Research Statement

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My research as an applied economist seeks to understand how firms and consumers respond to environmental and technological transformations, and how market-based policies can guide these adjustments toward a low-carbon economy. I study these processes at the intersection of climate policy, industrial organization, and energy economics, combining quasi-experimental and structural approaches. Through the contexts outlined in the following sections, my aim is to inform the design of public policies that promote efficient and equitable adaptation to the climate transition. Section 1 presents my main research agenda on carbon markets, examining how emission trading affects firm behavior through plant exit, internal reallocation, and interactions with new sources of energy demand such as digitalization. Section 2 discusses two studies on electricity markets and energy efficiency, utilizing two natural experiments in the fields of demand response and efficient housing in Switzerland. Finally, Section 3 outlines an ongoing project examining the effect of repeated climate extreme events like floodings on firm operational outcomes and relocation choices.

1 Carbon Emissions and Industry Dynamics

Cap-and-trade systems around the world promise to decrease emissions in a cost-efficient way by introducing additional costs for polluting firms and rewarding cleaner companies with the extra revenues from selling unused carbon permits. Motivated by the ongoing expansion of the EU Emissions Trading System (ETS) and the broader transformation of energy-intensive sectors, my research examines how carbon-market design shapes firm and industry adjustment under evolving economic conditions. In particular, I study the mechanisms through which carbon pricing reduces emissions through endogenous plant exit, within-firm reallocation, and the interaction of market incentives with new sources of energy demand such as digitalization.

In my job market paper, **"Carbon Permits, Plant Emissions and Industry Dynamics: To Cut or to Quit?"**, I mostly focus on the compositional effects of the EU ETS. I study how changes in free permit allocation rules affected plants closure decisions, using French administrative data and the EU Transaction Log database. The research leverages a

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policy shift in 2013 that differently allocated free permits based on newly-introduced product benchmarks, which tightened allowances for dirtier plants. By relying on a difference-in-differences strategy and a survival analysis, I find that emissions following the new rule fell substantially, but that reductions came not only from abatement at surviving plants: about one-third was explained by plant exit, while roughly 30–40% of the plant-level reductions do not translate into net firm-level abatement. Building on this evidence, a second early-stage project isolates an additional channel of adaptation: within-firm reallocation of workers and output. Whether firms adapt or not by closing inefficient plants, multi-plant firms still have the opportunity of reacting to tighter climate policies by reallocating labor and production across their plants. By leveraging matched employer–employee administrative data linked to plants in the ETS, I aim to answer the following questions: when a plant is heavily affected by allocation cuts, do firms reallocate workers to cleaner plants? And when plants shut down, are their workers absorbed within the firm or displaced from the industry? The research question connects to recent models of multi-plant adjustment under tighter carbon policies (e.g. Bustamante and Zucchi (2022), Stillger (2025)), and recent evidence on reallocation of resources across entities owned by the same business group (e.g. Cestone et al. (2023), Alder et al. (2025)).

In a third project, I examine how the rapid digitalization of European economies affects the pace of decarbonization in the power sector. As most countries move toward data-intensive production and services, the surge in electricity demand from data centers is creating new baseload needs that often rely on fossil generation (e.g. Bonfiglioli et al. (2025)). I study whether these digitalization-driven demand shocks interact with carbon-market design to slow the retirement of fossil power plants. The analysis exploits the institutional setting of the EU Emissions Trading System (EU ETS), where since 2013 most power plants must buy carbon permits, yet several lower-income Eastern-European Member States temporarily continued to receive free allowances to modernize their sectors (a setting used in Zaklan (2023)). At the same time, data-center capacity expanded rapidly but unevenly across Europe, generating exogenous local variation in electricity demand. Using a 2005–2025 panel of individual power plants combining verified emissions, generation, and closure data from EUTL, ENTSO-E and national TSOs, as well as geocoded data-center openings, I estimate how proximity to new data centers affects plant exit and emissions, and whether these effects differ with the extent of free permit allocation. These results inform whether digitalization and market design can inadvertently create a rebound effect, locking in fossil generation where carbon-market policies provide implicit protection to dirtier plants.

