NBER Digital Economics and AI Tutorial, 2027

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1. Background

I am currently a third-year PhD candidate in Economics at the University of Galway, Ireland. I have completed all the required coursework and am in the PhD thesis phase of the program. My doctoral training combines econometrics, economics, and machine learning applications. My PhD research is part of the MPA-LIFE-Ireland project, which is fully funded by the European Union and the Department of Housing, Local Government, and Heritage, Republic of Ireland.

Prior to my PhD, I completed an MSc. Economics (Quantitative Economics specialisation) at the University of Jena, Germany, and a BSc. Mathematics with Economics. My professional experience includes serving as a Junior Research Fellow at the European Institute of Policy Research and Human Rights (Germany), where I contributed to research on poverty and energy efficiency in oil-producing African countries.

2. Research Interests

My research lies at the intersection of economics, econometrics, and artificial intelligence (AI). Broadly, I focus on:

- **Machine Learning and AI in economic valuation:** developing hybrid econometric-machine learning models for non-market valuation of marine natural capital.
- **Discrete choice and behavioural economics:** integrating ML algorithms to capture heterogeneity and test behavioural consistency in stated-preference data.
- **AI and macroeconomic policy:** analysing the role of AI-driven uncertainty in environmental taxation, marine economy growth, and monetary policy frameworks.
- **Digital monitoring of conservation policies:** exploring the integration of digital robots, drones, and remote sensing for monitoring and evaluating Marine Protected Areas (MPAs).
- **Social media and digital trace data:** applying machine learning and natural language processing (NLP) to social media data to understand public sentiment toward designating MPAs in Ireland.

These interests combine frontier digital tools with applied policy challenges in climate, biodiversity, and sustainability finance.

3. PhD Dissertation Research

Title: ***Economics of Marine Protected Areas in Ireland: A Discrete Choice Experiment and Machine Learning Approach***

Abstract

My PhD research contributes to methodological frontiers of knowledge by applying machine learning and econometric methods to assess public willingness to pay (WTP) for the expansion of Marine Protected Areas (MPAs) in Irish waters (digital monitoring of MPAs for biodiversity conservation). Using a discrete choice experiment survey, I am seeking to analyse preference heterogeneity, cost sensitivity, and behavioural consistency in stated-preference responses. So far, I have proposed the Behavioural Consistency Index (BCI), a diagnostic tool for evaluating whether ML models align with economic axioms such as monotonicity and rationality (*submitted to the Journal of Machine Learning and Applications*). This research advances valuation methodology by integrating AI into environmental economics, demonstrating how digital tools can enhance the credibility of welfare estimates for natural capital.

In a later stage, the EU MPA-LIFE-IRELAND project, which my PhD research addresses, work package (WP3) will extend into digital monitoring of MPAs, involving the potential use of autonomous drones and underwater robots to collect ecological and compliance data. These technologies generate new digital datasets that, when combined with AI and econometric models, can significantly enhance the monitoring, enforcement, and adaptive management of MPAs in Irish waters.

Alongside my dissertation, I have authored a review paper, ***"Economic Valuation Methods and their Relevance in Achieving Marine Protected Area Targets: State-of-the-Art and AI Missing Pathways"*** (Ankamah, J., Hynes, S., & O'Leary, D., 2026). This work highlights that less than 3% of global MPA research considers valuation, reveals the dominance of non-market methods, and identifies the missing role of AI in natural capital accounting. It proposes an integrated framework combining conventional econometric methods with data-driven predictive analytics to help meet the global and Europe's 30x30 biodiversity target.

I am also developing a working paper (***Sentiment Analysis towards Ireland's Marine Protected Areas: Using social media and machine learning***), which applies NLP and sentiment analysis to X (*Twitter*) data. This complements stated-preference valuation by offering real-time, digital insights into public attitudes toward MPAs.

Supervisory Committee members:

- Prof. Stephen Hynes (Primary Supervisor, SEMRU, University of Galway, Ireland)
- Dr. Tom McDermott (Graduate Research Committee, University of Galway, Ireland)

- Dr. Tim O'Higgins (Graduate Research Committee, Scientific Policy Advisor, DHLGH, Dublin, Government of Ireland).
- Prof. Mark Peter Johnson (Established Chair, Graduate Research Committee, University of Galway, Ireland).

4. Why am I applying for the NBER Digital Economics and AI Tutorial

Digital economics is the field of economics that examines whether and how digital technology changes markets, including market structure, firm behaviour, consumer interactions, and welfare outcomes. It provides the broader framework for my research. My work extends this scope into non-market valuation and environmental economics by applying AI and digital tools, such as online willingness-to-pay surveys, social media sentiment analysis, and drone-based monitoring data, to study Marine Protected Areas (MPAs).

The NBER Digital Economics and AI Tutorial is highly aligned with my doctoral research focus. My PhD project demonstrates how AI and digital methods, machine learning algorithms, digital data analysis, econometrics, AI hybrids, and digital monitoring technologies can be extended beyond traditional markets to inform environmental valuation, public sentiment, and conservation policy evaluation.

By participating in the tutorial, I aim to:

1. Deepen my technical expertise in AI methods that can be adapted to non-market valuation and digital trace analysis.
2. Connect with researchers who are advancing digital economics in both market and non-market domains.
3. Bring insights from environmental and resource economics into the broader AI and digital economics conversation, highlighting new frontiers where these tools can add value.

This opportunity would strengthen the methodological foundation of my dissertation, enhance my ability to contribute to the economics of digital and AI transitions, and support my future career as a researcher at the interface of digital technology and sustainability economics.

Acknowledgements and Disclosure

My doctoral research is conducted within the MPA-LIFE-Ireland project, supported by funding from the European Union and Ireland's Department of Housing, Local Government and Heritage. I acknowledge the research support provided through this project and the University of Galway, Ireland. I have no other additional financial relationships or potential conflicts of interest to disclose in connection with this application.