Interplay Roles of Telework and Climate Hazard Risks in Recent Migration Trends

Mohammed Iddrisu Kambala[a]*, Sicheng Wang[b], Dikshya Panta[c]

Abstract

Remote work has become a lasting feature of the U.S. labor market, offering individuals greater flexibility to live farther from their workplaces. At the same time, climate hazards such as hurricanes, droughts, and floods are growing in severity and frequency, shaping where people feel safe and comfortable living. While both trends are reshaping population movements, it remains unclear how they interact. Do climate risks deter remote workers from relocating to certain areas, or does the flexibility of telework reduce sensitivity to environmental hazards? This paper investigates how climate risk moderates the relationship between remote work and interstate migration. We construct a panel dataset of U.S. census tracts from 2013 to 2023, combining American Community Survey (ACS) data on telework and migration with hazard risk scores from FEMA's National Risk Index. Using the composite hazard risk score, we find that remote work is associated with increased migration into higher-risk areas. Analyses of individual hazards yield similar results for riverine flooding, hurricanes, tornadoes, cold waves, and droughts. In contrast, risks such as extreme heat slightly reduce in-migration, while winter weather shows no clear effect. These findings suggest that many remote workers may prioritize affordability or lifestyle amenities over climate safety. Telework appears to be a powerful driver of migration that can override traditional deterrents like environmental risk, with important implications for planning around population growth, disaster preparedness, infrastructure investment, and the future of remote work.

Keywords: telework, natural hazard, migration, climate change, national risk index, work from home

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Introduction

The rise of telework has changed how and where people choose to live and work. As more workers gain the flexibility to work remotely, many are no longer tied to living near their place of employment. While telework surged during the COVID-19 pandemic, it has not returned to its pre-pandemic levels. Instead, it has stabilized as a significant and persistent feature of the labor market (Bloom et al., 2022). This shift in the work environment raises important questions about how telework affects migration patterns. At the same time, climate hazards like tornadoes, hurricanes, and heatwaves are becoming more frequent and severe, influencing where people feel safe and comfortable living (Hsiang et al., 2017). Although both telework and climate risk are reshaping population movements, we still know little about how these two forces interact.

Most research on the relationship between telework and migration has focused on rural-urban shifts, movements from central business districts to surrounding suburbs, the reorganization of economic geography, or the impact of telework on housing markets (Delventhal et al., 2022; Keenan et al., 2018; Ramani & Bloom, 2021). Similarly, studies on climate migration have largely focused on displacement from disaster-hit areas, the adaptation of climate migrants in new communities, place attachment, or the patterns of return migration (Adams, 2016; Black et al., 2011; Bonaiuto et al., 2016; Chamlee-Wright & Storr, 2009). Despite the parallel significance of telework and climate hazards in shaping migration, there is virtually no research examining whether climate risks influence where teleworkers, who are supposed to have more flexibility to relocate, decide to move. This raises a key question: does telework make people more or less sensitive to environmental hazards? Are teleworkers avoiding risky areas, or are they willing to move to high-risk areas in exchange for the freedom that telework affords?

In this paper, we explore how climate hazards moderate the relationship between telework and interstate migration in the United States. We ask whether telework increases migration into areas with higher risks of climate hazards, or whether these risks limit where teleworkers choose to go. Understanding this interaction is important because it speaks to how environmental hazards and economic flexibility jointly shape migration, a crucial issue that has existential implications for housing markets, infrastructure planning, climate adaptation, among others.

To address the questions, we combine census tract-level data on work-from-home from the American Community Survey (ACS) with climate hazard risk scores data from the Federal Emergency Management Agency (FEMA) National Risk Index (NRI) database. Using these two sources, we build a panel dataset of census tracts spanning 2013 to 2023. We then specify and estimate two empirical specifications that include interactions terms between telework and climate hazards, our key variable of interest, to assess their combined effect on in-migration. In the first specification we use the contemporaneous values of WFH, while in the second specification we employ its one-year lag in order to capture the potential delayed effects of telework on interstate migration. We also include state and year fixed effects to control for time-invariant characteristics of states and nationwide, common shocks that could influence migration flows.

Our analysis focuses on the overall climate hazard risk as well as seven specific types of climate hazards, including flooding, drought, tornadoes, hurricanes, heatwaves, cold waves, and winter weather. We select these hazards because they are among the most frequent and severe natural threats facing American communities. They also affect broad geographic areas, and data on their occurrences are available for longer historical period. By doing so, we assess the most significant environmental risks that could plausibly influence telework-driven migration decisions.

The direction of the relationship between telework and climate hazard is not obvious a priori, as the influence of environmental risks on migration depends on several factors such as the type of hazard, local context, and household-level characteristics (Hunter, 2005). Ordinarily, high climate risk areas are expected to deter in-migration, even when telework opportunities are abundant. But it is also possible that people seeking telework flexibility may still choose to move into risky areas if the availability, flexibility and benefits of telework outweigh their concern about climate threats (for example, see Clark et al., 2022). In this paper, we find support for the latter. In general, individuals appear less sensitive to environmental risk when telework opportunities are present.

Specifically, our results show that teleworkers are generally less discouraged by climate hazards when deciding where to move. In other words, the interaction between telework and climate hazards is positive and statistically significant in many of our models. This relationship is particularly strong for droughts, tornadoes, cold waves, hurricanes, and riverine flooding. These findings suggest that teleworkers may see the benefits of telework, such as flexibility or affordability, as more important than the potential dangers posed by these hazards.

However, for heatwave, the relationship is different. The interaction term is negative, which means that people are less likely to move into areas with higher heatwave risk, even if telework were available. A plausible explanation is that heatwaves cause persistent discomfort or health concerns that are harder to ignore, especially for those working from home. Finally, in the case of winter weather, we find no strong or consistent effect. The interaction term is not statistically significant, suggesting that winter weather risk does not particularly influence whether teleworkers choose to move into or avoid colder areas.

Literature Review

The impacts of both climate hazards and telework on migration have been extensively studied. However, studies have largely investigated these two variables in isolation, investigating their individual impacts on population movements. This section reviews the existing literature on this body of work and highlights the gap this study addresses.

Telework and Migration

Telework has acted to decentralize residential geography, by loosening the traditional, rigid link between job location and residence (Elldér, 2015). Much of the literature has focused heavily on how decoupling drives population redistribution, particularly away from city centers toward suburban and rural areas. For example, Ramani & Bloom (2021) describe a "donut effect," where workers increasingly relocate from dense urban cores to surrounding peripheries. Similarly, Delventhal et al. (2022) show that telework has weakened the urban wage premium, allowing workers to seek residences in less expensive locations. These trends are reinforced by Bloom et al. (2022), who argue that hybrid work has become a stable feature of the labor market, with lasting consequences for where workers choose to live.

Beyond these broad patterns, other studies have highlighted more nuanced dynamics. One such dimension is population growth in rural and suburban regions driven by telework-enabled migration. Knuepling et al. (2025), for instance, find that rural areas in Germany experienced net in-migration during the pandemic, particularly among younger and more educated workers who leveraged the flexibility of telework to leave cities. Another nuance involves migration distance. While many teleworkers are open to relocating, Tan et al. (2023) find that most such moves are relatively short-range, especially among U.S. tech workers.

At the same time, the growing prevalence of telework may also dampen overall migration. As remote work reduces the need to move for employment reasons, some workers may simply stay put. Correa (2023) offers evidence from Sweden showing that remote-eligible workers were less likely to relocate than others, suggesting that when geography no longer constrains job access, residential stability may increase.

From a theoretical perspective, telework expands the geographic choices available to individuals by decoupling employment from residence. This shift in locational flexibility becomes even more salient when combined with other push or pull factors, such as cost of living, amenities, or environmental risk. Nevertheless, most of the existing research has emphasized urban–rural redistribution or within-metro shifts. There remains limited understanding of how telework interacts with deeper structural forces – like environmental hazards – in shaping migration patterns at a broader, national scale.