2 Electricity Markets and Energy Efficiency

Industrialized and emerging countries are implementing energy and climate policies to promote the energy transition away from fossil fuels, thus requiring the development of increasingly electrified energy systems in ever-more energy efficient buildings. To address the push for electrification and efficiency in transportation and heating, two of my projects use behavioral economic theory through a randomised-controlled trial approach (RCT).

In terms of electricity tariffs, the project **"The Impact of Monetary Incentives on the Adoption of Direct Load Control Electricity Tariffs by Residential Consumers"**[2] focuses on the company and market level implications of a demand response mechanism introduced in the Swiss Canton of Ticino. This research evaluates the effectiveness of two incentives (i.e. a video intervention and an upfront monetary subsidy) in increasing the adoption of an existing direct load control (DLC) tariff among owners of electric vehicles and heat pumps. By conducting both a stated-choice survey and a revealed-choice RCT, I confirm that both interventions slightly but positively influence acceptance rates, although I observe no substantial impact of the resulting DLC tariff increased adoption on system cost reduction and wholesale prices. In line with the work of Yilmaz et al. (2022) and Hortaçsu et al. (2017), this paper underscores the importance of considering a broader range of barriers to adoption of demand-response tariffs on top of economic incentives, especially when aiming at using these findings to perform market-level predictions.

The project sparked my interest in studying the impact of an information policy designed to improve housing efficiency. In this second study, I exploit data from past consulting interventions, conducted by energy engineers at a sample of households, to compute the personalized savings that each household would obtain if they performed a certain type of refurbishment — net of regional and national subsidies. Using an RCT approach, I identify whether informing households of monetary personalized estimates of energy savings increases their likelihood of performing multiple refurbishment (e.g. solar panels, heat pumps, insulation), compared to only presenting a ranking of suggested types of refurbishment. In line with past findings on framing theory in behavioral economics (e.g. Boogen et al. (2022), Carroll et al. (2022)), I expect that presenting households with monetary estimates could result in a higher probability of undergoing multiple refurbishments.

[2] Joint work with *Davide Cerruti, Massimo Filippini* and *Jonas Salvelsberg.*

3 Extreme Climate Events and Firm Adaptation

With the increasing frequency and magnitude of extreme climate events (ECEs), long-term responses of firms to repeated climate events are still understudied. A core area of my research follows the recent emergence of a field that relates extreme climate-related events (ECEs) to firm location choices and long-term industry dynamics (e.g. Balboni et al. (2023), Jia et al. (2025)). Specifically, do repeated disruptions induce firms to undertake long-term adaptive changes (e.g. geographical relocation, across-plants reallocation) so to mitigate future vulnerability?

My ongoing project, **"Flood me once, flood me twice"**[3], examines how firms adapt to repeated floodings and whether temporary disruptions induce lasting changes in survival, production, and location choices. I exploit a quasi-natural experiment: the December 1999 "Lothar" storm, which caused flooding across nearly 70% of French municipalities. The main analysis relies on official disaster declarations and administrative firm-level data to track exposure and firm outcomes. As a robustness check, we "clean" the treatment group of firms located in affected municipalities by validating declared emergencies against river discharge and historical flood data from the Global Flood Awareness System (Grimaldi et al. (2022)). Through a propensity-score–matched staggered difference-in-differences design, preliminary results suggest that flooded firms present output losses of up to 5% even six years after the event, in line with existing literature (e.g. Fatica et al. (2024)), and destruction of inventories up to 20% at impact, but no persistent effects on employment or fixed assets. Through a structural model, we plan on further investigating whether subsequent floods amplify damages, due to cumulative losses, or attenuate them, through adaptation such as capital investments, internal reallocation, or relocation.

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