Climate Change, Firms and the Macroeconomy*

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Abstract

A rapidly growing body of research uses firm-level micro data to examine how climate events affect aggregate economic outcomes (for a review, see Dell, Jones, and Olken (2014)). Because of the generalised and sharp increase in average temperatures caused by climate change, many studies have investigated the effect of extreme temperature shocks on firm outcomes, in particular on labour productivity, in developing countries (e.g. see Addoum et al. (2020), Chen and Yang (2019), Somanathan et al. (2021), and Custodio et al. (2022), among others). However, much less is known about the impact of climate change events on firm outcomes in Europe, despite the fact that temperatures have risen significantly, especially in southern countries like Italy and Spain (see figures 1a and 1b below).

This paper studies the misallocation effects, and their aggregate implications, of extreme temperature shocks for the population of firms in Spain and Italy. We propose a methodology inspired by the misallocation literature (e.g. see Gopinath et al. (2017)) that is able to disentangle the effect of exogenous temperature shocks on demand, production efficiency, and input-related wedges.

We perform the analysis on census level data of the population of Spanish firms, and on a large sample of Italian firms from ORBIS, which covers approximately 45% of Italian GDP, for the 1999 to 2013 period. We merge firm level data with climate data. We use gridded E-OBS daily meteorological data for Europe from the Copernicus Climate Change Services.[1] We obtain daily surface temperatures at the 0.1 x 0.1 resolution, which corresponds to grid cells of around 11 km x 11 km. Since we do not have precise location coordinates from the firm-level, we assign to each firm the temperature and rainfall corresponding to the nearest grid-cell in which the firm is situated. The firm location is approximated by the postcode of its headquarters.

The richness of the firm-level data available, which includes both tradable and non-tradable sectors, allows us to identify how these temperature shocks separately affect demand and productivity, while our structural framework allows us to further distinguish between the effects on firm efficiency and input costs, as well as to derive the aggregate implications of the estimated effects. Finally, we also take advantage of the sharp temperature rise in the sample period to study adaptation.

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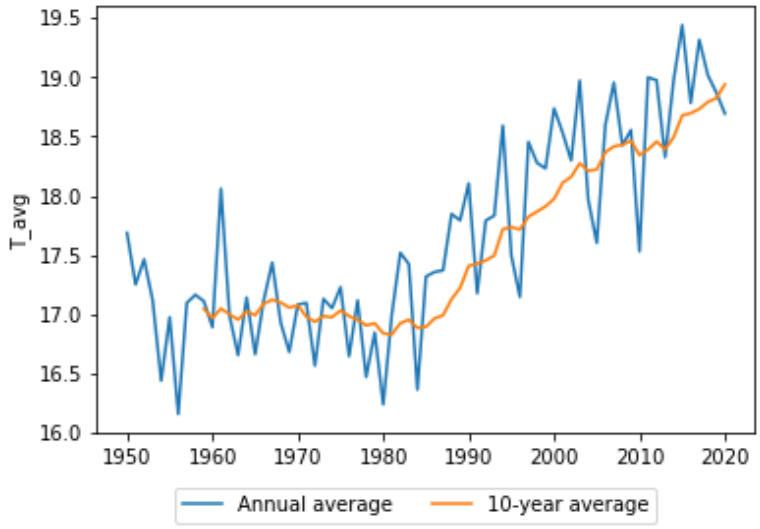
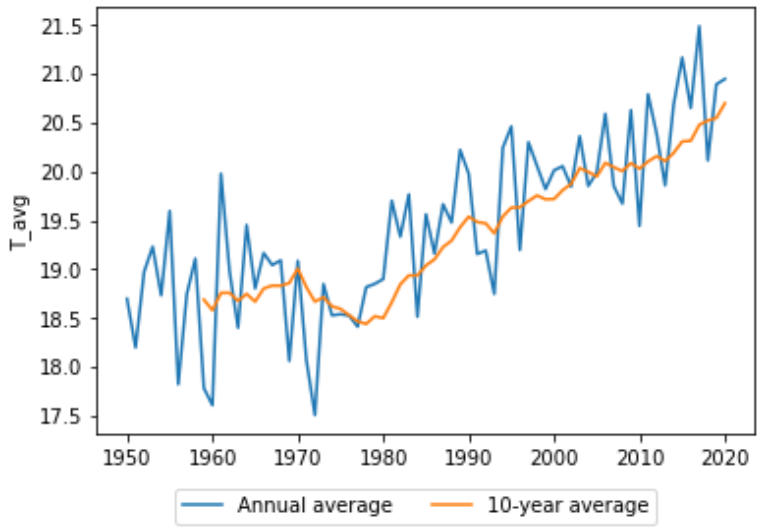
[1] See https://doi.org/10.24381/cds.151d3ec6

Figure 1: Average Yearly Temperatures

(a) Average Yearly Temperature: Italy



(b) Average Yearly Temperature: Spain



Note: We use population weights to compute the average yearly temperature at the country level.

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