

# Climate change: extreme heat will decrease rural employment and increase migration in Mexico



Climate change is predicted to bring increased incidence of extreme weather events, rising temperatures, melting ice caps, and changing precipitation patterns. A growing body of literature suggests that the economic costs of climate change may be substantial and far-reaching, impacting agriculture, mortality, labour productivity, economic growth, civil conflict, and migration. Until recently, however, the literature has remained relatively silent on the role of temperature in agricultural production and rural incomes in less-developed countries. In these countries, farmers face limited access to credit, fertiliser, other agricultural inputs or government support, and a larger proportion of the population is employed in agriculture.

The focus of our study is Mexico, where agriculture is one of the largest sectors of employment, providing work for more than 13 per cent of the country's population in 2016. This study investigates the effects of temperature and precipitation on local employment decisions in rural Mexico, including demand for hired labour, agricultural employment, and non-agricultural employment.

One sector in Mexico that might be quite responsive to extreme heat is rural labour. In Mexico, small traditional or subsistence farmers own or manage more than 77 per cent of rural properties. These farmers often do not have access to irrigation, credit, or improved seeds. Perhaps because of this, agriculture is quite labour intensive. Labour may be one of the only margins through which farmers can respond to extreme heat.

Our research, using nearly 30 years of nationally representative household survey data, is the first to evaluate the effect of extreme heat on the probability of local work in rural Mexico. We combine the self-reported employment data from 8,107 individuals between 1980 and 2007 with village-level weather data collected from 1,334 stations to evaluate the effects of weather on rural Mexicans' sector and location of work. Our empirical approach uses year-to-year variation in observed temperature and precipitation conditions. A cross-sectional comparison of employment decisions across weather zones may suffer from omitted variable bias, inasmuch as average climate is correlated with other time-invariant factors. Time shocks, such as state agricultural policies, also may be correlated with temperature. Our empirical approach controls for these potential confounding factors by utilising presumably random, year-to-year variation in weather after controlling for individual and state-year fixed effects.

We measure extreme heat in harmful degree days (HDDs), where each increase in average temperature by 1° C above 32° on a given day translates into a 1° increase in HDDs. We find that extreme heat reduces the probability of local work in rural Mexico, with a 1 HDD increase reducing the probability of local employment by 0.05 percentage points. These impacts are particularly acute for wage workers. The negative impacts are not limited to agricultural employment, and reverberate into non-agricultural sectors of the rural economy such as retail, services, and construction. The probability of employment in those sectors declines by 0.04 percentage points per 1-unit increase in HDDs.

Rural labour also responds to negative weather shocks through migration. Our work adds a new and critical data point by assessing the effects of temperature and rainfall shocks on both intra-national, rural-to-urban and international migration. We find that in response to extreme heat, particularly at the height of the growing season, local workers migrate either to urban areas of Mexico or to the United States.

We used these econometric findings to project changes in rural employment and migration from climate change. All climate models predict that the number of extreme heat days will increase over a large part of Mexico. Under a moderate emissions scenario, there is a decrease in local employment of up to 1.4 per cent and an increase in migration to other parts of Mexico and to the U.S. of up to 1.4 per cent and 0.25 per cent, respectively. These projections translate into 236,094 fewer individuals employed locally, 232,792 migrating to urban areas of Mexico, and 41,275 migrating to the U.S.

To the best of our knowledge, our study provides the first micro-level causal evidence demonstrating that warming temperatures will meaningfully reduce the probability of local employment, particularly for non-agricultural and hired labour in rural Mexico. This confirms the long-standing belief that warming temperatures will have negative implications on local labour markets in less-developed countries, particularly for poor wage-labourer households that are most susceptible to local market conditions and may face the greatest response constraints.



#### Notes:

- This blog post is based on the authors' paper [Climate Change and Labour Allocation in Rural Mexico: Evidence from Annual Fluctuations in Weather](#), *Economic Journal*
- The post gives the views of its authors, not the position of LSE Business Review or the London School of Economics.
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