Climate Hazards and Migration

A parallel body of research has examined how climate hazards influence migration patterns. The evidence, however, remains mixed, often varying by context, hazard type, and population vulnerability. Hunter (2005) provides an early synthesis, arguing that environmental risks often serve as "push" factors for migration, though their effects tend to be indirect and highly dependent on local social and institutional conditions.

Building on this foundation, more recent empirical studies have established clearer links between specific climate hazards and migration flows. For example, Sheldon & Zhan (2022) find that in the United States, extreme events such as hurricanes and floods are associated with increased out-migration from both counties and metropolitan areas. However, this effect is uneven across income groups, with lower-income households often lacking the resources to relocate, thus remaining trapped in high-risk areas. Similarly, Shumway et al. (2014) show that counties with higher exposure to environmental risks experience elevated rates of out-migration, which in turn leads to substantial economic losses for those regions. At the international level, Beine & Parsons (2017) observe that while climate anomalies and natural disasters tend to suppress cross-border migration, they may simultaneously increase shorter-distance moves, especially toward neighboring countries or culturally familiar destinations. These findings suggest that climate migration is not uniformly outward or long-distance but shaped by proximity, networks, and cultural ties.

Additionally, Ivanova et al. (2024) emphasize the context-specific nature of climate-related migration. Their review highlights how local vulnerability, infrastructure quality, and public policy mediate whether and how people respond to environmental risks. Notably, they find that climate hazards do not always deter migration. In some cases, individuals may still choose to move into high-risk areas due to affordable housing, job access, or proximity to social networks. This insight aligns with Clark et al. (2022), who report that many Americans continue to migrate to wildfire- and flood-prone regions, often motivated by lifestyle preferences or economic opportunities despite the known risks.

Looking toward the future, Hauer (2017) models the potential demographic impacts of sea-level rise in the U.S., projecting that over 13 million people could be displaced by 2100 if no adaptation measures are taken. Coastal states such as Florida and Louisiana are especially vulnerable, while inland counties could see large influxes of climate migrants. His work underscores the long-term policy relevance of anticipating and managing large-scale, hazard-driven population shifts.

To explain why migration responses to climate hazards vary so widely, some scholars have turned to conceptual models. McLeman (2018), for instance, introduces the idea of “threshold effects,” proposing that environmental risks may only trigger migration once certain social, economic, or physical tipping points are crossed. This perspective helps clarify why some climate risks may appear muted in migration data until they become severe, frequent, or unavoidable.

Gap and Contribution

Despite the rich literature on both telework and climate migration, their intersection has received virtually no empirical attention. While some recent work acknowledged that climate risks may shape the future of telework – such as Bai et al. (2023), who argue that weather disruptions will increase the need for business continuity via telework – there is little evidence on whether telework itself makes people more or less sensitive to climate hazards when choosing where to live.

This study addresses that gap by examining how climate hazard exposure moderates the relationship between telework and interstate migration in the United States. In doing so, it adds to a growing body of work that treats migration as the product of multiple overlapping forces, economic, environmental, and social. Our study offers new evidence on how labor market flexibility and climate exposure jointly influence domestic migration decisions.

Data

American Community Survey

We use data from the American Community Survey (ACS) accessed through Social Explorer, a web-based platform that reorganizes and disseminates publicly available U.S. demographic datasets (Social Explorer, n.d.). ACS is a nationally representative survey conducted by the U.S. Census Bureau, providing detailed annual estimates on demographic, social, economic, and housing characteristics of the U.S. population (US Census Bureau, 2024). The ACS publishes two types of datasets, including one-year estimates and five-year estimates. While the one-year estimates reflect conditions in a single year and cover geographic areas with 65,000 people or more, the five-year estimates provide five-year moving estimates for all geographic units down to the census tract and block group levels (US Census Bureau 2018; Missouri Census Data Center 2021). We use the five-year ACS estimates and conduct our analysis at the census tract level, as this is the most granular geographic scale available for which consistent climate hazard data can be matched.

Our sample period spans from 2013 to 2023, covering seven consecutive ACS five-year datasets from 2013–2017 through 2019–2023.[1] This allows us to construct a panel of census tracts over time for our analysis. Because the ACS five-year estimates are rolling averages that reflect conditions over the five-year period leading up to the release year, this approach enables us to track changes in tract-level characteristics. By aligning these datasets across time, we construct a balanced panel of census tracts that captures long-run patterns in work-from-home prevalence and migration outcomes.

We source many key variables from the ACS five-year estimates dataset. The first is our main dependent variable, which is the percentage of residents in a tract who moved from a different state in the year prior to the survey. ACS question asks whether the respondents lived in the same or different residence one year prior to the survey. Respondents are classified as either living in the same house, moved within the same county, moved to a different county within the same state, moved from a different state, or moved from abroad. Our outcome variable is the share of residents in a census tract who migrated from a different state.

Our second key variable from the ACS is the main explanatory variable, the share of teleworkers in a census tract. The ACS asks workers aged 16+ who were employed and at work in the previous week, on the method of transportation used to get to work the past week. Specifically, the question asks, "How did this person usually get to work LAST WEEK?" Options include various transportation modes (e.g., driving, public transportation, walking, bicycling, etc.) as well as an answer "worked at home." We use the "worked at home" option to calculate the share of teleworkers in each tract.

We also source all our control variables from the ACS five-year estimates. These include total population, median household income, and tract-level percentages of residents who are married, non-Hispanic White, college-educated, and within the working-age population (civilian non-institutionalized individuals ages 16 to 64). These variables help us control for tract-level, time-varying demographic and socioeconomic factors that may influence both migration and telework trends.

FEMA National Risk Index

We obtain tract-level measures of climate hazard exposure from the 2023 release of the Federal Emergency Management Agency's (FEMA) National Risk Index (NRI) dataset. The NRI is a publicly available dataset that provides relative risk assessments for 18 different natural hazards across all U.S. counties and census tracts. The risk scores range from 0 to 100, representing a community's national percentile ranking relative to all other communities at the same level (county or tract). Higher values indicate greater relative risk.

The NRI defines risk as the potential negative impacts from a natural hazard event, expressed as:

[1] The 2019–2023 dataset was the most recently available at the time of writing.

$$\text{Risk Index Score} = \text{Expected Annual Loss x Community Risk Factor} \qquad \text{Eq. 1}$$

Expected Annual Loss (EAL) captures the natural hazard component and is calculated based on three factors, including exposure, annualized frequency, and historic loss ratio. Mathematically, the EAL is expressed as:

$$\text{EAL} = \text{Exposure x Annualized Frequency x Historic Loss Ratio} \qquad \text{Eq. 2}$$

Exposure refers to the estimated dollar value of buildings, population, and agriculture that could be affected by the hazard, while annualized frequency refers to the likelihood of the hazard occurring as derived from historical records. Historic Loss Ratio captures the expected percentage of exposed assets likely to be lost based on past events.

The Community Risk Factor (CRF) from Eq. 1 captures two social dimensions, including Social Vulnerability and Community Resilience. Social Vulnerability represents the percentile ranking reflecting the relative susceptibility of populations to the adverse effects of a hazard (such as disproportionate death, injury, loss, or disruption of livelihood), whereas Community Resilience represents the percentile ranking reflecting a community's ability to prepare for, adapt to, withstand, and recover from disruptions.

Mathematically, the CRF is calculated using a functional transformation of the ratio of Social Vulnerability to Community Resilience:

$$\text{CRF} = \text{f}\left(\frac{\text{Social Vulnerability}}{\text{Community Resilience}}\right) \qquad \text{Eq. 3}$$

Thus, for a given EAL, communities with higher social vulnerability and lower community resilience, relative to all other communities at the same census tract level, receive a higher CRF, increasing their risk index scores.

