PIETRO SALA

Applied Economist | Agricultural, Water and Resource Economics

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PROFILE

Applied economist in the final year of a PhD in agricultural and resource economics at the Technical University of Munich (expected April 2027). My research uses econometrics, mainly stochastic frontier analysis, panel data methods and causal machine learning, to study how farms use inputs and resources, and how policy shapes those choices. Since 2023 I have worked in two EU-funded research consortia on water governance, the water-energy-food-ecosystems (WEFE) nexus and nature-based solutions. Results from both projects provided policy recommendations for local administrators and EU policy makers. Outside academia, I co-run Mithril Metrics, a platform that applies these methods to current policy questions with public data. At the chair, I am also responsible for outreach to Southeast Asia, with partners in Vietnam, Cambodia, Malaysia, and Indonesia. I speak Italian (native), English (C2) and Spanish (B2), and French at an intermediate level (B1).

PROFESSIONAL EXPERIENCE

Technical University of Munich, Chair of Agricultural Production and Resource Economics Apr 2023 – present
Research Associate and PhD Candidate, Freising/Munich, Germany

- **PhD research:** efficiency and productivity of natural-resource use in agriculture. Methodological work on stochastic frontier analysis (regularity conditions in translog frontiers, machine-learning-based estimators, separating weather-driven losses from managerial inefficiency), with empirical applications.
- **RETOUCH NEXUS (Horizon Europe), water governance and WEFE nexus:** co-authored the project's assessment of available data and data gaps across EU case-study river basins (Deliverables 1.2–1.4) and a review of welfare and policy in hydro-economic models (Water Resources Management, 2026). Co-developed a system dynamics model of the economic effects of water scarcity in the Upper Main River Basin (Germany; SSRN preprint, 2026) and translated case-study results, including water pricing in the Júcar basin (Spain), into policy options for DG Environment. Developed a Shiny R tool for generating composite indicators under a WEFE framework.
- **PONDERFUL (Horizon 2020), nature-based solutions and climate adaptation:** lead author of the project's economic evaluation of ponds as nature-based solutions, measuring their effectiveness and eco-efficiency across European study sites (Journal of Environmental Management, 2025); contributed to the landscape-scale synthesis on implementation barriers (Hydrobiologia, 2026).
- **Water quality and growth:** panel econometric analysis of the relationship between economic growth, water pollution and water stress in the EU (Environmental Kuznets Curve; Journal of Environmental Management, 2026).
- **Climate risk and loss compensation:** developing a stochastic frontier framework that splits weather-related farm output shortfalls into technological weather losses, average-manager adaptation shortfalls and farm-specific managerial shortfalls, applied to Italian FADN (RICA) data to audit the targeting of EU CAP loss compensation (Art. 76 risk-management tools).
- **Southeast Asia outreach:** responsible for the chair's research and teaching links with the region. Co-developed, with Universiti Putra Malaysia and the Malaysian Palm Oil Board, a proposal to the Council of Palm Oil Producing Countries (CPOPC) on the contribution of palm oil to global food security, now shortlisted; responsible for the econometric design. Co-delivered an online lecture with Universitas Padjadjaran (Indonesia).
- **Communication:** manage the chair's external communication (LinkedIn, website news).

Mithril Metrics 2026 – present
Co-founder, independent policy-analysis platform, mithril-metrics.github.io

- Co-run a platform that publishes short, reproducible case studies on agri-food, water and climate policy (productivity, water pricing, climate risk). Each answers one current policy question from public data in concise, decision-oriented findings for non-specialists, with the R code published on GitHub.

Studio Brado Oct 2020 – present
Freelance Web and Graphic Designer (ongoing collaboration), Parma, Italy

- Design and build websites and digital communication for more than 20 clients in a range of sectors, handling each project from client brief to delivery.

UP! Comunicazione Sep 2018 – Oct 2020
Freelance Communication and Web Designer, Parma, Italy

- Planned content marketing and paid social media advertising; designed websites and visual material for print and online.

