration exposure (but not their signed exposure), and that positions persist. To explain both the macroeconomic and microeconomic evidence, we develop a model in which policy surprises revalue arbitrageurs' pre-shock positions, generating a wealth effect that amplifies average transmission.

The Nonvacuity of the Core: An Alternative Proof for Schmeidler's Theorem

Bernard Cornet, Miklós Pintér

In this paper, we rigorously show that Cornet's result on arbitrage-free pricing rules (Theorem 1 on p. 716 in Cornet (2025)) implies Schmeidler's theorem (the Bondareva–Shapley theorem for infinite games) in its full generality, as stated in Theorem 4 on p. 155 in Bartl and Pintér (2023).

The Unequal Geography of Artificial Intelligence: Data-Centre Expansion, Socio-Ecological Externalities and Community Welfare in Southeast Asia

Zsuzsa R. Huszár, Anita Lovas, Jing Li

Growing demand for hyperscale data centres to meet the high computational and data storage requirements of artificial intelligence (AI) services creates a spatial mismatch between the location of economic benefits and the location of resource demands and environmental costs. This study develops an integrated social-welfare accounting framework to evaluate the distributional consequences of data-centre expansion in Johor Bahru, Malaysia, and Batam, Indonesia, two locations within a Singapore-anchored regional digital infrastructure network. The analysis quantifies household-level and municipal-level costs across three expansion scenarios by tracing utility expenditure, infrastructure investment requirements, environmental exposure, and healthcare costs. The framework distinguishes costs borne directly by households from those absorbed by local governments and public utilities, accounting for the incidence of burden-shifting through tariff structures and cost-allocation mechanisms. Building on environmental taxation and the community-reinvestment tradition of the 1977 U.S. Community Reinvestment Act, the study proposes a Data-Center Reinvestment, Offset and Obligation Tax (DC-ROOT), under which operators contribute to a dedicated local fund based on their incremental resource demand, attributable infrastructure costs, and residual impacts. This new tax is intended to combine cost-reflective contributions, recurring externality charges, and community-benefit allocations to distribute digital-economy gains more equitably between investors and host populations. The study extends conventional infrastructure cost–benefit analysis to account for the spatial separation between digital benefits and localized burdens, offering a policy basis for embedding community compensation and environmental accountability into AI infrastructure governance.

Transaction Costs and the Stochastic Discount Factor

Daniele Bianchi, Teng Jiao, Hao Ma

Transaction costs determine which characteristic exposures are worth maintaining in equilibrium, yet standard stochastic discount factor (SDF) estimates often ignore them. We embed stock-specific trading costs into the no-arbitrage condition to identify a nonlinear SDF, which we estimate via adversarial neural networks across a large cross-section of U.S. equities. The transaction-cost-aware pricing kernel endogenously reallocates away from high-turnover fundamentals, improving cross-sectional pricing, mean-variance efficiency, and anomaly absorption. This reveals a taxonomy of implementation-dependent versus cost-invariant risk premia, with absorbed anomalies clustering among canonical limits-to-arbitrage signals. These findings hold across different cost specifications, market regimes, and a linear SDF specification.

U.S. Monetary Policy Spillovers and the Secular Decline in Emerging Market Long-Term Yields

Márton Ács, Gábor Neszveda

We study the role of U.S. monetary policy in the secular decline of long-term sovereign bond yields in emerging market economies (EMEs). Using daily data for 20 EMEs over 1999–2025, we decompose cumulative changes in domestic 10-year yields into movements occurring within narrow windows around FOMC announcements and movements outside those windows. We show that a substantial share of the long-run decline in EME yields is concentrated in these announcement windows and that, for many countries, the magnitude of the decline exceeds that observed in the United States. Yield responses are sharply timed: statistically significant declines occur primarily on the announcement day and the subsequent trading day, consistent with rapid market reaction to U.S. monetary policy news and global time-zone differences. We also provide evidence on the channels underlying these spillovers. Domestic yields co-move positively with U.S. Treasury yields, indicating the importance of the global benchmark rate, while lower sovereign CDS spreads are systematically associated with lower long-term yields, consistent with the risk-premium channel. Our findings imply that U.S. monetary policy is a key determinant of long-term interest rate dynamics in emerging markets and that the secular decline in global yields has an important international dimension.

