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PRMIA RISK MANAGEMENT RESEARCH CONFERENCE 2024

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On 16 October 2024, the Hungarian Chapter of the Professional Risk Managers' International Association (PRMIA) held its annual research conference at Corvinus University of Budapest. After the keynote presentation on the proposal for a more prudent payment rule for adjustable rate mortgages, the speakers presented their research results in two sessions focusing on financial risks; biodiversity and ESG.
The program is shown in *Table 1*.

Table 1
Program of the 9th PRMIA Research conference

Attila Víg (keynote)	The loan paying rule of adjustable-rate mortgages
Session I. – Financial risks	Chair: Nóra Felföldi-Szűcs
Péter Juhász	Operational risks of using AIs in workplaces
Nóra Felföldi-Szűcs, Péter Juhász, Balázs Králik	The effect of allocation rules in corporate cash pools
Barbara Dömötör, Samet Günay, Attila Víg	FX market uncertainty or liquidity? Investigation of emerging market stress under various frequency bands.
Session II. - Biodiversity and ESG	Chair: Anita Lovas
Helena Naffa, Gergely Czupy, Márton Kiss, Balázs Kotró	Assessing Financial Systemic Risk through Biodiversity Loss: A Multi-Disciplinary Analysis Using Earth Observation Data
Wu Xintian	A Study on the Impact of ESG Performance on the Financial Performance of Listed Companies in China
Li Xinglin	Double materiality assessment of biodiversity-related risk: An analysis of the MSCI ACWI ETF Portfolio

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1 KEYNOTE LECTURE THE LOAN PAYING RULE OF ADJUSTABLE-RATE MORTGAGES

Adjustable-rate mortgages (ARMs) pose significant risks for borrowers, primarily because their monthly payments can increase substantially when interest rates rise. Unlike fixed-rate mortgages, which offer predictable and stable payments over the life of the loan, ARMs expose borrowers to the uncertainty of future market fluctuations, potentially leading to financial strain if rates climb sharply. Despite these risks to consumers, ARMs are often favored by banks due to their relatively low duration, allowing financial institutions to better manage their balance sheets and adapt more easily to evolving economic conditions.

In current banking practice, the annuity-type monthly payments of ARMs are calculated based on the assumption that the prevailing interest rate will remain constant until maturity, resulting in abrupt and potentially severe changes in the installment if interest rates rise, as the payment is recalculated using the higher rate over the entire remaining lifetime of the loan.

This research proposes a new method for calculating monthly payments by incorporating the expected path of interest rates. Using a continuous-time theoretical model, the author demonstrates that the suggested formula provides a smoother payment stream, which can help reduce default rates while preserving the advantage of low duration.

2 SESSION I: FINANCIAL RISKS

2.1

The first presenter, *Péter Juhász*, gave an overview of the operational risks associated with using AIs. Artificial Intelligence (AI) has become increasingly integrated into business operations, improving efficiency, decision-making and productivity, while reducing human error. However, its adoption also introduces new operational risks, such as data security breaches, algorithmic bias, and system reliability issues, which organizations must actively manage. The presentation reviewed key operational risks linked to AI, including ethical concerns, job displacement, overdependence on technology, integration challenges, data security vulnerabilities, scalability issues, inadequate testing, model drift, lack of transparency, regulatory compliance risks and herding behavior.

Ethical issues, such as algorithmic bias, can harm reputation, while job displacement due to automation requires workforce reskilling strategies. Overreliance on AI can create vulnerabilities if systems fail, and integration challenges can

disrupt existing workflows. Additionally, data security risks arise from the vast amounts of information AI systems process, while scalability and performance degradation issues may emerge in real-world deployment. Inadequate testing, lack of transparency in AI decision-making, and the need to comply with evolving legal standards further complicate AI risk management. Widespread use of similar AI tools can also lead to systemic market risks.

To manage these risks, companies should conduct thorough risk assessments, establish strong data governance frameworks, and implement bias mitigation strategies. Continuous monitoring of AI systems, employee training programs, and fostering a culture of human – AI collaboration are essential. Organizations must also adopt AI-conscious HR policies to ensure skilled oversight, stay aligned with regulatory requirements, and develop robust incident response plans. By proactively addressing these risks, businesses can maximize AI's benefits while safeguarding against potential operational pitfalls, ensuring resilience and long-term success in an AI-driven environment.

2.2

The next presenter, *Nóra Felföldi-Szűcs*, introduced her research on how cash pools can enhance the financial resilience of member firms during both normal and crisis periods. In collaboration with her coauthors, she examined the effectiveness of various cash pool allocation strategies. Instead of focusing solely on the availability of a cash pool, they modelled various allocation rules to determine the most effective structures for managing liquidity under varying economic conditions.

The liquidity of three firms was modelled, with liquidity developments driven by correlated Arithmetic Brownian Motions (ABM), reflecting either closely related or diversified firm structures. Firms aimed to maintain a target cash reserve to ensure business continuity having access both cash pools and bank credit lines to manage liquidity. Different allocation rules were tested: transferring excess cash to the firm most in need, least in need, or distributing it proportionally based on liquidity shortfalls.

A 10,000-run Monte Carlo simulation over a one-year period, with daily liquidity adjustments, evaluated these strategies. The simulation incorporated normal and crisis conditions, with crisis periods modeled by introducing jump processes to liquidity shocks. Results confirmed that cash pool cooperation significantly lowers default rates compared to firms managing liquidity individually. However, the study warned that the benefits of cash pools observed during stable periods may overstate their resilience benefits during crises.

The presentation highlighted that while cash pools improve liquidity management, their design and allocation rules critically influence their effectiveness, especially during financial distress. So, future research should examine more complex inter-firm dynamics and endogenize liquidity drivers to better capture firm-specific risks.