EDUCATION

PhD, Agricultural Production and Resource Economics 2023 – Apr 2027 (expected)
Technical University of Munich, TUM School of Management, Germany

Double Master's Degree Programme 2020 – 2023
M.Sc. Agricultural and Food Economics, Università Cattolica del Sacro Cuore, Italy. Grade: 110/110 cum laude
M.Sc. Management, Economics and Consumer Studies (Economics and Governance), Wageningen University & Research, Netherlands. Grade: 8.4/10

B.Sc. Gastronomic Sciences (Food Science) 2016 – 2020
Università degli Studi di Parma, Italy

B.Sc. Building Architecture 2013 – 2016
Politecnico di Milano, Italy. Grade: 106/110. Exchange year at Universidad de Chile, Santiago

PUBLICATIONS

Peer-reviewed articles

- Bremer, L., Ansink, E., Baccour, S., Twohig, C., Henao, J.P., **Sala, P.**, Rubio Martin, A., Vrachioli, M. (2026). Bridging the nexus: Policy and welfare dimensions in hydro-economic models. *Water Resources Management*, 40, 501. doi:10.1007/s11269-026-04848-0
- Blicharska, M., Lago, M., McDonald, H., Robin, J., **Sala, P.**, Vrachioli, M., Ryfisch, S. (2026). Challenges for assessing and implementing nature-based solutions at landscape-scale: Insights from a project on ponds and pondscapes. *Hydrobiologia*. doi:10.1007/s10750-026-06212-0
- Dinov, V., Henao, J.P., **Sala, P.**, Vrachioli, M. (2026). Environmental Kuznets Curve applications for water pollution in the EU. *Journal of Environmental Management*, 398, 127942. doi:10.1016/j.jenvman.2025.127942
- **Sala, P.**, Vrachioli, M., Frick, F., Lemmens, P., Davidson, T.A., Brucet, S., Sauer, J. (2025). Evaluating ponds as nature-based solutions: Effectiveness and eco-efficiency. *Journal of Environmental Management*, 393, 126933. doi:10.1016/j.jenvman.2025.126933

Preprints

- Twohig, C., **Sala, P.**, Henao, J.P., Presser, L., Huang, J., Vrachioli, M. (2026). Economic implications of water scarcity in the WEFE nexus: A system dynamics model of the Upper Main River Basin, Germany. SSRN Working Paper 7307240. doi:10.2139/ssrn.7307240

Conference contributions

- Rubio-Martin, A., Gomez-Martin, E., Ansink, E., Bremer, L., Tavernier, L., Henao, J.P., Villalba, R., Lazorcakova, E., Rajcaniova, M., Fovelle, S., Gracia, C., Cutajar, A., Monaco, M., Macian-Sorribes, H., Pulido-Velazquez, M., **Sala, P.**, Vrachioli, M. (2024). A comparative analysis of economic instruments for water management across Europe. EGU General Assembly 2024, Vienna, 14–19 April 2024, EGU24-11849 (poster). doi:10.5194/egusphere-egu24-11849

Working papers and work in progress

- **Sala, P.**, Vrachioli, M., Frick, F., Sauer, J. The cost of regularity: Empirical evidence on monotonicity, quasi-concavity and frontier flexibility. Presented at the XIX European Workshop on Efficiency and Productivity Analysis (EWEPA), Munich, June 2026.
- Bad luck or bad management? Separating weather losses from managerial inefficiency in stochastic frontier models, with an application to loss compensation for Italian farms (in progress).

Project reports

- RETOUCH NEXUS Deliverables 1.2, 1.3 and 1.4 (2024), including "Available data, data gaps and their implications" (D1.4), co-author.

SKILLS

Econometrics: efficiency and productivity analysis (SFA, DEA), panel data (fixed effects), instrumental variables, regression discontinuity, selection models, double/debiased machine learning, LASSO and elastic net, Monte Carlo simulation, causal econometrics

Policy areas: water resources management and pricing, WEFE nexus, nature-based solutions, climate risk and loss compensation in agriculture, agricultural productivity, food security

Software: R (advanced), Stata, Python, GAMS, LaTeX, MS Office; Adobe Creative Suite, HTML/CSS for data visualisation and communication

Languages: Italian (native), English (C2; TOEFL iBT 115/120), Spanish (B2), French (B1)