Volatility-to-Price-Impact Transmission and Stock Liquidity Premium

Szymon Stereńczak

The effective functioning of capital markets is contingent upon adequate stock liquidity, which facilitates smooth transactions and efficient valuation. Trading less liquid assets incurs higher costs. Consequently, investors require a higher return on these stocks, a phenomenon known as the liquidity premium. Empirical analyses suggest that the liquidity premium varies across different markets. However, a paucity of research exists that identifies the drivers of this variance. The present study investigates the impact of the relationship between volatility and liquidity on the liquidity premium. To this end, the model developed by Pereira and Zhang (2010), and further developed by Stereńczak (2020), is extended by incorporating a transmission from market volatility to both permanent and temporary price impacts. The numerical results suggest a positive relationship between the liquidity premium and the strength of the transmission between volatility and price impact. Furthermore, the dependence of liquidity on volatility reduces investors' ability to time their trades and leverage time-varying liquidity.

What Drives the Greenium, and Does It Align with Green Innovation?

Nam Nguyen

The greenium—the expected-return spread between brown and green equity—is robustly estimated to be positive, yet two questions remain: what drives it, and does the higher cost of capital it imposes on brown firms spur the green innovation it is meant to encourage? This paper develops a continuous-time general-equilibrium model of a brown and a green sector that addresses both. The greenium decomposes into three interacting components: a policy component, from the brown sector's exposure to climate-policy tightening; a diversification component, because the dominant brown sector co-moves most with aggregate wealth and is the poorer hedge for the market portfolio; and a hedging component that runs the other way, as a household with a taste for green consumption fears green scarcity and accepts a lower return on green equity, masking part of the spread. Policy risk and diversification are the primary drivers, and the greenium deepens as climate risk intensifies. Brown firms can innovate by mitigating—lowering the frequency of policy shocks—or transitioning—converting brown capital into green—yet both are misaligned with the premium they face. This yields a novel, risk-based explanation for the recent decline in green innovation.

When Unemployment Hits Mortgage Loans

Axel Möhlmann, Edgar Vogel

This paper examines the effect of unemployment on mortgage loan late payments using a long household panel and fixed-effects regressions. We estimate that unemployment increases the probability of missing a mortgage payment by two percentage points. The impact of unemployment intensifies with its duration, highlighting the significant role of long-term joblessness. Further analysis reveals that a higher debt service burden amplifies the effect of unemployment non-linearly. Specifically, the odds of individuals who have lost their jobs making a late mortgage payment increase disproportionately for those with a debt service ratio of 30% to 40% of their income. This suggests that capping debt-service-to-income ratios can mitigate the risk of mortgage defaults while simultaneously enhancing resilience against labour market shocks, which is relevant for financial stability analysis and macroprudential regulation.

Who Responds to ECB Green Speeches? Green–Brown Stock Repricing Across Institutional Ownership Groups

Ajeng Ratna Kartina, Gábor Neszveda, Henrik Singmann, Adam J. L. Harris

Recent research suggests that climate-focused central bank communication can affect asset prices. Different investor types may, however, respond differently to these communications. We study whether ECB green communication is associated with short-horizon repricing between greener and browner stocks in major European equity markets, and whether responses vary across institutional ownership (IO) and over time. In 2010–2020, when ECB green speeches were relatively rare and novel, economically meaningful positive green–brown return differentials are concentrated on high-intensity speech days, and we find no evidence of IO heterogeneity across groups, suggesting broad market incorporation. In 2021–2024, we see that ECB climate communication becomes more frequent. In addition, event-day effects attenuate, consistent with communication operating more as a persistent signal that may reinforce existing beliefs and be incorporated more gradually. Any remaining sensitivity in some specifications is more detectable among high-IO stocks.

Flash Talks

A FOMO-Based Capital Asset Pricing Model

Mohammed Kaddouhah, Simon Rudkin, Wanling Rudkin

Investors experience a Fear of Missing Out (FOMO) when observing peers' investment choices outperforming their own. Agents require compensation for holding stocks that deliver lower expected returns than the equities held by their peers. This paper provides a theoretical and empirical introduction to the FOMO Capital Asset Pricing Model (FOMO-CAPM). Analysis of US equities between 1980 and 2024 shows FOMO is a significant determinant of asset prices. An annualized FOMO risk premium of 21.4% is demonstrated. The explanatory power of FOMO for stock returns is robust to a battery of alternative peer group portfolios, risk exposure controls and sub-period analyses.