2.3

The third presenter of the session *Barbara Dömötör* with her co-authors introduced the research on the relationship between market stress measured by Emerging Market Financial Stress Index (EMFSI) and foreign exchange market changes in emerging markets. The authors applied MODWT-based multiresolution analysis to account for different investment horizons and found that the significance of correlations between currency returns and EMFSI increased with longer frequency scales. Wavelet coherence analysis revealed that co-movements are more driven by political events than by global economic crises like the GFC or COVID-19. Significant correlations were notably linked to events such as the annexation of Crimea, India-Pakistan conflicts, the China-US trade war, and political developments in Turkey.

To deepen the analysis, TVP-VAR frequency connectedness was also used, revealing that while long-term correlations were strong, short-term spillovers mainly drove these interactions, highlighting the predictive role of short-term currency market fluctuations. The authors suggested that investors should account for political risks in their required rates of return and portfolio strategies and regulators should develop indices that better capture dynamic political risks.

The presentation also highlighted that investment horizons significantly influence market behavior. While political risks shape long-term trends, their transmission often begins with short-term shocks. Therefore, effective political risk management is critical for economic policy success in emerging markets.

3 SESSION II: BIODIVERSITY AND ESG

3.1

The next session focused on a highly relevant topic in today's research: ESG and biodiversity. The first presentation was delivered by *Helena Naffa*, leader of the ESG Hub at Corvinus University. She argued that nature-related risks, particularly exposure to biodiversity loss, represent a systemic financial risk. To assess these risks, her research team utilized Earth observation (EO) data for conducting biodiversity risk assessments of financial issuers affected by nature-related

risks. Unlike ratings-based assessments, their approach is forward-looking, objective, non-manipulable, and independent of potentially biased, self-reported disclosures from financial issuers.

The presentation summarized the Biodiversity Geospatial Risk Impact Framework (BGRIF), a methodology for assessing geographic-based biodiversity-induced financial systemic risk using satellite imagery. The method builds on the System of Environmental Economic Accounts Ecosystem Accounting (SEEA EA) framework, proposing indicators to evaluate the condition of ecosystem services in specific geographic locations linked to the activities of financial issuers. By employing the cascade model from ecology, they connected industrial activities with their dependence on ecosystem services using the Exploring Natural Capital Opportunities, Risks, and Exposure (ENCORE) database, estimating biodiversity risk exposure at the industry level.

In addition, they analyzed the interdependencies and systemic risks between industries operating within European NUTS2 regions, linking them through interregional trade flows that serve as channels for transferring biodiversity risks. A core-periphery model was applied to examine how these trade connections influence the distribution of biodiversity risk across European regions. While their primary focus was on assessing biodiversity risk at the regional level, the methodology is adaptable to corporate issuers by aligning risk assessments with the geographic locations of their assets and supply chains.

3.2

The next presenter, *Xinglin Li*, introduced his PhD research, which examines the environmental dependencies and pressures of sub-industries within the MSCI ACWI ETF, focusing on their reliance on ecosystem services and environmental impacts.

He analyzed 157 GICS sub-industries based on their weight in the portfolio's net asset value and found that 148 sub-industries depend on at least one ecosystem service, with Semiconductors, Diversified Banks, and Technology Hardware being the most significant by asset value. Using the ENCORE methodology, he identified 43 sub-industries as highly or very highly dependent on 14 ecosystem services, representing 19.41% of the portfolio, or approximately $3.63 billion. Pharmaceuticals, for instance, were found to rely heavily on genetic material, water services and education, indicating major risk areas.

Dependencies were categorized as either "high" or "very high," with particular vulnerabilities around flood control, climate regulation, and soil retention. The pressure analysis evaluated the environmental impacts generated by sub-industries through resource use, emissions, and land alteration. Thirteen pres-

sure factors were identified, with 47 sub-industries exerting high impacts and 34 contributing very high impacts, notably through toxic soil and water pollution. Integrated Oil & Gas and Semiconductors emerged as the largest contributors to environmental pressures.

The presentation highlighted that several key sub-industries pose significant risks due to both their dependence on fragile ecosystem services and the environmental pressures they generate. These findings underscore the importance of integrating sustainability and risk mitigation strategies into portfolio management to support long-term financial and operational resilience aligned with environmental goals.

3.3

The last presenter, *Wu Xintian*, a Finance master student of Corvinus University of Budapest presented her master thesis, on the impact of ESG performance on the financial performance of listed companies in China. She pointed out that although China adopted ESG practices later than many developed economies, significant progress has been made, particularly in policy reforms and corporate reporting.

The analysis used a dataset of 4,332 A-share listed companies over the period 2010–2022. Employing panel data models with return on assets (ROA) as the dependent variable, and control variables such as company size, years listed, executive shareholding, Tobin's Q, and debt-to-assets ratio, she found a positive and statistically significant correlation between ESG performance and financial outcomes. Larger companies particularly benefited, leveraging their resources to integrate sustainable practices that boost investor confidence and financial stability. Smaller firms, while positively impacted, faced greater resource constraints in capitalizing on ESG advantages.

Theoretically, the research enriches the literature on ESG impacts in emerging markets. Practically, it advises companies to embed ESG into their operations to enhance transparency and financial performance. For investors, ESG serves as a useful predictor of financial health, and regulators are encouraged to strengthen ESG disclosure standards to improve market transparency and accountability.

SUMMARY

PRMIA's research conference aims to provide a platform for sharing research results between theoreticians and practitioners. The topics presented at this conference reflected the latest research trends. The rise and spread of artificial in-

telligence are reshaping risk management, while biodiversity conservation has emerged as a key theme in sustainability. It is hoped that collaborative thinking in these areas will advance the debate, deepen understanding, and contribute to the development of effective solutions.