



Impact of natural disasters on income inequality in Sri Lanka

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ABSTRACT

We explore the relationship between natural disasters and income inequality in Sri Lanka as the first study of this nature for the country. The analysis uses a unique panel data set constructed for the purpose of this paper. It contains district inequality measures based on household income reported in six waves of the Household Income and Expenditure Survey of Sri Lanka during the period between 1990 and 2013, data on disaster affected population and other economic and social indicators. Employing a panel fixed effects estimator, we find that contemporaneous natural disasters and their immediate lags significantly and substantially decrease inequality in per adult equivalent household income as measured by the Theil index. Findings are robust across various inequality metrics, sub-samples and alternative estimators such as Ordinary Least Squares and System GMM. However, natural disasters do not affect household expenditure inequality. Either households behave as if they have a permanent income or all households reduce their expenditure proportionately irrespective of their income level in responding to natural disasters. Natural disasters decrease non-seasonal agricultural and non-agricultural income inequality but increase seasonal agricultural income inequality. Income of richer households is mainly derived from non-agricultural sources such as manufacturing and business activities and non-seasonal agricultural activities. Poorer households have a higher share of agricultural income.

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1. Introduction

Natural disasters disproportionately affect the poor. It is therefore often assumed that natural disasters increase income inequality. However, as Karim and Noy (2016) point out, there is little research on the impact of natural disasters on income inequality. This paper contributes with a study of Sri Lanka.

We study the impact of natural disasters on income inequality in Sri Lanka at district level, as the first study of this nature. We find that natural disasters decrease income inequality among Sri Lankan households. These findings may be somewhat surprising on the face of it as one would expect natural disasters to exacerbate income inequality. However, at subsistence level, people possess little that can be lost to a natural disaster. Losses for the wealthier groups would be disproportionately greater due

to natural disasters. People on a monthly wage would not see their income affected by a disaster, but small business owners would. Unskilled day labourers may find new opportunities in the reconstruction effort.

Investigating the impact of Cyclone Aila in Sundarbans region in Bangladesh in 2009, Abdullah, Zander, Myers, Stacey, and Garnett (2016) establish that income inequality decreased after the cyclone. Another very recent paper by Feng, Lu, Nolen, and Wang (2016) show that household income fell by 14% due to 2008 Sichuan earthquake in China, however, income inequality did not change.

Our findings are in line with the results of the aforesaid two studies on Bangladesh and China (Abdullah et al. (2016), Feng et al. (2016)). Our data allow us to decompose income sources, so that we better understand the mechanisms.

The paper proceeds as follows. Section 2 presents a background discussion with related existing literature. Section 3 describes data and empirical strategy. Results are discussed in Section 4 followed by Section 5 which contains robustness checks. Section 6 sets out

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concluding remarks with some policy implications and also recognises the limitations of the study.

2. Background discussion

In the aftermath of a natural catastrophe, it is essential that affected agents should have access to timely and sufficient finances to ensure a smooth and speedy recovery (Keerthiratne & Tol, 2017). Flow of foreign aid that follows a natural disaster plays a key role in the economic recovery process. Enterprises would recover fast when they are provided with additional capital after a natural disaster. Using a randomised experiment where randomly selected enterprises in Sri Lanka were given cash grants after the tsunami, De Mel, McKenzie, and Woodruff (2012) present evidence for this.

Wealthy individuals are in a better position to meet the financial requirement through self-financing as they can use their savings for reconstruction, they are more likely to have bought insurance to cover any losses, and they have better access to loans and credit. Not only that, the rich are often better prepared for natural disasters as they can financially afford to have precautionary solutions to avoid or mitigate disaster damages. Further, the poor are more likely to have irregular income, so that every disruption, either due to the disaster directly or dealing with the aftermath, means a loss in income. As such, even within the same country, natural disasters would differently affect rich and poor individuals. Natural disasters may thus negatively affect the level of income of the poor leading to a widened income inequality in society.

Furthermore, disaster affected territories generally suffer economic damages by way of human and physical capital losses which usually cause declines in average incomes. Accordingly, this may lead to spatial disparities in average incomes ultimately increasing income inequality among individuals within the same economy.

However, microfinance can act as a recovery tool for poor households in the aftermath of severe natural disasters. Using Sri Lanka after the 2004 tsunami as a case study, Becchetti and Castriota (2011) show that real income and working hours were increased as a result of loans from micro finance institutions.