Behavioral Spillovers and Global Credit Risk Contagion: Evidence from Banking CDS Spreads

Elroi Hadad, Sun Yong Choi

This study investigates the behavioral and macroeconomic drivers of credit risk contagion across global banking CDS markets. Using a time-varying connectedness framework and quantile regression on daily data from 2007 to 2024, we uncover a dynamic and asymmetric structure of CDS spread spillovers among North America, Europe, and Asia. North America consistently emerges as the main transmitter of risk, particularly during crises, while Europe plays an intermediary role and Asia serves as a persistent risk absorber. We find that investor sentiment and risk aversion are the most influential drivers of spillovers, especially under stress, whereas traditional uncertainty measures such as economic policy and geopolitical risk exert limited influence. These findings challenge the dominance of macro-based models in explaining CDS dynamics and underscore the critical role of behavioral channels in amplifying systemic risk. Our results carry important implications for financial stability monitoring and the design of early-warning tools in the global banking sector.

Beyond Green Finance: Financial and Structural Gaps in Europe's Green Innovation

Emilia Németh-Durkó

Green finance has become a central instrument of Europe's climate transition, yet comparable levels of green financial activity have produced markedly different eco-innovation outcomes across member states. Using panel data for EU member states between 2014 and 2020, the paper decomposes countries' distance from the frontier into a financial gap, reflecting green financial capacity, and a structural gap, capturing the economic and institutional conditions required to transform financial resources into innovation. The decomposition reveals systematic differences across country groups. Emerging issuers are located close to the financial frontier but remain far from the structural frontier, whereas high-potential innovators exhibit the opposite pattern, combining favourable structural conditions with comparatively limited green financial capacity. By contrast, leaders occupy positions close to both frontiers and exhibit the lowest within-group dispersion, indicating a more balanced innovation system than any other group. Distinguishing financial and structural gaps provides a more precise explanation of why similar levels of green finance generate different innovation outcomes across Europe. The results indicate that narrowing the financial gap alone is unlikely to eliminate cross-country disparities unless accompanied by improvements in the structural conditions that enable green innovation.

Beyond Non-Bankability: Financial Vulnerability, Borrowing Behaviour, and Renovation Finance in Bulgaria

Aniko Dobi-Rozsa, Adrian Balaci

Energy efficiency and building renovation finance policies rely on grant-based instruments in many European countries, with limited development of dedicated commercial loan schemes for financially vulnerable households. This grant-dominated architecture implicitly treats vulnerable households as a homogeneous group characterised by financial inactivity and inability to service debt. This paper examines whether observed borrowing behaviour among Bulgarian homeowners in multifamily buildings is consistent with this assumption. Using a household survey of 972 observations and two financial vulnerability indicators — high energy burden and utility-payment arrears — three regression models are deployed to examine the associations between vulnerability and formal credit participation, credit intensity, and consumer-credit use. A scenario-based repayment compatibility analysis then benchmarks simulated renovation-finance repayments against observed household debt-service obligations. We find that the two vulnerability indicators are associated with opposite borrowing profiles, thus challenging the prevailing assumption. These results suggest that financial vulnerability is not a single condition with uniform credit market implications, and point towards targeted financing instruments rather than uniform grant provisions as a more appropriate policy response.

Climate Risk-Induced Spatial Correlation and the Limits of Credit Portfolio Diversification

Barbara Dömötör, Ferenc Illés

This paper incorporates climate risk into the single-factor Vasicek credit risk model through spatial dependence in borrower-specific shocks. The principal methodological contribution is a spatial dependence channel that captures geographically proximate borrowers' exposure to common local climate hazards without introducing an additional global systematic factor or non-Gaussian shocks. We model local exposures using a Gaussian random field with distance-dependent correlations, preserving the economic interpretation of the conventional systematic factor. For portfolios distributed over a fixed geographical domain, we derive the limiting portfolio default rate as a spatial integral of conditional default probabilities. While independent borrower-specific risk diversifies away, spatially correlated shocks can generate residual portfolio uncertainty even as the number of borrowers approaches infinity. Conditional on the conventional systematic factor, the expected default rate remains equal to the Vasicek benchmark, but the limiting default rate need not be deterministic. Numerical simulations on the sphere illustrate how spatial correlation affects the distribution of portfolio default rates, ranging from the conventional Vasicek benchmark to the perfectly correlated spatial-shock limit. Our findings demonstrate that spatially correlated climate exposures can limit credit portfolio diversification without changing marginal default probabilities, challenging a fundamental assumption underlying the asymptotic single-risk-factor framework.

