The Impact of Natural Disasters on Migration in European Regions

Nikitas Provatakis[*], Vassilis Tselios[†]

1. INTRODUCTION

In recent years, our world has faced a rise in the frequency and magnitude of natural disasters. Nonetheless, monitoring the social and economic impact of natural disasters is crucial for entities at the national and regional level. The lessons to learn by monitoring natural disasters include the effective implementation of robustness measures through spending in resilient infrastructure, the design of social security policy, and the optimal allocation of disaster-relief funds through the identification of the most affected groups.

Traditionally, research on the socioeconomic outcomes of natural disasters has focused on a distinct set of outcomes, emphasizing on slowing economic growth and rising unemployment in affected areas as well as widening income inequality (Paudel, 2023; Yamamura, 2015). More recently, research has focused on the effects of natural disasters on income inequality, providing mixed results (Keerthiratne & Tol, 2018; Pleninger, 2020). I aim to contribute to this growing line of literature by considering a full mechanism model to explore the possible channels that affect the broader socioeconomic outcome of migration.

This is not the first time in the literature that natural disasters have been linked with outward migration from affected areas. It is my aim however to investigate some of the less explored reasons behind the decision-making of potential migrants. It is well-documented in the literature that affected areas face slow growth and high unemployment rates (Belasen &

[*]Panteion University of Social and Political Sciences, Department of Economic and Regional Development, Syngrou av. 136, 17671 Athens, Greece. Email: nikitasprovatakis@hotmail.com
[†]Panteion University of Social and Political Sciences, Department of Economic and Regional Development, Syngrou av. 136, 17671 Athens, Greece. Email: v.tselios@panteion.gr

Polachek, 2008; Coffman & Noy, 2012; Groen et al., 2019;). These effects have been studied individually and not as part of integrative studies. In the conceptual model shown in **Figure 1**, I integrate these variables by considering the direct effect on migration, and two main channels that may intensify the effect on migration. The most interesting indirect effect of natural disasters is the housing market channel. If the construction industry faces a boom following (severe) natural disasters, then the forced displacement of people may be driven by the increased housing prices. Following previous research on natural disasters, I incorporate another main explanatory variable, i.e. sectoral composition. Natural disasters typically lead to destruction of land and business closure. This may in turn disturb those sectors that are tightly bound to land, namely agriculture, and revitalize services, a sector that is more robust to natural disasters. It is for these reasons that the age distribution and the sectoral mix are central to the regional migration discussion (Dancygjer and Donelly, 2013; Palaskas et al, 2015).

With this paper, I aim to bridge the gap in the literature with the introduction of real estate as a factor that shapes socioeconomic outcomes, whose relationship has not been extensively explored. To the best of my knowledge, this is the first systematic study to link natural disasters with migration through the abovementioned proposed channels for all European regions with sufficient data availability. Furthermore, I extend previous work by utilizing the detailed EM-DAT dataset and introducing variables to account for the occurrence, type, and intensity of natural disasters.

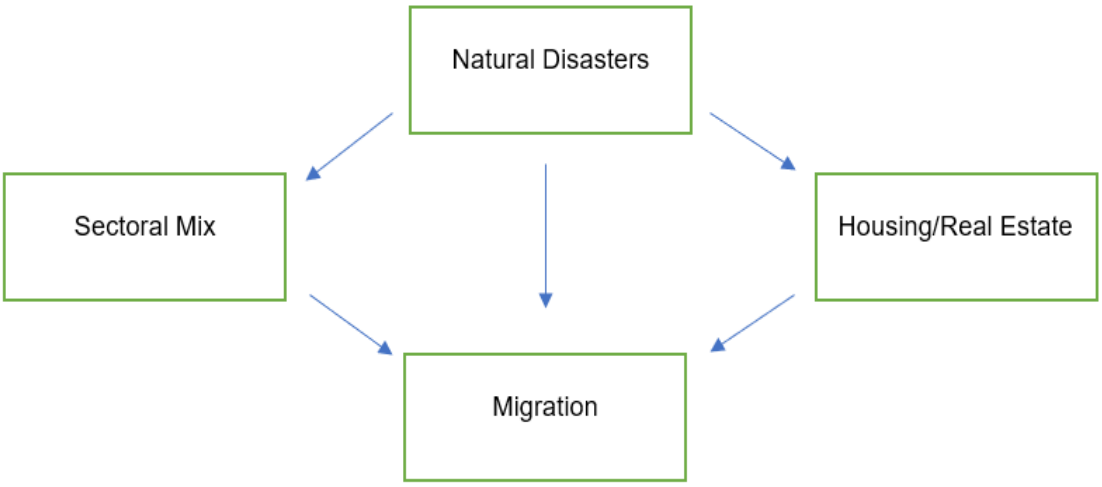

Figure 1: The conceptual mechanism model underlying the proposed relationship between natural disasters and national and regional migration.