The composite hazard score (from Eq. 1) reflects a census tract's overall risk from all the 18 hazard types, including avalanche, coastal flooding, cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong winds, tornado, tsunami, volcanic activity, wildfire, and winter weather. The index score is derived by summing the hazard-specific risk values, calculated as the product of each hazard's EAL and CRF. To address skewness, a cube-root transformation is applied to the resulting values, which are then normalized on a 0-100 scale.[2]

In our analysis, we use both the composite and the individual hazard risk scores. However, for the individual hazards, we focus on those that are most relevant to migration and environmental risk. By relevance, we

[2] The discussion here is drawn from FEMA's NRI technical document, accessed at https://www.fema.gov/flood-maps/products-tools/national-risk-index on 05/22/2025

mean that the hazard is both common and impactful enough to plausibly shape where people choose to live and/or work. The hazard should occur frequently and with sufficient severity across large parts of the U.S., such that people are likely to factor it into their relocation decisions. Based on this criterion, we exclude the following hazards that either occur infrequently or are unlikely to occur with sufficient severity to shape people's relocation decisions: avalanche, earthquake, hail, ice storm, landslide, strong wind, tsunami, lightning, and volcanic activity. Hazards like avalanches, tsunamis, volcanic activity, and earthquakes are infrequent and highly localized, affecting only limited geographic areas of the U.S. This reduces their relevance for nationwide migration analysis. Likewise, hail, lightning, and strong wind generally cause relatively minor or short-term disruptions, and so they are less likely to weigh heavily on households' relocation decisions. However, even though ice storms and landslides can be damaging, they occur infrequently and are not widespread enough to systematically influence population movements.

Another criterion we apply is time coverage. Hazards with relatively short historical time coverage (5 years or less) or missing coverage are excluded. For instance, we exclude wildfires and earthquakes because their risk scores are based solely on data from 2021. Similarly, we exclude coastal flooding because the dataset includes neither a start nor end year.

Applying these two criteria excludes 11 hazards, resulting in a final focus on seven major ones, including riverine flooding, drought, heat waves, cold waves, hurricanes, tornadoes, and winter weather. All these hazards are time invariant, capturing a snapshot of the hazard risk over a specific period of time. Their time coverages vary widely, with cold waves, heat wave, and winter weather risks calculated based on data from 2005 to 2021 while that of riverine flooding covers 1996-2019. Drought spans 2000-2021 and Tornado risk covers a relatively longer historical period, from 1950 to 2021. However, by far hurricane covers the most extensive period from 1851 (or 1949, depending on the region) to 2021. The detailed definitions of the seven hazards are presented in Appendix A.

We merge this climate hazard risk data with the ACS data. The caveat here is that while ACS is a panel data, the FEMA NRI data is cross-sectional, providing a static snapshot of baseline risk as of 2023. Hence, we assign each tract a fixed hazard score across all ACS years from 2013 to 2023. Merging these two datasets allows us to examine whether persistent exposure to specific hazards moderates the relationship between the rise of telework and changes in interstate migration at the local level.

Stylized Facts

Summary Statistics

The summary statistics of our main variables are reported in **Table 1**. The sample covers about 512,000 census tract-year observations. However, two hazard variables, the coastal flood risk and hurricane risk, have remarkably higher missing values, with 224,728 and 391,923 observations, respectively.

On average, about 7.9 percent of people in a tract work from home. However, this varies widely, with some tracts having all people working from home while others have none working from home. Interstate migration is comparatively lower, with only 2.3 percent of the tract population having recently moved from a different state. However, some tracts show in-migration values as high as 85 percent.

The composite hazard score has both mean and median of about 50.4, indicating moderate levels of cumulative hazard exposure in census tracts. Several individual hazard variables, including heat wave, tornado, winter weather, riverine flood, and hurricane risks, also have means around 47 to 50, indicating widespread exposure across the country. In contrast, droughts and cold waves show relatively lower average values of 26.5 and 41.6, respectively, reflecting a more regional or uneven distribution.

The average census tract population is roughly 4,000. But this masks considerable variation with some tracts having as few as 16 residents or as high as over 40,000. We use the natural logarithm of population in our models to account for the high skewness and variation in tract-level population size. On average, about 31.6 percent of tract residents have college degree or higher, while 60.8 percent identify as non-Hispanic White. Furthermore, while roughly 61 percent of tract residents are aged 18 to 64, only 47 percent are married. The median household income is relatively high, standing at $72,065. But this figure also variables widely, from about $2,500 to the data's top-coded limit of $250,001. Our models include the logarithm of median household income to normalize its distribution and reduce the influence of extreme values. Overall, these statistics suggest a diverse set of communities in terms of demographics, economic status, and exposure to climate risk.

Table 1. Summary Statistics

VARIABLES	(1) N	(2) Max	(3) Min	(4) SD	(5) Mean	(6) Median
% Telework	511,922	100	0	6.871	7.860	5.965
Interstate Migration	511,922	85.10	0	3.154	2.275	1.313
Composite Hazard Risk	511,922	100	0.06	28.66	50.38	50.37
Cold Wave Risk	511,922	100	0	37.58	41.62	50.74
Drought Risk	511,922	100	0	39.44	26.51	0
Heat wave Risk	511,922	100	0	30.47	49.75	51.06
Riverine Flood Risk	511,922	100	0	33.11	46.82	50.19
Tornado Risk	511,922	100	0.03	28.73	50.41	50.39
Winter Weather Risk	511,922	100	0	30.30	49.49	50.66
Hurricane Risk	391,923	100	0	28.85	49.61	49.76
Population	511,922	40,402	16	1,639	3,968	3,805
% College+	511,918	100	0	19.61	31.62	26.71
% Non-Hispanic White	511,922	100	0	29.85	60.78	68.94
% Aged 18 to 64	511,922	100	0	8.104	61.41	60.86
% Married	511,922	97.56	0	13.95	47.20	48.62
Median Household Income ($)	511,922	250,001	2,499	36,557	72,065	63,828

Figure 1 displays the map of the change in percentage of interstate migration across the country over the study period, ranging from -21.4% to 26.14. The map does not show a clear spatial pattern at the national level, while we observe highly increased migrations clustered in some small regions in part the Northeast and the Midwest. We also observe some significant drop in migration in some economically important areas such as the New York City, the California Coasts, and the Florida Coasts.