Co-opetition in Financial Markets: Liquidity, Market Support, and Benchmark-Induced Fragility

Ondrej Cernik

Financial-market benchmarks can become fragile before they are formally rejected. This paper develops a mechanism through which formally rational benchmarks may weaken the liquidity and market-support conditions required for their own implementation. The central claim is that liquidity support is not merely a market outcome measured by spreads, depth, or trading volume. It is an implementation resource through which competing financial-market actors sustain benchmark-based coordination. The paper argues that benchmark-induced asymmetry can create asymmetric liquidity, collateral, margin, funding, or counterparty-support burdens. These burdens affect both the capacity and the willingness of actors to provide liquidity and maintain market support. The result is not necessarily formal rejection of the benchmark, but support thinning: reduced liquidity provision, wider spreads, defensive collateral behavior, lower counterparty confidence, and higher modeled implementation failure risk. A limited Stella mechanism demonstration illustrates the argument. Across four controlled theoretical scenarios, Formal Benchmark Acceptance remains fixed at 1.00, while modeled liquidity support, market support, co-opetition fragility, and the model's behavioral implementability index vary substantially. The results illustrate failure before formal rejection and show that high benchmark-induced asymmetry is not automatically fatal when path readability and relational support preserve implementation support.

Determinants of Corporate Foreign Currency Debt: The Case of the Firms in Former Yugoslav Republics

Milan Čupić, Milica Kaplarević, Mirjana Todorović

The study aims to examine the determinants of foreign-currency debt among non-financial firms listed on stock exchanges in the former Yugoslav republics from 2012 to 2019. Probit and OLS regressions are used. The results suggest that firms in the former Yugoslav republics make debt decisions based on internal factors and business policies aimed at mitigating foreign exchange risk and benefiting from interest rate differentials. The influence of the country's dominant foreign currency on the financial and economic system is also significant. The study contributes to the literature by examining the influence of several factors, most often identified in the literature, on the use of foreign currency debt. The study results point to practical recommendations for reducing or eliminating the risks associated with foreign currency debt to improve business operations, financial stability, and economic development.

Does Public Debt Weaken the Growth Payoff from Renewable Energy? Evidence from a Threshold Model

Aletta Biszák, Chaoyi Chen, Gábor Neszveda

This paper examines whether public debt nonlinearly conditions the growth payoff from renewable energy consumption. Using an annual panel of 139 countries over 1993–2021, we estimate a dynamic panel threshold model with endogeneity and complement it with a Grouped Fixed Effects estimator to account for latent cross-country heterogeneity. The threshold test formally rejects a linear specification. The results identify a statistically significant debt threshold of approximately 30.4% of GDP, interpreted as the point at which the renewable energy–growth relationship changes rather than as a general debt-sustainability threshold. Renewable energy consumption is positively and significantly associated with growth in both regimes, but the estimated association is significantly attenuated above the threshold. Channel-based robustness checks show that this pattern is broadly present among net oil importers and higher-income economies, while the results differ markedly for net oil exporters and some lower-income or latent country groups. These findings suggest that fiscal conditions and structural characteristics jointly shape the economic dividends of renewable energy expansion.

Energy Uncertainty and Financial Connectedness in Central European Markets

Giancarlo Alexis Meléndez Córdoba, Ewa Dziwok, Silvia Romagnoli

Energy uncertainty has become an important source of financial instability, particularly in economies dependent on imported energy resources. Despite growing interest in news-based uncertainty measures, evidence on the relationship between energy uncertainty and financial connectedness in Central Europe remains limited. This study examines the dynamic interaction between the Energy Uncertainty Index (EUI) and financial markets in Poland, Hungary, and the Czech Republic. Using monthly data from 2001–2024 and a Time-Varying Parameter Vector Autoregressive (TVP-VAR) connectedness framework, we analyze shock transmission between energy uncertainty, government bond markets, and foreign exchange markets. The results show that financial connectedness is highly variable and increases during periods of geopolitical and economic stress. Energy uncertainty contributes to the transmission of financial shocks, although its position within the connectedness network changes over time. Before the Global Financial Crisis, the EUI acts primarily as a net transmitter of shocks, whereas in the post-crisis period it increasingly becomes a net receiver, reflecting broader macro-financial conditions. The findings also reveal substantial cross-country heterogeneity. Poland emerges as the main regional transmitter of spillovers, Hungary exhibits the highest sensitivity to external shocks, and Czech financial markets show the strongest integration with broader European developments.