As Karim and Noy (2016, p. 4) highlight, it is apparent from the existing literature that “poorer households are more vulnerable and will bear the direct damages of disasters disproportionately at higher levels and as higher shares of their household’s income” compared to rich households (Datt & Hoogeveen, 2003; Kim, 2012; Masozera, Bailey, & Kerchner, 2007; Morris et al., 2002; Rodríguez-Oreggia, 2010; Tesliuc & Lindert, 2002; Toya & Skidmore, 2007).

When a disaster strikes, the magnitude of its impact on an economy depends on characteristics of disaster itself and the prevailing conditions and socio-economic status of the affected territory as a whole. It appears that as a result of a similar natural disaster event more vulnerable poor countries suffer to a greater extent as opposed to their well-prepared wealthy counterparts. Quoting the World Bank, McDermott, Barry, and Tol (2014, p. 751) highlight that 97% of deaths related to natural disasters occur in developing countries and poor countries experience extremely high economic losses as a share of gross national product than rich countries due to natural disasters.

Whilst arguing that natural disasters cause human and economic losses irrespective of the level of economic development countries have achieved, Yamamura (2015) employs panel data for 86 countries covering the period from 1970 to 2004 to examine how the occurrence of natural disasters has affected the income inequality, as measured by Gini coefficient. He finds that natural disasters increase income inequality in the short run, however, this is not observable in the long run.

As Karim and Noy (2016, p. 4) suggest “the direct impact of disasters on the poor (in magnitude, and relative to the rich) cannot be answered” fully by merely “examining the cross-country distribution of costs and economic activity... the evidence on the distribution of the direct impact of a disaster within a country on households in various income levels is less well understood” as it clearly depends on country characteristics. As such, country-level research is warranted in this field.

Using the Vietnam Household Living Standard Survey in 2008, Bui, Dungey, Nguyen, and Pham (2014) find that natural disasters increased income inequality among households in Vietnam in 2008. When natural disasters occur, households can suffer large losses in assets and income. However, poor may be more vulnerable to loss of income due to their inability to engage in work and the unavoidable sale of income deriving capital assets as a coping strategy. If poorer households are less prepared for disasters; the poor live in disaster prone areas and homes that are more likely to be damaged; and receive earnings mainly from sectors which are more likely to face downturn (e.g., weather dependent traditional agriculture), poor would bear higher income losses and natural disasters could cause greater income inequality.

However Abdullah et al. (2016) and Feng et al. (2016) found results in contrary to the above as mentioned in the Introduction. In other words, the impact of natural disasters on income inequality is ambiguous.

3. Empirical analysis

3.1. Data

Natural disaster data are from the Disaster Management Centre of Sri Lanka, which maintains disaster related data in collaboration with ‘Desinventar’, the Disaster Information Management System of UNISDR, United Nations Office for Disaster Risk Reduction. Income data and other social and economic indicators are obtained from the Household Income and Expenditure Survey (HIES) series conducted by the Department of Census and Statistics of Sri Lanka from 1990 to 2013. There are six waves, i.e. 1990/91, 1995/96, 2002, 2006/07, 2009/10 and 2012/13 where the data are representative at district level. Note that these are not panel data. The only wave which covers the entire country is the 2012/13 survey. Due to the ongoing civil war at that time, some districts of Northern and Eastern provinces were not covered in earlier waves. Mid-year district population data are taken from the Registrar General’s Department of Sri Lanka and the study uses the Consumer Price Index published by the Central Bank of Sri Lanka.

Extracting the data reported in the official website of Disaster Management Centre, we construct a district-wise annual disaster database for Sri Lanka from 1985 to 2013. It contains the number of people affected due to cyclones, droughts, epidemics, floods, gales, heavy rains, landslides, land subsidence, plagues, storms, strong winds, surges, tornados, and tsunami in each district, yearly. According to the database, around 27 million people were affected from natural disasters in Sri Lanka during the period from 1985 to 2013. Of them, 47% and 45% were affected by droughts and floods, respectively. Extreme wind events were responsible for 6% of the population affected whilst 2% were affected due to epidemics. Following Noy (2009), we normalise the number affected by disasters with lagged population. Thus, disasters are measured as the percentage of population affected due to all natural disasters in each district during a calendar year.

Potential alternative choices for disaster measures would have been the number of total deaths or mortality, morbidity or the total monetary damage caused by a disaster. Keerthiratne and Tol (2017) have paid special attention to these alternative choices for

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