

# The impact of climate policy and natural disasters on firms in China

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Does a price on carbon emissions induce more green innovations? In her doctoral thesis in Economics, Ruijie Tian, examines the impact of emission trading schemes on Chinese firms by looking at green patents and carbon emission.

## What is the topic of your thesis?

"In the first two chapters I analyze different impacts of carbon emissions trading schemes introduced in six pilot regions in China. I examine how

the policy incentivize firms to reduce their emissions facing a carbon price and in what way increased carbon prices affect technical change, measured by the number of green patents. Under cap-and-trade schemes, government sets up the number of emissions allowed to be emitted (the cap) and firms receive [emission](#) allowances. The firms that are covered by the rules are required to submit allowances for their emissions or, if they emit more than the allocated allowances, to purchase emission reduction from other firms (the trade). This imposes an emission price for carbon emissions and provides a cost-effective way for firms to comply. In the third chapter I analyze the international propagation of adverse shocks, in this case the US hurricane season in 2005, by examining how Chinese firms respond to this [shock](#)."

## **Why did you choose to study these subjects?**

"When I started as a Ph.D. student, I wanted to focus on [environmental economics](#), and more specifically on how firms are dealing with the challenges of climate change, since firms are large contributors to carbon emissions. And I wanted to focus on China because it is the largest carbon emitter in the world and hence important to study."

## **What are your results?**

"My results in the first chapter suggest that, on average, the higher the carbon prices, the more green innovation is induced by the emission trading schemes. I find that only firms that are productive enough and firms that innovated earlier, are responding to the policy in a positive way. The least productive firms didn't increase their green patents and firms that didn't innovate at all before the scheme was introduced, innovated less with green patents."

"In the second chapter, we analyze the impact of emissions trading

schemes in Beijing, the region with the highest [carbon](#) prices among all the regions, and we therefore can expect more salient increases in firms' energy cost in Beijing. We find that the policy reduced emissions of firms in the industry sector, but not of firms in the service sector. Firms reduced emissions mainly by switching fuel consumption from coal to natural gas."

"In the third chapter, we find that the adverse shock that is caused by the hurricanes in the US in 2005 didn't propagate along the value chain in any significant way. This suggests that a temporary supply reduction induced by an adverse shock in a foreign country does not impose a substantial risk for Chinese processing firms on their production of exports. We also provide preliminary evidence that supply chains can adjust after natural disasters, when firms heavily affected by the hurricanes increased the number of suppliers in the period after the hurricane. This could be due to firms' strategy adjustment to seek alternative suppliers and avert future shocks. This relates to the debate about negative influence of the COVID-19 pandemic, where people are concerned about long term economic effects that may disrupt the global value chain. But what we find is that the impact of shocks like natural disasters, doesn't need to last very long."

## Who can benefit from your study?

"Policy makers can benefit from it since I analyze how firms respond to [climate policy](#), and firms can benefit since the thesis point to firm sourcing diversification as a way to increase resilience to adverse shocks, and better tackle the effects of climate change. I think the results also can provide insights for other countries than China, since China is the world's largest country experiencing a rapid growth in their economy. Studying a transitional economy such as China, provides insight for other countries that may implement climate policy like Vietnam, Chile and Indonesia. And our conclusion about how adverse shocks propagate

along the global [value chain](#) applies to firms all over the world."

**More information:** Impacts of Climate Policy and Natural Disasters: Evidence from China. [hdl.handle.net/2077/68714](https://hdl.handle.net/2077/68714)

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