From Traditional Scores to Explainable Machine Learning: Evidence on Structural Differences in Bankruptcy Prediction from a Central and Eastern European Economy

László Rajka, Zoltán Pollák, György Walter

Using large-scale panel data on Hungarian manufacturing firms from 2020 to 2024, this study compares traditional statistical models, machine learning approaches, and the original Altman Z-score using the same five Altman-type financial ratios. This common information set isolates the effect of model architecture from differences in variable selection. Predictive performance is evaluated through a stratified firm-year holdout benchmark and an out-of-time validation exercise, while SHAP-based analysis examines architecture-specific explanatory patterns. XGBoost achieves the strongest overall discriminatory performance in terms of ROC-AUC and Gini. However, the original Altman Z-score remains highly competitive in temporal validation, recording the highest PR-AUC and top-decile default capture despite relying on fixed historical weights. The findings also show that identical accounting ratios generate different explanatory structures across model classes. The study contributes by demonstrating that model architecture affects both predictive accuracy and the interpretation of corporate distress. For credit risk management, model governance, and financial supervision, the results suggest that model quality should be assessed jointly in terms of discrimination, rare-event identification, temporal robustness, interpretability, and practical usability, while transparent traditional models should not be dismissed solely because of their simpler structure.

Getting the Target Right in Return Prediction

Nusret Cakici, Adam Zaremba

We show that a largely overlooked design choice—how returns are defined as prediction targets—drives machine learning performance in stock returns. Using a large international panel of equities from 35 markets over 1994 to 2024, we compare transformations applied to stock characteristics and target returns. Transforming the target from raw to standardized or rank-based returns nearly triples predictive accuracy and doubles portfolio returns. Feature transformations play a secondary role. Rank-based targets perform best on average but discard information about return magnitudes, leading to underperformance when dispersion or skewness is high, particularly among micro-cap stocks. The optimal transformation varies across markets and over time.

How Much Predictive Power Is Actually Gained by Moving from Supervised to Unsupervised Learning?

László Madar

Credit risk modelling has traditionally relied on logistic regression scorecards because they combine acceptable predictive performance with transparency, stability and operational usability. Recent machine learning classifiers, especially XGBoost, LightGBM and neural-network-based models, often achieve superior results on public tabular prediction benchmarks, raising the question of whether classical scorecard methods remain competitive. This study provides an empirical comparison between an automated, binned logistic regression framework using all quirks of the banking industry's best practice and leading Kaggle machine learning approaches on three binary classification datasets: Give Me Some Credit, Home Credit Default Risk and Telco Customer Churn. The logistic regression benchmark is not treated as a naïve raw-variable model, but as a structured scorecard process using preprocessing, adjusted MDLP-based optimal binning, Weight of Evidence transformation, variable screening, forward stepwise selection and scorecard calibration – just as banks develop their scorecard, but in an automated way within a scorecard development tool called ISA. The machine learning benchmark represents the dominant high-performing Kaggle model family: gradient-boosted decision trees, supported by feature engineering and validation. The study therefore evaluates not only predictive performance, but also whether incremental statistical improvement is large enough to justify replacing interpretable scorecard models in credit-risk-style business environments.

How to Spot Outliers: An Ensemble Anomaly Detection Framework

Daniil Peysakhovich, Rafał Sieradzki

Errors in risk valuation outputs – arising from data-feed failures, model misconfiguration, or system malfunctions – can propagate undetected through an investment bank's risk infrastructure and generate material operational losses. Using proprietary daily credit-derivatives data from a major global investment bank, we design, implement, and empirically evaluate the Ensemble Quality Assessment Framework (EQAF): a layered, unsupervised architecture that combines complementary outlier-detection methods to monitor risk calculation integrity in real time. Using a controlled anomaly injection protocol with eight operationally realistic scenarios, we demonstrate that the calibrated ensemble achieves F1-scores of 61–79% – substantially outperforming the best individual method (6–66%) across four distinct risk-measure datasets. AUC-ROC improvements of 4–6 percentage points confirm the advantage is robust to threshold selection. We further establish that purely statistical detection methods structurally fail to identify stale-value anomalies – a class of frozen-feed errors in which valuation outputs are numerically identical to prior observations and therefore indistinguishable from normal data – and that domain-specific deterministic rules are architecturally indispensable. Our findings have direct implications for model risk management under Basel III and the Fundamental Review of the Trading Book (FRTB), where automated, auditable quality controls over internal risk models are increasingly mandated.