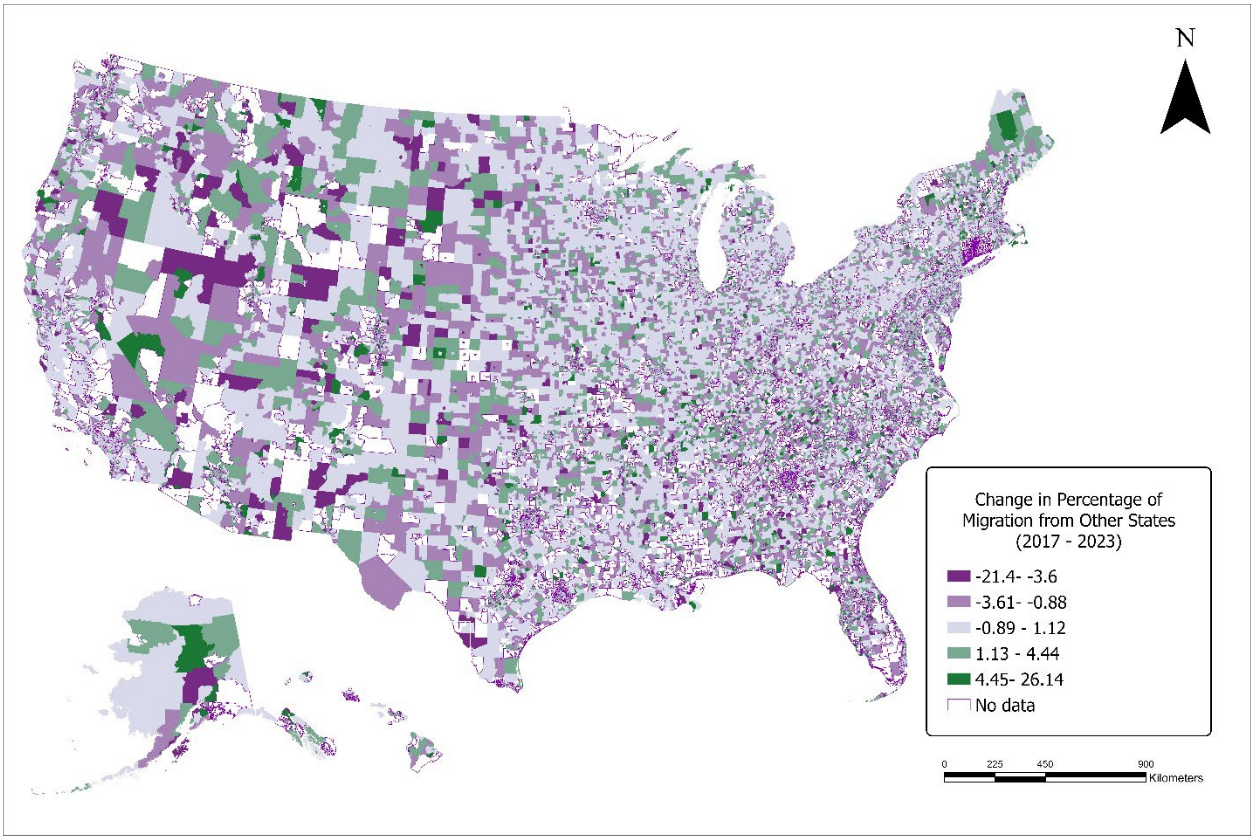

Figure 1. Change in Percentage of Interstate Migration in the U.S.

The Rise of Telework

Figure 2 shows a plot of the percentage of workers working from home at the census tract level and a map of the change in the percentage of the study period. The plot depicts a clear upward trend in the share of people working from home from 2013-2017 to 2019-2023. In 2013/2017, only about 4.6 percent of workers reported working from home. At first, this share did not record dramatic rise, increasing slowly to 4.8 percent in 2014/2018 and 5 percent in 2015-2019. This indicates that telework was still relatively uncommon and increasing only modestly in the years prior to the COVID-19 pandemic. However, after 2015-2019, a sharp increase began. Between 2015-2019 and 2016-2020, the share of teleworkers increased by 2 percentage points, from 5 percent to 7 percent. This period coincides with the COVID-19 pandemic, during which telework became a widespread necessity due to public health restrictions and workplace closures. The growth in telework continued rapidly, reaching 9.2 percent in 2017-2021 and 11 percent in 2018-2022. The share of teleworkers from 2018-2022 to 2019-2023 has remained stable at 11 percent, suggesting a possible stabilization of telework at this higher level. To put this into perspective, it means that an average census tract in our sample (with a population of 4000) has about 440 people working from home.

In sum, the plot shows a major shift in the U.S. labor market, with the share of telework increasing by about 2.4 folds from 2013-2017 to 2019-2023. Although the pandemic precipitated the trend, the sustained rise in telework suggests a structural shift, not a temporary response to the pandemic. The sustained rise in telework has implications for where people choose to live and work, and how environmental risks factor into these relocation decisions.

Meanwhile, the map shows that rapidly increasing telework is concentrated in many urban areas. We can observe clustering of high percentages in metropolitan areas such as Boston, New York, Washington, Atlanta, Houston, Dallas, San Antonio, Seattle, San Francisco, and Los Angeles. Some large tracts also show significant increases, possibly due to factors related to their rural nature.

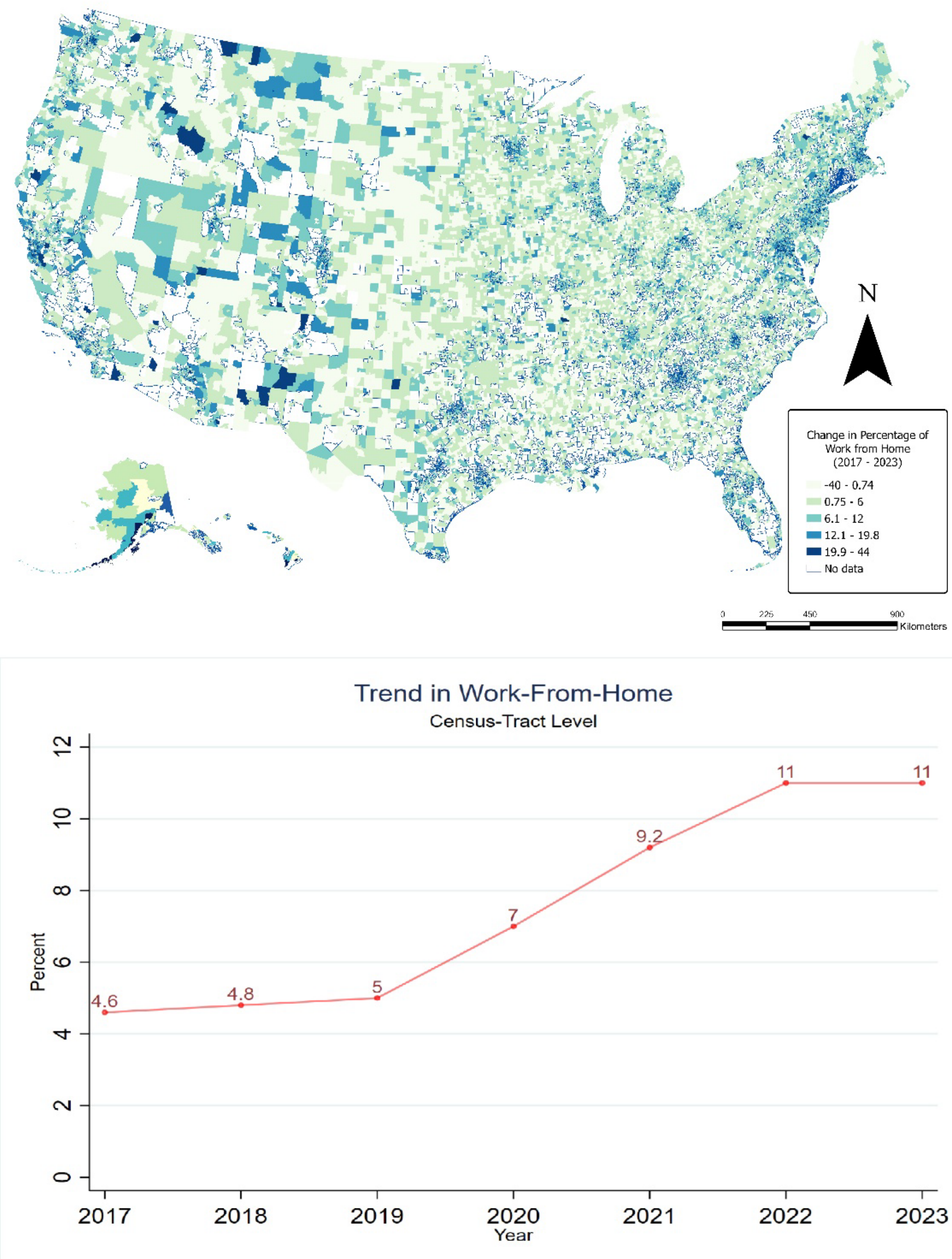

Figure 2. Plot and Map of Teleworkers in the U.S.

Interstate Migration Across Census Tracts

Figure 3 shows the trend in interstate migration rates at the census-tract level. Overall, the migration rate remains quite stable over the period, hovering between 2.2% and 2.3%. From 2023-2017 to 2019-2023, the rate holds steady at 2.2%. Starting in 2016-2020, there is a slight increase to 2.3%, and this level is maintained consistently through to 2019-2023. The trend suggests that despite economic and social changes during this period – including the COVID-19 pandemic – the overall rate of interstate migration among census tracts remained largely unchanged, with only a modest increase observed from 2020 onward.

