

ERF Policy Brief

How Does Climate Change Affect Food Consumption in Turkey?

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In a nutshell

- *Turkey has faced various circumstances stemming from climate change, such as rising temperatures, drought, unseasonable rains, and the increasing prevalence of extreme weather events.*
- *In the 2011-2019 period, there were many remarkable deviations from long-term averages observed in Turkey for annual average temperatures and precipitation.*
- *The estimates show a significant climate change impact on household food consumption behavior through price and budget channels.*
- *We have shown that the price effect on non-food consumption decreases more in regions where climate change exists than regions with no significant change in climate figures.*

Introduction

The issue of ensuring food security has three pillars in related literature: affordability, availability, and accessibility. In Turkey, availability and accessibility are not considered as significant concerns for economic agents. TURKSTAT figures indicate that the sum of the agricultural sector and food industry are net exporters in Turkey. Besides, the retail sector has experienced substantial growth in the last ten years in Turkey. These figures point out that availability and accessibility are not concerning issues from a broad point of view. However, high food inflation has been hitting consumers recently and has become a prior policy-making area. Thus, affordability is inevitably determined as the focus of this study.

The effect of climate change on food consumption is the most minor studied area within the food security concept (Zewdie, 2014). Therefore, investigating this relationship for Turkey in our paper assumes a significant role in guiding and designing policies for climate change and the agricultural sector.

We aim to examine the significance of climate shocks in Turkey's food prices. The unique structures of this brief are threefold: first, we define climate shocks as persistent deviations from the long-term mean in a region regarding temperature and precipitation due to climate change; second, controlling for possible shocks, we examine the role of climate change in food price processes; and third, we examine the causal effect of food price on per capita food expenditure based on the demand equation.

The results imply a five percent increase in the region's food prices where climate change exists according to our specification compared to other regions. The results also emphasize that the sole effects of both precipitation and temperature remain limited, but the combined effect grows apace. In our second stage, the estimates suggest that both price and the wealth effects on food consumption increase more in regions where climate change exists than in the regions where there is no significant change in regions climate figures. However, we do not observe significant differences in the wealth effect on non-food consumption among the regions.

Overview of Climate Change in Turkey

Turkey is a crossroads between Western Europe, the Middle East, and Asia. Having a profound land area with diversified geographical formations and 7,200 kilometers of coastline brings many climatic types to Turkey.

Like many MENA countries, Turkey has faced a series of circumstances stemming from climate change, such as rising temperatures, drought, unseasonable rains, and the increasing prevalence of extreme weather events (Bayram & Öztürk, 2014).

In latest two decades, the factors leading to climate change in Turkey have drastically escalated. Turkey was doing better than the global average in CO₂ emission per capita; however, it exceeded the global average in the last three years. On the other hand, between 1999 and 2019, forest land per capita shrank 16.5%. The first factors are the increasing population and ongoing rapid industrialization of an emerging country, aggressive export-oriented policies, unconscious agricultural implementation, lack of inspection, and insufficient past policies.

Due to such deterioration in climate change indicators in Turkey, the outlook in precipitation regime and annual average temperatures exhibited a worse course in the last decade. Precipitation has deviated from the 1981-2010 period's average remarkably upwards each year, causing excessive precipitation (and untimely in many cases). Similarly, the upward deviation of annual temperature from the long-term average has an increasing tendency over the years. Accordingly, the rate of deviation in Turkey exceeded that of the global average in latest two years.

Data

Investigating the climate change process and constructing climate change indicators for regions in Turkey are the starting points of our study. The climate change process may co-occur for all regions, or remarkable variations among regions and months could arise. We may use these variations to obtain causal inferences about the effect of climate change on our variables of interest. Therefore, we first investigate whether climate change differs within regions and months of the year in Turkey. Then, we construct our food price variable using data from Turkstat's Central Dissemination System for consumer price. We first get COICOP (Classification of Individual Consumption According to Purpose) indices of food products from the TURKSTAT database for each region.

Our primary data source will be the Household Budget Survey (HBS) micro datasets between 2003 and 2019. This survey reveals consumption patterns and income levels of individuals and households by socio-economical groups and regions. Using this information, we can produce consumption expenditures, consumption habits,



and variety of spending for goods and services on socio-economic features of households, the total income of households, employment status of household members, and source of income.

We use HBS data and regional CPI to construct our food and non-food consumption variable for 2005 prices.

Our Results

The estimations indicate that climate change does not cause a variation in food price if we consider only temperature levels. Although the amount of precipitation designates a statistically significant difference in food prices compared to the regions with no significant structural breaks in the precipitation levels, the effect remains limited by around 1.4 percent.

It is essential to decompose the climate effect on food prices among different food groups. Note that the deviations from the long-run average of temperature and precipitation levels are essential in our specifications. For this reason, unseasonal rains or temperature levels may also result in a decrease in food production—the decrease in production results in an essential effect on food prices. We find the most prominent climate change effect on bread and cereals and other food products. In addition, there is no substantial effect of the structural breaks in climate figures on the prices of animal products, fruits, and vegetables.

We also estimate the relation between climate change and household consumption behavior through budget channels. The estimates suggest that the wealth effect on food consumption increases more in the regions where climate change exists (i.e., there exists a structural break in the combination of precipitation and temperature data.) than in the region where there is no significant change in climate figures. However, we do not observe significant differences in the wealth effect on non-food consumption among the regions.