Measuring Corporate Biodiversity Exposure: A Geospatial Framework

Gergely Gajdócsi, Helena Naffa, Anita Lovas

Biodiversity loss has emerged as a critical systemic and financial risk, with significant implications for companies that depend on ecosystem services. This study contributes to the growing body of literature and methodologies aimed at measuring corporate biodiversity risk and dependency. Existing approaches predominantly rely on either structured scoring from investment databases or large language model-based analysis of corporate sustainability disclosures. Both methods are inherently indirect, depending on aggregated or qualitative proxies rather than primary ecological data. We advance beyond these limitations by integrating biodiversity metrics for spatial analysis and biodiversity dependence measurement. Our geospatial framework draws on established indicators including the Biodiversity Intactness Index (BII) and IUCN Red List assessments, mapping European company operational sites and activity types – by industry and sector – to corresponding ecosystem types and conditions.

Nonparametric Estimation and Testing of Heterogeneous Nonlinear Temperature–Yield Relationships

Chaoyi Chen, Yiguo Sun, Jianhan Zhang

This paper proposes a mixed sieve–kernel estimator for the nonlinear crop yield response model of Schlenker and Roberts (2009). Annual crop yields are modeled as the integral of an unknown yield response function with respect to a within-season temperature density, which is estimated nonparametrically. We establish consistency and asymptotic normality of the proposed estimator in a panel data framework and develop a formal test for the equality of state-specific yield response functions. Monte Carlo simulations demonstrate good finite-sample performance. An empirical application to U.S. county-level corn yields from 1950 to 2020 replicates the well-documented nonlinear temperature–yield relationship and strongly rejects yield homogeneity across states, providing clear evidence of substantial spatial heterogeneity in climate sensitivity.

Poor ESG, Strong Response? Regulatory Pressure and Corporate Investment in China

Dániel Havran, Dehua Xia

Poor ESG performance is often read as a marker of governance failure, but it can equally proxy for a firm's exposure to an incoming regulatory correction. We test this idea using China's 2015 revision of the Environmental Protection Law (EPL) as a quasi-natural experiment. Using a difference-in-differences design on a panel of Chinese non-financial listed firms, we show that firms with poor pre-EPL ESG performance increased real investment intensity significantly more than better-ESG firms after the reform, and that this effect appears to be driven primarily by agency slackness beyond the characteristics of heavily polluting industries. Consistent with a regulatory-adjustment mechanism, firms with poor pre-EPL ESG performance increased investment significantly more than better-ESG firms after the reform. The effect is concentrated among firms with weaker pre-existing monitoring and among financially unconstrained firms, suggesting that regulatory pressure translates into investment primarily where adjustment needs are greatest and firms possess the capacity to respond.

Predicting Financial Distress in Italian SMEs: An Empirical Investigation

Enrico Battisti, Noemi Bongiovanni, Satish Kumar, Antonio Salvi

Forecasting financial distress among small and medium-sized enterprises (SMEs) remains an empirically underexplored field, despite their structural centrality in economies such as Italy. Although distress prediction research has expanded considerably, evidence on whether methodological complexity translates into superior predictive performance in SME contexts remains inconclusive. This study evaluates the comparative predictive performance of statistical, ensemble, and neural network models on a matched panel dataset of 316 Italian SMEs with bankruptcy events observed between 2015 and 2023 and analyzes the dynamic financial deterioration preceding bankruptcy through Welch t-tests on profitability and cash flow generation measures. The findings show that statistical and ensemble models consistently outperform neural network architectures, with leverage and structural indicators emerging as dominant predictors while neural networks prioritize short-term liquidity indicators, failing to capture the long-term predictors of financial distress in SMEs. Additionally, dynamic analysis confirms significant deterioration in key performance indicators at least three years before bankruptcy. These findings suggest that interpretable and parsimonious models represent an effective foundation for early warning systems, with direct implications for SME managers and policymakers, especially in the light of the Italian Insolvency Code (Legislative Decree No. 14/2019).

