Research Statement

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Introduction

My research seeks to understand the processes at the intersection between current climate policies and potential future adaptation from a market perspective. Firms' costs and consumers' preferences both adjust as they try to bridge the gap between our current way of living and an ideal target to strive for, in light of the challenges of sustainable growth. Through exploring various of these markets, I want to contribute to the analysis of public policies and ultimately inform new policy creation that guides firms' and consumers' behaviour towards climate transition. Although my primary approach is empirical, I regard complementing empirical findings with structural models as an essential step to gain insight into the processes that shape behaviour, as evident from my ongoing projects.

In the following sections, I present three core areas of research. Section 1 focuses on my main research agenda, in which I investigate how firms and consumers within different industries reacted to a policy change in the EU Emission Trading Scheme, to determine whether permit allocation choices influence firm emission adaptation, green investment and consumer prices. 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 two projects examining the effect of climate events on firm and voter behaviors: do they adapt to increased climate risks and the occurrence of extreme events?

My contribution to these topics is highly relevant for various reasons. With respect to carbon markets, while previous studies (e.g., Reguant and Ellerman (2008), Bustamante and Zucchi (2022)) have focused on theoretical approaches, my novel work empirically examines the regional and sectoral impacts of free allocation in carbon markets, extending beyond electricity production (Zaklan (2023), Fabra and Reguant (2014)). With respect to electricity markets and efficiency, my projects on consumer inertia and switching costs of demand response and housing refurbishment are among the first to overcome hypothetical bias by making use of revealed-choice natural experiments instead of a stated-choice approach (e.g. Yilmaz et al. (2022), Boogen et al. (2022)). Finally, with respect to climate risk and events, only a handful of other papers (e.g. Balboni et al. (2023)) analysed the long-term industry dynamics and relocation impacts of increased climate risk using both theoretical and empirical approaches.

1 Grandfathering, Emissions and Green Investment

Cap-and-trade systems around the world promise to decrease emissions in a cost-efficient way by introducing additional expenses for polluting firms and rewarding cleaner companies with the extra revenues of selling their unused carbon permits. What happens, however, to emissions, green investments and consumer prices when "bad" firms are given most of their permits for free, while carbon prices are too low to compensate "good" firms?

Motivated by the upcoming expansion of the EU Emission Trading Scheme (ETS) to new sectors, and contributing to the literature on carbon permit overcompensation (e.g. Martin et al. (2014)), a key part of my research focuses on the ETS effectiveness in reducing emissions and fostering green investments by overcompensated firms. Specifically, I study the impact of grandfathering (i.e. automatically allocating a percentage of total carbon permits to certain polluting plants) on realised emissions, operational behaviour and investments. While some papers already looked at the impact of free permits on emissions (e.g. Reguant and Ellerman (2008), Zaklan (2023)), no analysis has so far exploited both the industry and the geographical components of permit allocation rules to study their heterogeneous impacts on emissions and firm choices. In my project **"The Impact of Free Carbon Credits on Emissions and Investments: Evidence from France"** I explore how the allocation of free carbon permits within the EU ETS influenced regional emission levels and firm operational decisions using French administrative data and the EU Transaction Log database. This research leverages a policy shift in 2013 that differently allocated free permits based on industry benchmarks, and brought free allocation to zero for electricity generation plants. By exploiting the temporal variation in yearly allocation, industry variation introduced by the new allocation rule, and the regional variation of allocated permits to French firms, I use Bartik instruments to assess the policy impacts on French regional emissions and firms across various sectors. Adding on what Zaklan (2023) did for the electricity sector to the rest of ETS-covered sectors, and calibrating the model proposed by Bustamante and Zucchi (2022) with French establishment-level data, I expect to find whether effectively making the ETS binding for firms pushes green investments or merely increases short-term abatement measures.

With respect to the consumer side, the new allocation rule and additional ETS market mechanisms (e.g. Backloading, Market Stability Reserve, Invalidation Rule) seem to have effectively boosted the previously sluggish carbon prices. Since by construction the rule affected ETS-covered sectors differently, and one would expect heterogeneous abilities by sector to pass-through emission costs (e.g. Neuhoff and Ritz (2019), Fabra and Reguant (2014)), a possible addition to the literature on pass-through could analyse how it affected consumer choices though final price shifts.

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.

In terms of electricity tariffs, my submitted paper on **"The Impact of Monetary Incentives on the Adoption of Direct Load Control Electricity Tariffs by Residential Consumers"**[1] 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 levels of an existing direct load control (DLC) tariff among owners of electric vehicles (EVs) and heat pumps (HPs). By conducting both a stated-choice survey and a revealed-choice randomized-controlled trial, 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-

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

response tariffs on top of mere 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 Ticino. 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.

3 Adaptation to Climate Risk and Extreme Events

With the increasing frequency and magnitude of extreme climate events (ECEs), long-term responses of firms and individuals to rising climate risk are still understudied. Accordingly, a few questions arise. Do temporary disruptions induce firms to undertake long-term adaptive changes (e.g. geographical relocation, across-plants reallocation) so to mitigate future vulnerability? Do they induce affected voters to subsequently reward parties that promote preventive policies?

With respect to firm responses, few studies analyzed the impact on productivity, location and industry dynamics (i.e. entry, exit, acquisitions, and market share) resulting from exposure to increased climate risk. Consequently, 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. Fatica et al. (2024), Balboni et al. (2023), Jia et al. (2022)). My study **"Multidimensional Climate Risks, Company Location and Industry Dynamics"**[2] seeks to fill the gap in understanding how ECEs such as floods, droughts, and heatwaves affect firm survival and entry, location decisions and market concentration in affected regions. Utilizing administrative French firm-level data on operations, employment, and industry linkages, together with our self-developed data on climate risk, estimated markup and public reinsurance, I identify how French industries are exposed and responding to multidimensional climate risks. Firstly, I use a quantitative spatial model to investigate the links between climate risks and firm characteristics. Secondly, I apply a differences-in-differences approach to causally identify the impact of ECEs on the dynamics of firms that were differently exposed to such risks based on their geographic and sectoral position. By shedding light on the economic consequences of ECEs, my aim is to support policymakers in promoting the internalization of climate risk into companies' location choices and improving overall industry resilience.

Tackling this topic from a different perspective, I intend to study the relationship between flooding events and voting behavior. Building upon recent studies that examined the electoral impacts of flooding events (e.g. D'Amato et al. (2017) and Baccini and Leemann (2021)), I apply the "party positioning hypothesis" observed in Birch (2023). Specifically, I study whether parties that adjusted their environmental policy proposals in response to floods gained support in affected areas in the context of regional and national elections in Italy. If proven true, the hypothesis of parties responding to extreme events by proposing greener policies — and being rewarded for that — could constitute a silver lining of natural disasters.

[2] Joint work with *Sébastien Houde*.

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