Note that the results confirm the expected signs and magnitude for the wealth effect on food consumption that is positive and lower than one and on non-food consumption that is positive and more than one. These propose that, on average, while food consumption is a necessity good, non-food consumption is a luxury good in Turkey.

Additionally, we estimate the relation between climate change and household consumption behavior through price channels. These estimates suggest that the price effect on food consumption increases more in the

regions where climate change exists than in regions with no significant change in climate figures. However, we do not observe any differences in the price effect on non-food consumption among the regions when analyzing the estimates. The estimates show that the price effect on non-food consumption decreases more in regions where climate change exists than regions with no significant change in climate figures. This finding implies a loss in real wealth and a possible no change in food consumption causes a decrease in non-food consumption in the regions where climate change exists.

Note that the results also confirm the expected signs and magnitude for the price effect on both food consumption and non-food consumption that are negative. As expected, the results also suggest that non-food consumption is more price-sensitive compared to food consumption.

Policy Implications

There are still many targets for Turkey to be achieved in adopting and mitigating climate change. Turkey has the advantage of being an emerging country that exhales less carbon emission than advanced countries and has an excellent opportunity to make “green investments” in economic development. Given the low-mid level of per capita income in recent years and secular structural fragilities in the economy, the unique possible drawback against achieving these targets may be financing issues. Therefore, rationalizing environmental tax and expenditure policy, even implementing a rule-based and transparent carbon tax, could help Turkey improve despite economic difficulties. This type of improvement can be gradually carried out in a few years by having the power of social and political consensus over the Paris Agreement.

The remarkable ongoing slowdown in economic activities since 2018, which has stemmed from the sharp depreciation in national currency and the Covid-19 pandemic, has contributed to the GHG mitigation process. However, GHG emission is likely to hike again in a couple of years due to the expected economic recovery relying on the unprecedentedly fast development of vaccines against Covid-19 and the accelerating pace of vaccination in Turkey. Hence, besides the GHG mitigation policies already being implemented, which are beneficial for the entire society, not only for the food market, it is inevitable to design policies aiming at food security and inherently, to restrain the rise in food prices, as an integral part of adaptation to climate change.

Investments in the agricultural sector may preserve agricultural production from the detrimental effects of



climate change and mitigate the price pressures. In this sense, extending and improving greenhouse cultivating, which accounts only for 0.2% of total agricultural areas as of 2020, maybe one of the main targets. In Turkey, there are some sincere but weak efforts to promote greenhouse cultivating. Although the Turkish government has been providing incentives for greenhouse investments through subsidizing loan interest rates and tax exemptions, growing economic difficulties have been forcing agricultural households to shift towards non-agricultural activities in urban areas and causing a drop in the agricultural sector's share in GDP and agricultural lands to shrink. Hence, even as conventional agricultural practices have faced difficulties, financial incentives for greenhouse cultivating have not attracted much attention.

Therefore, founding new state-owned enterprises (SOE) in eligible areas may be a much more concrete initiative than subsidizing farmers severally for greenhouse cultivating, and high-end investments of these SOEs for greenhouse cultivating can reduce the dependency of agricultural output on weather conditions and assume a significant role on adopting climate change and awakening public awareness against it.

Alternatively, cultivating new crops resistant to high temperature, drought, and needless inputs and increasing efficiency in water use and fertilizer may improve food security and mitigate the pressure on food prices while providing higher profits to farmers. In particular, unconscious and excessive groundwater use in agricultural areas like Konya province is quite problematic. As of early 2021, there have been more than 600 sinkholes in Konya, which threatens agricultural activities due to groundwater use for irrigation. Therefore, investments for surface-water-based irrigation systems and legislation limiting groundwater use seem indispensable for preserving groundwater and agricultural areas.

Finally, yet importantly, public service ads may assume an essential role in enhancing public awareness and sensitivity to combating climate change. According to the world values survey, the share of persons in Turkey affiliated with an environmental organization was 1.3% in 2007. This ratio increased to 5.1% in 2018 that points out the increasing public awareness for environmental issues. Although the awareness has been rising, there is still a large room to capture.

People may become more sensitive to this issue by public service ads explicitly focusing on the devastating effects of climate change on agricultural activities,

food availability, and the sincere efforts of non-profit environmental organizations. Moreover, this may increase the donations for environmental NGOs, which will be an additional financial resource for “green investments.”

Further Reading

- Bayram, H., & Öztürk, A. B. (2014). Global climate change, desertification, and its consequences in Turkey and the Middle East. In *Global climate change and public health* (pp. 293-305). Humana Press, New York, NY.
- Zewdie, A. (2014). Impacts of climate change on food security: a literature review in Sub Saharan Africa. *Journal of Earth Science & Climatic Change*, 5(8).





ERF at a Glance: *The Economic Research Forum (ERF) is a regional network dedicated to promoting high-quality economic research for sustainable development in the Arab countries, Iran and Turkey. Established in 1993, ERF's core objectives are to build a strong research capacity in the region; to encourage the production of independent, high-quality research; and to disseminate research output to a wide and diverse audience. To achieve these objectives, ERF's portfolio of activities includes managing carefully selected regional research initiatives; providing training and mentoring to junior researchers; and disseminating the research findings through seminars, conferences and a variety of publications. The network is headquartered in Egypt but its affiliates come primarily from different countries in the region.*

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