Subordinated Debt and Heterogeneous Bank Lending During Crises: Evidence from Hungary

Marianna Endrész, Judit Hevér, Leyla Yusifzada

We study how subordinated debt in bank capital structures influences lending during systemic crises, highlighting heterogeneous effects across banks. Subordinated debt is associated with lending contractions, reflecting its link to weaker capital. The impact of subordinated debt is further shaped by funding conditions—non-core capital amplifies fragility under unstable funding. We also find that intragroup funding structures transmit parent-level stress to subsidiaries, with senior parent funding stabilizing lending while subordinated parent funding exacerbates stress.

The Five-Step Tango: Informational Efficiency in the Age of Fast Trading

Laurent Pataillot, Iordanis Kalaitzoglou, Brice Corgnet

We introduce a novel measure of informational efficiency in high-frequency markets, where traditional metrics prove inadequate. In these markets, algorithms extract information from order flow rather than fundamentals, generating additional trades in response to observed patterns—a phenomenon known as market reflexivity. We define high-frequency efficiency (HF-Efficiency) as the absence of such reflexivity, where order sequences are unpredictable and information is instantaneously incorporated into prices. Using a dataset from 14 exchanges (2019–2025) with microsecond-level resolution, we model order arrivals via Hawkes processes to quantify reflexivity and identify clusters. We estimate HF-Efficiency at 0.8, corresponding to an average cluster size of five orders. Empirically, we validate HF-Efficiency by demonstrating its ability to predict classical measures of informational efficiency, including those based on time-series models and standard risk-factor analyses. Our results reveal that HF-Efficiency remains remarkably stable over time, despite increases in market speed and variations in exchange characteristics. This invariance suggests two key insights: first, the race for speed does not enhance informational efficiency; second, market stability is largely unaffected by recent technological advances.

The Relationship Between National ESG Conditions, Banking Groups and Banks' Sustainability Disclosure – Evidence from the Visegrad Countries

Gabriella Lamanda, Zsuzsanna T. Vőneki

This study examines how national ESG conditions and banking-group affiliation relate to sustainability disclosure in Central European banking. Drawing on 174 bank-year observations from 26 banks operating in the Visegrad Four countries between 2017 and 2023, the analysis combines Refinitiv sovereign ESG scores with a 32-item ESG Disclosure Index developed through content analysis of approximately 550 bank reports. Correlated random-effects models are used to explore the relationships between national ESG performance, its environmental, social and governance dimensions, and bank-level disclosure. The findings reveal no significant association between aggregate national ESG scores and bank sustainability disclosure. However, the three ESG dimensions are jointly significant, with national governance quality emerging as the strongest positive correlate, while environmental and social scores show no significant independent relationships. The results also indicate a marked increase in ESG disclosure after 2020 and highlight the importance of banking-group affiliation in explaining persistent differences in reporting practices across banks. The study demonstrates that aggregate ESG measures may conceal important governance-specific relationships and suggests that both national institutional environments and banking-group characteristics are relevant to understanding sustainability disclosure in Central European banking.

Transition Risk and Asymmetric ESG Materiality in Credit Rating Downgrades

Sylwia Frydrych

This paper examines whether ESG information contributes differently to credit rating downgrade risk in carbon-intensive and non-carbon-intensive firms. Motivated by the transition-risk view, it investigates how ESG signals become financially material when firms face carbon regulation, emission standards, stranded asset risk, and changing investor preferences. Using 1,697 rating action observations for 141 European corporate issuers over 2015–mid-2025, we employ XGBoost classification models combined with SHAP values to identify non-linearities and threshold effects that traditional models overlook. The results show that ESG information matters in both groups, but through different mechanisms. Aggregate ESG importance is not higher in carbon-intensive firms; instead, the difference lies in the structure of ESG effects. In carbon-intensive firms, the Environmental Pillar is the most important ESG predictor and exhibits a clear threshold-based downside-risk pattern: downgrade risk increases at low environmental scores and declines only once a performance threshold is reached. ESG controversies also show stronger and more asymmetric effects in this group, consistent with heightened regulatory and reputational sensitivity to negative shocks. The findings suggest that ESG materiality in credit risk is not sector-specific in magnitude, but sector-specific in mechanism, with significant implications for sustainability-informed credit assessment and market stability.

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