

A Research Statement

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My research intersects applied econometrics, financial economics, macroeconomics, and the economics of climate change, focusing on how markets and economic systems respond to sustainability transitions, climate risk, and structural shifts in global financial systems. I investigate how information, risk, and uncertainty are incorporated into market prices, how intermarket linkages evolve over time, and how these dynamics are influenced by financialisation, climate policy, and other structural changes.

Through the collaborative and interdisciplinary research initiatives, my research not only seeks to unravel the complex dynamics shaping the global economy but also aims to provide actionable insights. In particular, I employ a systems-thinking approach to the UK investment system to examine how resilience can be enhanced within financial frameworks. This reflects my commitment to innovative research design and methods that align with the real-world economic and environmental demands, laying the groundwork for a sustainable economic future.

I have published peer reviewed research in the *International Review of Financial Analysis* and the *Journal of Environmental Management*, with a further article accepted at *European Financial Management*. I also have a manuscript currently under review following a revise and resubmit decision at the *European Journal of Finance*. This paper analyses volatility dynamics in equity and commodity futures markets, with particular attention to persistence, seasonality, the Samuelson hypothesis, and cross market interconnectedness, including differences between off index and in index futures. The study examines how financialisation has altered these volatility processes and the transmission of risk across markets.

As well as this, I am preparing several manuscripts which are at an advanced stage for submission to journals. These papers cover three main areas: (i) applied and climate econometrics; (ii) macro-finance; and (iii) energy and environmental economics. The first strand employs empirical measures of dependence, persistence, and tail behaviour in financial and climate data. For example, in climate econometrics paper, we evaluate paleoclimate sensitivity, i.e., the relationship between global temperatures and radiative forcing over the past 800,000 years using two co-movement measures (long-run covariability and quantile coherency). Our findings indicate that the relationship is considerably weaker during full glacial climates compared to interglacial periods and intermediate glacial climates. The second strand examines whether financial and commodity markets absorb shocks or transmit them, how this varies across regimes and horizons, and the implications for risk management and macroeconomic uncertainty. The third strand studies how environmental and energy risks enter economic systems and markets, including through climate related assets and transition signals, with implications for risk pricing, the allocation of capital, and policy interpretation.

Alongside academic work, I lead the quantitative strand of the New Capital Consensus (NCC), in collaboration with the Chatham House Sustainability Accelerator, convenes industry leaders, policymakers, and academics to examine institutional reform of the UK financial sector using a systems-thinking lens. This collaboration culminated in a parliamentary launch at the House of Commons, with the UK Pensions Minister. From the NCC work, I have co-authored a white paper, which is feeding into policy discussions with the HM Treasury and other departments. It reflects my growing role as an economist whose research not only informs theory but

also shapes national policy debate. I also worked at the UK Centre for Greening Finance & Investment (CGFI), funded by UKRI-NERC, focuses on integrating climate science into financial decision-making. In this project I contributed to work on climate risk communication for UK mortgage portfolios, developing narrative-based approaches to flooding and overheating risks in partnership with the Building Societies Association.

I have also recently embarked on developing research grant applications, with planned submissions focused on the corporate biodiversity footprints and the systems thinking approach in the financial system, targeting funding bodies such as UKRI-ESRC Grant, ERC starting grant, among others. These applications are designed to consolidate my existing strands of work and to scale them into larger, collaborative programmes.

My future research is structured around three research streams: (i) Climate Change; (ii) Financial Systems and Challenges of Ergodicity; and (iii) Commodity Market Dynamics. This agenda is developed in collaboration with colleagues across institutions in the UK, Europe, Asia, and Australia.

In the first research stream, I explore how climate risks enter financial decision-making and how climate information can be measured and communicated. Ongoing projects include work on pension fund trustees' understanding of climate risk, paleoclimate sensitivity and temperature anomalies, climate policy uncertainty, and corporate biodiversity footprints. In the biodiversity project, we examine how corporate biodiversity footprints relate to ESG investment returns and how environmental and social metrics interact with financial performance.

The second research stream focuses on the adaptive complexity of financial systems, especially under the conditions of market stress or crisis. Traditional financial models, often based on ergodic assumptions, struggle to capture the unpredictable, non-linear dynamics of the financial networks. My work addresses the unique, non-ergodic nature of these systems to provide insights into the risk management and financial resilience, aiming to bridge the gap between the conventional models and the real-world complexities of global financial systems.

In the third research stream, a solo-authored endeavour, I plan to study commodity futures under climate and energy shocks, with an emphasis on persistence, tail risks, and time variation. These projects include: (i) the dynamic nexus between climate risk, oil shocks, and energy/agricultural futures; (ii) time-varying long memory in energy futures using Local Whittle estimation; and (iii) extreme price dynamics in commodity futures using Extreme Value Theory. The aim is to identify how climate risks and structural shifts affect volatility, price discovery, and market efficiency, and to produce evidence relevant to risk management, policy, and investment practice.

In the future, I intend to seek external funding (John Templeton Foundation fund, Leverhulme Research Project Grant and Horizon Europe) to expand upon these three research streams, both locally and internationally. As an Assistant Professor at your institution, I would prioritise building multidisciplinary collaborations with scholars specialising in energy and environmental economics, and applied econometrics, and the Economics of Systems Thinking as it relates to sustainable development. Additionally, I would leverage my industry experience and connections to work closely with colleagues on consulting and applied research projects. These initiatives would not only enhance the visibility of your institutions but also deepen the societal impact of the research through practical, high-visibility contributions.