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We Are All in the Same Boat: Cross-Border Spillovers of Climate Risk Through International Trade and Supply Chain

by Alan Feng and Haishi Li

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I N T E R N A T I O N A L M O N E T A R Y F U N D

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Monetary and Capital Markets Department

We Are All in the Same Boat: Cross-Border Spillovers of Climate Risk Through International Trade and Supply Chain

Prepared by Alan Feng and Haishi Li*

Authorized for distribution by Ananthakrishnan Prasad

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Abstract

Are assets in a landlocked country subject to sea-level rise risk? In this paper, we study the cross-border spillovers of physical climate risks through international trade and supply chain linkages. As we base our findings on historical data between 1970 and 2018, we observe that globalization increased the similarity of countries' global climate risk exposures. Exposures to foreign climatic disasters in major trade partner countries (both upstream and downstream) lower the home-country stock market valuation for the aggregate market and for the tradable sectors. We also find that exposures to foreign long-term climate change risks reduce the asset price valuations of the tradable sectors at home. Findings in this paper suggest that climate adaptation efforts in a country can have positive externalities on other countries' macrofinancial performance and stability through international trade.

JEL classification numbers: G1, G12, G14

Keywords: climate risk, financial spillover, supply chain, financial stability

Authors' email addresses: xfeng@imf.org, haishi@uchicago.edu

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I. INTRODUCTION

Are assets in landlocked countries subject to sea-level rise risk? Are financial sector valuation and risk in Latin American countries subject to typhoon risk in East Asia? These questions have become highly relevant in today's global economy. Globalization has brought about significant economic benefits to countries around the world, but has also fundamentally altered how the risks of nature, especially climate-related risks, are shared, allocated, and priced. Through the sophisticated international trade system, a climatic disaster that disrupts economic activities in any part of the global supply chain network can have non-negligible impact on the macrofinancial performance and stability of other countries that are connected to the network. Understanding the cross-border spillover of climate risks (that is, the likelihood of climatic disasters) helps assess the implications of long-term climate change on the macrofinancial stability in individual countries, and inform collaborative measures in climate adaptation due to their positive externalities through the supply chain¹.

The COVID-19 pandemic and associated government lockdown measures provide a recent example of how a disaster (a public health disaster in the case of COVID-19) in one country can disrupt global economic activities by putting a pause on the international flows of goods, services, and people. Applying a new machine-learning technique to the real-time Automatic Identification System signals sent by global cargo ships, Cerdeiro and others (2020) find that Chinese exports declined by 30 percent from late January to early March 2020, when China imposed the COVID-19 lockdown. They also observe a second wave of global trade decline starting in early April 2020, when the US and many European countries followed up to enforce lockdown measures. Baldwin and Freeman (2020) refer to these patterns as global supply chain “contagion and reinfection.” When cross-border flows of goods, capital, and people are disrupted by disasters (or necessary policy measures due to disasters), all countries connected to the international trade network incur negative economic effects. Even if a country is free from the virus or has brought the virus under control, it still suffers from the negative supply and demand shocks from the foreign countries currently battling the virus.

Climatic disasters may have similar implications on the global supply chains. Climatic disasters in one country can destroy local physical and human capital and shut down roads and factories. Meanwhile, they disrupt economic activities in other countries that rely on the disaster-hit country for imports and exports. The severe floods in Thailand in 2011, which claimed hundreds of lives and affected millions locally, effectively put a halt to automobile parts production and assembly in the country. As a result, Japanese carmakers that used Thailand as a key supplier in Southeast Asia had to pause their car production and sales globally. For instance, a report² finds that “Toyota’s three plants in eastern Thailand were unaffected by the weather, but production was halted due to parts shortages.” The Japanese headquarters was affected as well. Toyota claimed that it had to cut car production in Japan by a total of 6,300 vehicles due to the flood in Thailand, a sizable number even compared with the 37,500-unit direct loss from Toyota’s

¹ In our paper, which studies the propagation of shocks, we define “climate risk” broadly as the risk of climatic disasters, such as hurricanes and floods, occurring. “Climate change” could change the magnitude, frequency, and geographic allocation of climatic disasters and hence climate risk.

² See <https://www.cbc.ca/news/business/thai-flooding-disrupts-auto-supply-chains-1.1049854>.