Floods and Adaptation Strategies: Evidence from Indian Manufacturing*

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Abstract

As global temperature increases, extreme weather events become more intense and severe. One of the most relevant natural disasters in terms of damages is floods, which have sizeable impacts on economic activity in many countries. In addition, when evaluating the future impact of extreme weather events, adaptation decisions are a key factor to determine the realized economic damages. In this paper, we explore how Manufacturing establishments adapt to flood risk in India, a country that is regularly affected by floods. We analyze how production and investment decisions by establishments change after the occurrence of a flood, exploring how adaptation decisions depend on the long run exposure to flood risk and the main activity of the establishment.

With this purpose, we combine different sources of data about the Indian economy. First, we use manufacturing establishment data from the Annual Survey of Industries, which provides information about the establishment location, as well as a detailed characterization of production and investment decisions. Second, we obtain a historical record of geo-localized floods from the Dartmouth Flood Observatory, which allows us to identify the occurrence of a flood and the long run exposure of a location. Third, we combine these sources with aggregate information about the Indian economy, including population and the Input-Output structure from the Asian Development Bank. Our empirical analysis shows that the impact of floods on investment depends on the long run exposure of a location, suggesting a role for adaptation.

We develop a theoretical framework to quantify the aggregate impact of floods in India, considering adaptation decisions. Establishments are characterized by their main activity and by the exposure of their location to flood risk. They are mobile across space and can invest in different types of capital. While production is affected by the realization of a flood, firms can spend part of the resources in adaptation capital, which reduces future impacts. The objective of the model is to discipline the heterogeneity in flood risk and adaptation decisions using the Manufacturing data for India, to quantify the aggregate consequences of flood risk and to explore different policy responses to the predicted increase in intensity and frequency of floods.

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