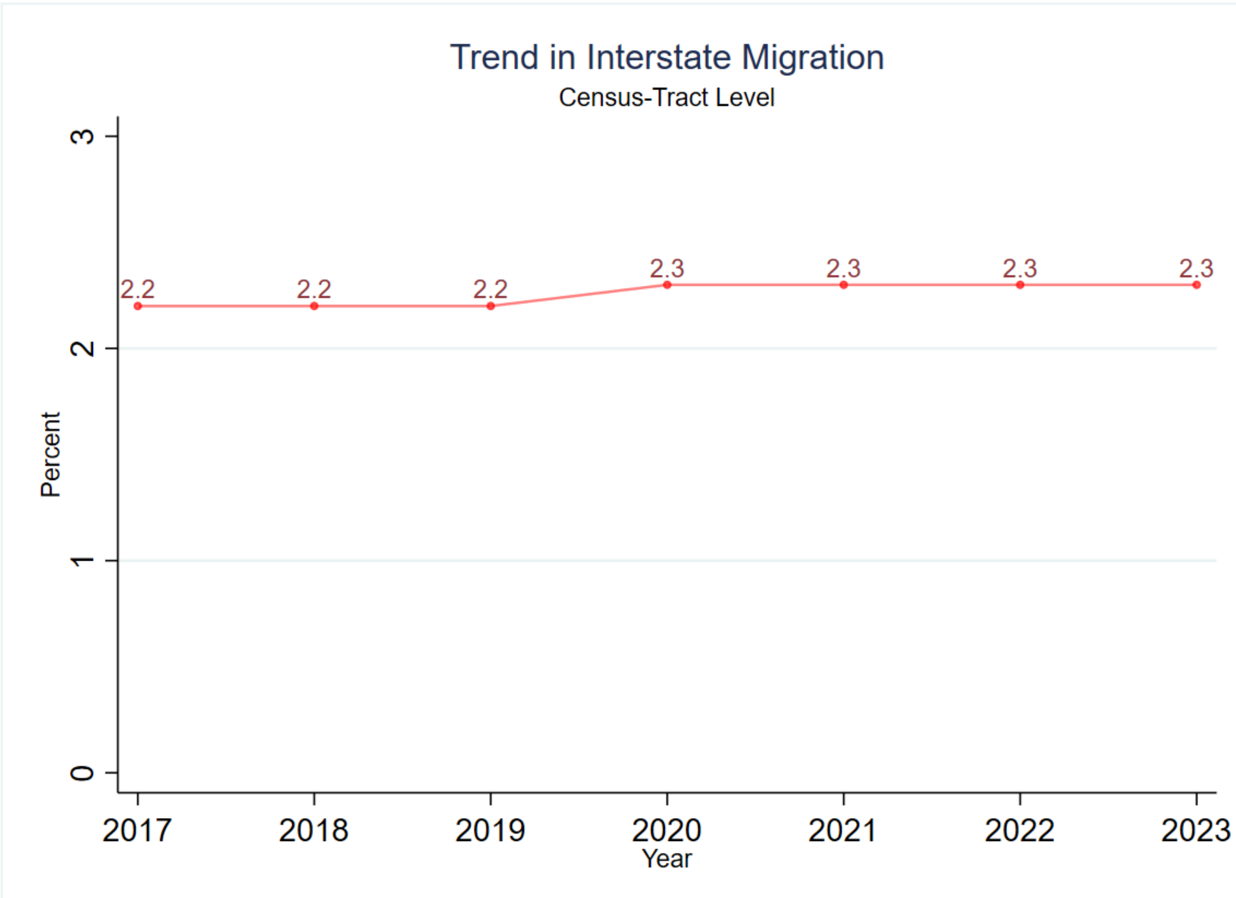

Figure 3. Plot of Interstate Migration Trend

Climate Hazard Risks Across Census Tracts

Figure 4 displays a series of maps of risk indices for the seven hazards and the overall climate hazard at the census tract level in the country, along with a bar chart showing the seven major climate hazards. Four of the hazards, tornadoes, hurricanes, winter weather and heat waves, have similar average risk score across census tracts. Tornadoes lead with an average risk score of 50.51, closely followed by hurricanes (49.84), winter weather (49.47), and heat waves (49.35). Next is riverine flooding with an average risk of 47.15. These top five hazards indicate that many U.S. communities face significant exposure to hydrometeorological and wind-related events.

In contrast, cold waves have a lower average risk score of 41.25, while drought stands out as the hazard with the lowest average risk, at 27.05. This relatively lower score for drought may reflect its regionalized occurrence, such as the western and southwestern United States. Overall, these patterns suggest that most census tracts in the U.S. are exposed to multiple overlapping climate risks. These risk levels form the basis for our analysis of how environmental threats may interact with telework to shape migration choices.

The maps show the spatial pattern of the hazards. The Great Lakes, the Mississippi River, and Part of Colorado River watershed regions have lower risks of drought. New England, the Rocky Mountains, the

Appalachian Mountains, and Florida have less heat wave risks. Hurricanes mainly threaten the East Coast and the Gulf Coast from Maine to Texas. California and Southeast states (except Florida) are less hit by cold waves. Riverine floods cover the country ubiquitously. Tornados primarily prevail in the Central and Southeast. Winter weather is not a big concern for California and Florida. Overall, the Appalachian Mountains and New England have relatively lower hazard risks in the country.

