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Firm-level impacts of natural disasters on production networks: Evidence from a flood in Thailand ☆

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ABSTRACT

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This paper explores the firm-level impact of the 2011 flooding in Thailand, specifically, the impact on procurement patterns at Japanese affiliates in Thailand. We find that, first, small firms are more likely to lower their local procurement share, especially their share of procurement from other Japanese-owned firms in Thailand. Second, young firms are more likely to increase their share of imports from Japan, whereas old firms are more likely to look to China. Third, there is no impact on imports from ASEAN and other countries. These findings are useful for uncovering how multinationals adjust their production networks before and after natural disasters. *J. Japanese Int. Economies* **38** (2015) 244–259. Inter-disciplinary Studies Center, Institute of Developing

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1. Introduction

Thailand experienced severe floods in 2011 triggered by a record number of typhoons or tropical storms that brought an abnormally high amount of rainfall. According to EM-DAT: The OFDA/CRED International Disaster Database, the floods reportedly killed 813, affected 10 million or more, and caused economic damage of an estimated $40 billion. The National Economic and Social Development Board reported that this flooding lowered real GDP growth rates by about 4%. Thailand is home to large industrial clusters, particularly the electronics and automobile industries, developed mainly by Japanese overseas affiliates. The 2011 floods not only destroyed such industrial clusters but also affected production in these industries globally by influencing supply chain networks.

Firm-level studies on natural disasters are slowly becoming more common. Although a number of cross-country or cross-subnational level analyses[1] exist, firm-level studies help uncover the impact of natural disasters on business activities at a very detailed level. Examples include Cole et al. (2013), De Mel et al. (2012), Leiter et al. (2009), and Todo et al. (2015).[2] Leiter et al. (2009) explored the impact of flooding in Europe and found that firm-level employment growth was higher in flooded regions. Cole et al. (2013) investigated the impact of Japan's 1995 earthquake and found a lower probability of survival and greater reduction in employment and value-added in firms in more severely affected regions. Employing field survey data, De Mel et al. (2012) focused on the impact of the 2004 Sri Lankan tsunami and found that direct aid such as cash grants played a significant role in firm resilience, particularly in service sectors. To emphasize the role of supply chain networks in such resilience, Todo et al. (2015) investigated the impact of the 2011 Japan earthquake. They examined the resilience of manufacturing firms and found that diversified supply chain networks played a positive role.

This paper also examines the economic impact of natural disasters at the firm level. Specifically, we explore the economic impact of the 2011 flooding in Thailand on Japanese affiliates in Thailand. Japan has operated sophisticated international production networks in Southeast Asia since the 1990s. Within these production networks, overseas affiliates in Thailand have played a pivotal role. Indeed, Japan is the largest investor in Thailand,[3] while Thailand has been the top host country for Japanese investors among Southeast Asian countries.[4] This paper focuses on the impact of flooding on procurement patterns at Japanese affiliates in Thailand to examine how natural disasters affect production networks in multinational enterprises (MNEs). We employ a unique dataset for the period 2009–2013 collected by the Japan External Trade Organization (JETRO) in its Survey of Japanese-Affiliated Firms in ASEAN, India, and Oceania. More specifically, we first examine changes in the share of local

[1] Examples include Cavallo et al. (2013), Coffman and Noy (2012), duPont and Noy (2015), Fomby et al. (2013), Loayza et al. (2012), Noy (2009), Skidmore and Toya (2002), and Strobl (2012). Most of the studies examined whether the impact of natural disasters on economic variables such as GDP per capita were persistently positive or negative. They found that this depended on various factors including disaster type (e.g., earthquake or flooding), industries, stage of economic development of countries, and magnitude of the disaster.

[2] More recently, some other firm-level studies have been conducted on the Great East Japan Earthquake in 2011 (Miyakawa et al., 2014; Uchida et al., 2014; Ono et al., 2014).

[3] According to the Board of Investment, Japanese investments accounted for 64% of total foreign investments in 2012. Furthermore, according to the Survey of Overseas Business Activities in 2012 by the Ministry of Economy, Trade and Industry (METI), Japan, and the 2012 Business and Industrial Census in Thailand, the number of employees in Japanese manufacturing affiliates comprises around 12% of the total manufacturing workforce in Thailand.

[4] According to the Survey of Overseas Business Activities by METI, there were 864 Japanese manufacturing affiliates in Thailand in 2011, accounting for 36% of the total number of Japanese manufacturing affiliates in Southeast Asian countries.