2. MATERIALS AND METHODS

All research questions in this paper will be incorporated econometrically into fixed effects regressions that take advantage of the data's panel structure and control for unobserved heterogeneity. The linear model should be of the following general form:

$$\boldsymbol{y}_{i,t} = a_i + a_t + \beta \boldsymbol{X}_{i,t} + u_t \ (1) \ ,$$

where $\boldsymbol{y}_{i,t}$ is the outcome variable, a_i, a_t denote country and time fixed effects respectively, $\boldsymbol{X}_{i,t}$ is a matrix of explanatory variables and u_t is an error term.

Below are the econometric specifications that attempt to answer our exact research hypotheses:

Research Hypothesis 1: Real estate acts as an intensifying channel for natural disasters, resulting in the increased displacement of people.

Specification 1:

a) $\boldsymbol{Migration\ Rate}_{i,t} = a_i + a_t + \beta_1 * \boldsymbol{Natural\ Disaster}_{i,t-1} + \beta_2 * \boldsymbol{Housing}_{i,t} + \beta_3 * \boldsymbol{Sectoral\ Mix}_{i,t} + \gamma * \boldsymbol{Z}_{i,t} + u_t$ (2)

The above represents the final specification. For the respective channels to be investigated, one has to gradually adjust equation (2) and monitor each explanatory variable's regression coefficient. Example sub-specifications include the following:

b) $\boldsymbol{Migration\ Rate}_{i,t} = a_i + a_t + \beta_1 * \boldsymbol{Natural\ Disaster}_{i,t-1} + u_t$ (3)

c) $\boldsymbol{Migration\ Rate}_{i,t} = a_i + a_t + \beta_1 * \boldsymbol{Natural\ Disaster}_{i,t-1} + \beta_2 * \boldsymbol{Housing}_{i,t} + \gamma * \boldsymbol{Z}_{i,t} + u_t$ (4)

Research Hypothesis 2: Natural disasters have a different effect depending on countries' sectoral mix.

Specification 2: The specification shown below can be adjusted in two ways. First, one can utilize interaction effects into the econometric specification to uncover if the sectoral mix has a conditioning effect on migration. This allows us to compare regions or countries whose agricultural dependence differs. Alternatively, and possibly to include as a check for our results' robustness, a variable denoting the countries' urbanization can be incorporated.

$$\boldsymbol{Migration\ Rate}_{i,t} = a_i + a_t + \beta_1 * \boldsymbol{Natural\ Disaster}_{i,t-1} + \beta_2 * \boldsymbol{Housing}_{i,t} + \beta_3 * \boldsymbol{Sectoral\ Mix}_{i,t} + \beta_4 * \boldsymbol{Natural\ Disaster} \times \boldsymbol{Sectoral\ Mix}_{i,t} + \gamma * \boldsymbol{Z}_{i,t} + u_t \quad (5)$$

Finally, it is important to note that natural disaster data are given by their exact location. Hence, research is conducted for the national and regional levels (NUTS 2 level) alike. The data include the occurrence of natural disasters, their subgroup and exact type, their focal point, and number of people affected, injuries, or deaths. The data are then to be used in conjunction with national and regional labor market and real estate data.

3. RESULTS AND DISCUSSION

At the time of writing this extended abstract, the findings presented and arguments provided are at a preliminary stage. First, we observe that any effect on migration indeed runs through the channels of real estate and sectoral composition. The main result at this stage stems from exploring the role of real estate, following natural disasters. The regression coefficients in our empirical strategy provide supportive evidence for a positive relationship between the occurrence of natural disasters and outward migration and between the intensity of natural disasters and outward migration at the regional levels. The observed changes in the regression coefficient after the inclusion of the real estate variable provides evidence that housing acts as an intensifying channel for the effects on migration. Our expectation is that following natural disasters, the real estate and construction industries to boom. As new houses are built to be more resilient, hence expensive, those affected face a barrier at rebuilding their lives, highlighting the role of real estate on migration.

With respect to sectoral composition, there is preliminary evidence for its conditioning effect on migration. The effect of natural disasters is higher in countries with greater dependence on their agricultural sector, leading to slower recovery in comparison to peers. On the contrary, highly urbanized countries may be more resilient. This kind of knowledge can foster European cooperation to alleviate damages through targeted relief programs and recovery planning.

Although this is not the main aim of this study, we confirm previous findings in the literature suggesting that the lower income groups are disproportionately affected.

4. CONCLUSION

In the wake of escalating migration trends, understanding the forces driving international migrant movements is of great importance. With the present study, I attempt to contribute to this growing body of literature by systematically investigating the role of natural disasters as a main driver of migration outflows. The rise of natural disaster frequency and intensity, the growing concern over affordable housing, and the gradual decline of the primary and secondary sectors in Europe, make the research questions posed in this paper ever so relevant and important. Our results suggest that natural disasters not only directly affect migration decisions, but also run through the channels of housing and sectoral composition. Natural disasters, proxied by their occurrence as well as their intensity, have a positive effect on outward migration.

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