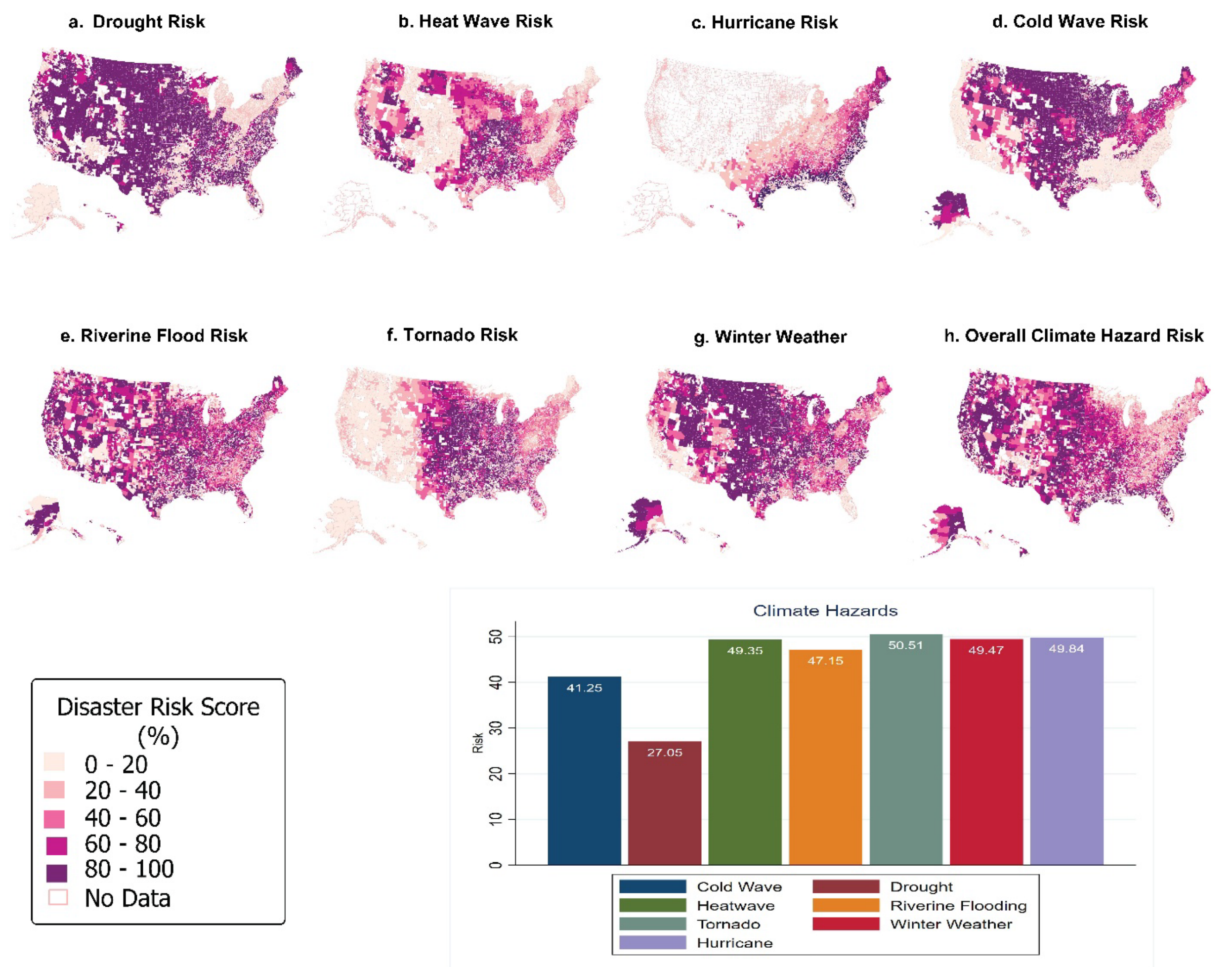

Figure 4. Maps and Bar Chart of National Risk Indices.

Methodology

We investigate the relationship between telework, climate risk, and interstate migration using a panel dataset of U.S. census tracts observed from 2013 to 2023. Our main outcome variable is the percentage of tract residents who moved from a different state (interstate migration). To account for both immediate and delayed effects of telework on migration, we estimate two specifications. One specification uses the contemporaneous value of telework while the other employs its one-year lag. The lagged model is essential because it recognizes that migration decisions may not be immediate, but unfold over time. For example, individuals may take several months to respond to new telework arrangements by relocating. The response might even be longer in cases where migration involves selling property or searching for housing in the new location. Thus, including both specifications helps ensure that we do not overlook important delayed behavioral responses in the migration process.

We then assess how climate risk moderates the relationship between telework and interstate migration by interacting the telework variable with FEMA's composite climate risk and the individual hazard risks. Specifically, we employ the following two-way contemporaneous and lagged fixed effect regressions.

Contemporaneous model:

$$\mathrm{Migration_{it}} = \beta_0 + \beta_1 \mathrm{WFH_{it}} + \beta_2 \mathrm{Hazard_i} + \beta_3 (\mathrm{WFH_{it}} \times \mathrm{Hazard_i}) + \mathrm{X}'_{\mathrm{it}}\delta + \alpha_s + \gamma_t + \varepsilon_{it} \quad Eq. 4$$

Lagged model:

$$\mathrm{Migration_{it}} = \beta_0 + \beta_1 \mathrm{WFH_{it-1}} + \beta_2 \mathrm{Hazard_i} + \beta_3 (\mathrm{WFH_{it-1}} \times \mathrm{Hazard_i}) + \mathrm{X}'_{\mathrm{it}}\delta + \alpha_s + \gamma_t + \varepsilon_{it} \quad Eq. 5$$

$\mathrm{Migration_{it}}$ is the percentage of the tract population that moved from another state into tract i in year t. $\mathrm{WFH_{it}}$ (or $\mathrm{WFH_{it-1}}$ in the lagged model) is the percentage of working from home and $\mathrm{Hazard_i}$ is the time-invariant FEMA hazard risk score. For completeness, we test both the composite risk score and the hazard-specific risk scores. The interaction between telework and hazard risk, $\mathrm{WFH_{it}} \times \mathrm{Hazard_i}$ (or $\mathrm{WFH_{it-1}} \times \mathrm{Hazard_i}$ in the lagged model), captures whether the effect of telework on interstate immigration varies depending on a tract's exposure to climate hazards. A positive and statistically significant interaction term would suggest that telework has a stronger migration-enhancing effect in areas with higher hazard risk. Conversely, a negative interaction would indicate that hazard exposure weakens the positive effect of telework on migration. Simply, we are testing whether climate risk acts as a constraint or amplifier on the location decisions of teleworkers.

$\mathrm{X}'_{\mathrm{it}}$ is a vector of control variables including the log of population size, log of median household income, percent of college-educated residents, percent non-Hispanic white, percent aged 18 to 64, and percent married. α_s and γ_t represent state and year fixed effects, respectively. The state fixed effects control for unobserved, time-invariant characteristics of states (like tax policy, labor market) that may systematically influence the attractiveness of a state to out-of-state migrants. Year fixed effects capture national shocks or trends that could affect migration patterns uniformly across all states and tracts in a given year.

Empirical Results

This section reports and discusses the results examining the relationship between telework, climate hazard risk, and interstate migration. For the composite and individual hazards, we report results from two model specifications in **Tables 2-9**, one using the contemporaneous percentage of teleworkers (Columns 1 to 3), and the other using a one-year lag to capture potential delayed effects on migration patterns (Columns 4 to 6). All models include state and year fixed effects. The focus of our interpretation lies in the interaction terms in the fully controlled models. The interaction terms will indicate whether climate hazards act as amplifiers or constraints on the migration-enhancing effects of telework.

Telework and In-Migration

Models 1 and 4 (Columns 1 and 4) in each result table display the relationship between telework and interstate migration. Across all specifications, the share of people working from home is positively and significantly associated with in-migration from other states. In the baseline specification (Column 1), a one percentage point (pp) increase in telework is associated with a 0.08 pp increase in the share of people moving into the tract from a different state. The baseline estimate in the lagged model in Column (4) shows a slightly larger coefficient, with the estimate increasing to 0.084 pp. This suggests that, compared to the immediate effects, increases in telework have stronger delayed positive effects on attracting interstate migrants. The following results report how this positive impact interacts with climate hazards to determine interstate migration.

Overall Climate Hazard and In-Migration

Table 2 presents the regression estimates examining how the overall climate hazard exposure (FEMA's composite hazard risk score) moderates the relationship between telework and interstate migration. Across both the contemporaneous and lagged models, the interaction between telework and the composite risk score is positive and statistically significant. Specifically, in both the fully controlled contemporaneous and lagged models (Columns 3 and 6), the interaction term is .0002, indicating that the positive impact of telework on interstate migration is stronger in tracts with higher composite hazard risk.

What these findings mean is that teleworkers are not systematically avoiding high-risk areas. Instead, they are more likely to move into such areas, possibly because of non-environmental pull factors like lower housing costs, scenic amenities, or lifestyle preferences. The following results delve into the relationships between the individual climate hazards, telework, and in-migration.

Table 2. Effects of Telework and Overall Climate Hazard on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: % Moved from a Different State					
% Telework	0.0809***	0.0747***	0.0207***	0.0841***	0.0795***	0.0253***
	(0.0007)	(0.0021)	(0.0023)	(0.0008)	(0.0026)	(0.0028)
Climate Hazard Risk		-0.0019***	0.0040***		-0.0016***	0.0044***
		(0.0003)	(0.0003)		(0.0004)	(0.0004)
%Telework x Climate Hazard Risk		0.0001***	0.0002***		0.0001**	0.0002***
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-0.1639***			-0.1535***
			(0.0140)			(0.0150)
Log Median Household Income			-1.4064***			-1.4150***
			(0.0272)			(0.0290)
% College+			0.0530***			0.0532***
			(0.0005)			(0.0005)
% Non-Hispanic White			0.0121***			0.0121***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0799***			0.0793***
			(0.0010)			(0.0011)
% Married			-0.0191***			-0.0194***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.0960	0.2277	0.0958	0.0959	0.2299
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Cold Wave

Table 3 displays the results examining the interaction between telework prevalence, cold wave risk, and interstate migration. The interaction between telework and cold wave risk is positive and statistically significant in both the contemporaneous and lagged models. In the fully controlled contemporaneous model (column 3), the interaction coefficient is 0.0001, suggesting that the beneficial effect of telework on attracting migrants is amplified in areas with greater cold wave risk. This result indicates that telework not only supports higher migration overall but may also encourage individuals to relocate to colder regions, regardless of potential climate-related challenges. A possible reason for this pattern is that colder areas might provide attractive features, such as more affordable housing, seasonal lifestyles, or proximity to social networks, which are valued by teleworkers. Additionally, concerns about cold wave risks may be less influential for teleworkers, who often spend more time indoors or can adapt more easily through improved housing and infrastructure.

Table 3. Effects of Telework and Cold Wave on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: % Moved from a Different State					
% Telework	0.0809***	0.0834***	0.0277***	0.0841***	0.0876***	0.0312***
	(0.0007)	(0.0014)	(0.0017)	(0.0008)	(0.0017)	(0.0021)
Cold Wave Risk		-0.0010***	0.0005*		-0.0009***	0.0005*
		(0.0003)	(0.0003)		(0.0003)	(0.0003)
%Telework x Cold Wave Risk		-0.0001**	0.0001***		-0.0001***	0.0001**
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-0.0692***			-0.0559***
			(0.0131)			(0.0139)
Log Median Household Income			-1.4304***			-1.4396***
			(0.0272)			(0.0291)
% College+			0.0525***			0.0527***
			(0.0005)			(0.0005)
% Non-Hispanic White			0.0124***			0.0123***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0787***			0.0781***
			(0.0010)			(0.0011)
% Married			-0.0195***			-0.0198***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.0960	0.2264	0.0958	0.0960	0.2286
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Drought

Table 4 shows the relationship between telework prevalence, drought risk, and interstate migration. Again, the interaction between telework and drought risk is positive and statistically significant in the fully controlled models. In Column (3), the interaction term is 0.0002, suggesting that the positive effect of telework on interstate migration is stronger in areas with higher drought risk. This result suggests that teleworkers are not deterred by drought-prone areas, and may in fact be more likely to move into such regions as telework opportunities increase. One possible explanation is that many drought-affected areas, such as California, Arizona, and Texas, also offer lifestyle or economic amenities that remain attractive despite water-related risks. In the lagged model (Column 6), the interaction term becomes very small and statistically insignificant, implying that the moderating effect of drought risk on telework-driven migration may be more immediate rather than delayed.

Table 4. Effects of Telework and Droughts on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: % Moved from a Different State					
% Telework	0.0809***	0.0832***	0.0291***	0.0841***	0.0881***	0.0335***
	(0.0012)	(0.0013)	(0.0017)	(0.0015)	(0.0016)	(0.0021)
Drought Risk		-0.0055***	-0.0006**		-0.0054***	-0.0002
		(0.0002)	(0.0002)		(0.0002)	(0.0002)
%Telework x Drought Risk		-0.0003***	0.0001***		-0.0003***	0.0000
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-0.0639***			-0.0503***
			(0.0131)			(0.0139)
Log Median Household Income			-1.4393***			-1.4480***
			(0.0271)			(0.0289)
% College+			0.0525***			0.0526***
			(0.0005)			(0.0006)
% Non-Hispanic White			0.0125***			0.0124***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0788***			0.0782***
			(0.0010)			(0.0011)
% Married			-0.0193***			-0.0196***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.1036	0.2264	0.0958	0.1040	0.2286
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Riverine Flooding

Table 5 presents the interaction effects between telework and riverine flooding risk on interstate migration. In the fully controlled contemporaneous model (Column 3), the interaction term is positive and statistically significant (0.0002), showing that the migration-enhancing effect of telework is stronger in areas with elevated riverine flooding risk. This finding implies that teleworkers are more inclined to move into flood-prone locations, likely attracted by features such as riverside environments, relatively lower housing prices, or other amenities that may overshadow concerns about flooding in the near term.

Similarly, in the fully controlled lagged model (Column 6), the interaction term remains positive and significant (0.0002). This suggests that the amplifying effect of riverine flooding risk on telework-driven migration persists over time. Teleworkers appear willing to relocate to flood-prone areas both immediately and after some delay, which may reflect a willingness to accept environmental risks in exchange for other benefits.

Table 5. Effects of Telework and Riverine Flooding on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: % Moved from a Different State					
% Telework	0.0809***	0.0876***	0.0204***	0.0841***	0.0936***	0.0252***
	(0.0012)	(0.0019)	(0.0022)	(0.0015)	(0.0023)	(0.0027)
Riverine Flooding Risk		-0.0046***	-0.0024***		-0.0043***	-0.0020***
		(0.0003)	(0.0003)		(0.0003)	(0.0003)
%Telework x Riverine Flooding Risk		-0.0002***	0.0002***		-0.0002***	0.0002***
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-0.0572***			-0.0444***
			(0.0131)			(0.0139)
Log Median Household Income			-1.4431***			-1.4517***
			(0.0272)			(0.0290)
% College+			0.0523***			0.0525***
			(0.0005)			(0.0005)
% Non-Hispanic White			0.0128***			0.0127***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0789***			0.0783***
			(0.0010)			(0.0011)
% Married			-0.0194***			-0.0197***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.0994	0.2267	0.0958	0.0995	0.2288
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Heat Wave

Table 6 examines the interaction between telework and heat wave risk in shaping interstate migration patterns. In the fully controlled contemporaneous model (Column 3), the interaction coefficient is negative and marginally significant, indicating that the positive impact of telework on migration is somewhat reduced in areas experiencing higher heat wave risk. This suggests that, in the short term, extreme heat conditions may discourage some teleworkers from relocating to regions frequently affected by heat waves, potentially due to concerns related to personal comfort, health risks, or increased energy demands.

In the fully controlled lagged model (Column 6), the interaction remains negative but not statistically significant, implying that heat wave risk does not exert a consistent or strong influence on telework-driven migration over time. It is possible that teleworkers do not systematically factor in heat wave exposure when making relocation decisions, or that other appealing aspects of a region counterbalance any negative perceptions associated with extreme heat.

Table 6. Effects of Telework and Heat wave on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: % Moved from a Different State					
% Telework	0.0809***	0.0753***	0.0337***	0.0841***	0.0779***	0.0371***
	(0.0012)	(0.0017)	(0.0019)	(0.0015)	(0.0020)	(0.0022)
Heat wave Risk		-0.0001	0.0045***		0.0000	0.0044***
		(0.0003)	(0.0003)		(0.0003)	(0.0003)
%Telework x Heat wave Risk		0.0001***	-0.0001*		0.0001***	-0.0001
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-0.1074***			-0.0945***
			(0.0132)			(0.0140)
Log Median Household Income			-1.4343***			-1.4430***
			(0.0271)			(0.0289)
% College+			0.0524***			0.0526***
			(0.0005)			(0.0005)
% Non-Hispanic White			0.0132***			0.0131***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0793***			0.0788***
			(0.0010)			(0.0011)
% Married			-0.0190***			-0.0194***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.0960	0.2270	0.0958	0.0959	0.2292
Year F.E.	YES	YES	YES	YES	YES	YES
State F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.

Hurricane

Table 7 reports the interaction effects between telework and hurricane risk in influencing interstate migration. In the fully controlled contemporaneous model (Column 3), the interaction term is positive and statistically significant (0.0005), indicating that the migration-enhancing effect of telework is amplified in regions with higher hurricane risk. This suggests that teleworkers are increasingly willing to relocate to hurricane-prone areas as telework becomes more prevalent. They may be motivated by attractive coastal environments, lifestyle amenities, or relatively lower housing prices, despite the inherent risks of extreme weather.

A similar pattern is evident in the fully controlled lagged model (Column 6), where the interaction term remains positive and significant (0.0006), showing that this positive relationship endures over time. These findings imply that the potential threat of hurricanes does not significantly deter teleworkers; instead, they appear to prioritize the perceived benefits of these areas over concerns about storm-related hazards.

Table 7. Effects of Telework and Hurricane on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: % Moved from a Different State						
% Telework	0.0809***	0.0801***	0.0161***	0.0841***	0.0835***	0.0194***
	(0.0012)	(0.0031)	(0.0036)	(0.0015)	(0.0037)	(0.0043)
Hurricane Risk		-0.0052***	0.0014***		-0.0052***	0.0018***
		(0.0005)	(0.0005)		(0.0005)	(0.0005)
%Telework x Hurricane Risk		0.0003***	0.0005***		0.0003***	0.0006***
		(0.0000)	(0.0000)		(0.0001)	(0.0001)
Log Population			-0.1095***			-0.1011***
			(0.0152)			(0.0161)
Log Median Household Income			-1.3210***			-1.3354***
			(0.0313)			(0.0334)
% College+			0.0523***			0.0526***
			(0.0006)			(0.0007)
% Non-Hispanic White			0.0130***			0.0129***
			(0.0002)			(0.0003)
% Aged 18 to 64			0.0766***			0.0762***
			(0.0012)			(0.0013)
% Married			-0.0229***			-0.0230***
			(0.0011)			(0.0011)
Observations	511,922	391,923	391,919	428,373	327,808	327,805
R-squared	0.0959	0.0832	0.2086	0.0958	0.0833	0.2109
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Tornado

Table 8 explores the interaction between telework prevalence and tornado risk in shaping interstate migration. The coefficient of the interaction term in Column (3) is positive and statistically significant (0.0002), suggesting that the beneficial effect of telework on migration is stronger in areas with elevated tornado risk. This indicates that teleworkers are more inclined to relocate to tornado-prone regions as telework becomes more widespread. Despite the climate hazard risks, these workers are potentially attracted by features such as lower cost of living, rural or suburban environments, or proximity to family and social networks.

The fully controlled lagged model (Column 6) reflects a similar and significant positive interaction (0.0002), demonstrating that this tendency persists over time. These findings imply that tornado risk does not deter teleworkers, who may prioritize other advantages of these areas, and are willing to accept the associated environmental risks in both the short and longer term.

Table 8. Effects of Telework and Tornado on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: % Moved from a Different State						

% Telework	0.0809***	0.0707***	0.0217***	0.0841***	0.0743***	0.0259***
	(0.0012)	(0.0017)	(0.0019)	(0.0015)	(0.0021)	(0.0023)
Tornado Risk		-0.0038***	-0.0003		-0.0035***	-0.0001
		(0.0004)	(0.0004)		(0.0004)	(0.0005)
%Telework x Tornado Risk		0.0002***	0.0002***		0.0002***	0.0002***
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-0.0889***			-0.0754***
			(0.0147)			(0.0156)
Log Median Household Income			-1.4342***			-1.4438***
			(0.0271)			(0.0289)
% College+			0.0524***			0.0526***
			(0.0005)			(0.0006)
% Non-Hispanic White			0.0125***			0.0124***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0784***			0.0779***
			(0.0010)			(0.0011)
% Married			-0.0194***			-0.0197***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.0962	0.2265	0.0958	0.0960	0.2287
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Winter Weather

Table 9 investigates how winter weather risk interacts with telework in shaping interstate migration patterns. In both the fully controlled contemporaneous model (Column 3) and the lagged model (Column 6), the interaction coefficients are negative but not statistically significant. This indicates that winter weather exposure has no measurable effect on the relationship between telework prevalence and migration, either in the near or long term. Based on these results, teleworkers do not appear to be systematically influenced by the severity or frequency of winter conditions when deciding where to relocate. In short, cold-weather hazards neither attract nor deter teleworkers in any consistent or meaningful way.

Table 9. Effects of Telework and Winter Weather on Migration

	Contemporaneous models			Lagged models		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: % Moved from a Different State					
% Telework	0.0809***	0.0887***	0.0320***	0.0841***	0.0938***	0.0367***
	(0.0012)	(0.0015)	(0.0018)	(0.0015)	(0.0017)	(0.0020)
Winter Weather Risk		-0.0020***	0.0055***		-0.0020***	0.0057***
		(0.0003)	(0.0003)		(0.0003)	(0.0004)
%Telework x Winter Weather Risk		-0.0002***	-0.0000		-0.0003***	-0.0001

		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Log Population			-			-
			0.1233***			0.1107***
			(0.0133)			(0.0142)
Log Median Household			-			-
Income			1.3986***			1.4073***
			(0.0272)			(0.0290)
% College+			0.0532***			0.0534***
			(0.0005)			(0.0005)
% Non-Hispanic White			0.0116***			0.0115***
			(0.0002)			(0.0002)
% Aged 18 to 64			0.0793***			0.0788***
			(0.0010)			(0.0011)
% Married			-			-
			0.0197***			0.0200***
			(0.0009)			(0.0010)
Observations	511,922	511,922	511,918	428,373	428,373	428,370
R-squared	0.0959	0.0965	0.2271	0.0958	0.0965	0.2294
State F.E.	YES	YES	YES	YES	YES	YES
Year F.E.	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Discussion

This study investigates whether climate hazard risk moderates the relationship between telework and interstate migration. Drawing on census tract-level panel data across the U.S., our results reveal a generally consistent and positive interaction between telework prevalence and climate risk exposure. For four hazards, including riverine flooding, hurricanes, tornadoes, and drought, the interaction terms are positive and statistically significant in both the fully controlled contemporaneous and lagged models. For heat waves and winter weather the interaction effects are marginally negative and absent, respectively.

A notable feature of the results is that the magnitudes of the interaction terms tend to be small. This is expected for two main reasons. First, both telework and hazard risk scores are measured in bounded units. Telework is expressed as a percentage of tract residents, ranging from 0 to 100. Similarly, FEMA hazard risk scores range from 0 to 100. Our models investigate the effect of telework on migration per one-unit increase in hazard risk. So even small coefficients can reflect meaningful changes when accumulated over realistic ranges of both variables. Second, the unit of analysis is the census tract, a relatively small geographic area. Hence, migration rates and telework shares are naturally small in such fine-grained units. As such, small in-migration in a tract can still represent significant population shifts when considered across thousands of tracts.

Nonetheless, our results generally stand in contrast with much of the climate migration literature, which typically argues that environmental hazards act as push factors that lead to out-migration or deter in-migration (Hunter, 2005; Shumway et al., 2014). The main implication of our findings is that the presence of telework may alter how individuals perceive and respond to environmental risks. Telework migrants may be drawn to locations with favorable amenities such as coastal access, affordable housing, or scenic landscapes, even when those areas are prone to climate hazards. This aligns with other research showing that climate hazards do not uniformly deter migration and may be offset by lifestyle or economic pull factors (Clark et al., 2022; Ivanova et al., 2024).

Still, the positive interaction effect of telework and climate hazards is not universal. In the case of heat waves, the interaction is negative, but only slightly significant. This suggests that extreme heat may still discourage migration into affected areas despite the availability of telework. This may reflect what McLeman (2018) calls the "threshold effect" where climate hazards only significantly influence migration once certain environmental or social tipping points are reached. Thus, heat waves would influence in-migration if its discomfort, health risks, or energy burdens begin to outweigh the perceived benefits of telework. Meanwhile, the results for winter weather are statistically insignificant, suggesting that cold-related risks may not have a strong moderating effect on migration decisions in either direction.

Broadly, our findings open new directions for the study of mobility as shaped by intersecting forces. While prior research has tended to treat economic and environmental migration drivers in isolation, our study demonstrates that the two variables can interact to influence population movements. Thus, our work views migration not as a response to a single factor (like hazards or economic conditions), but as a product of overlapping, opposing forces.

That said, our study has limitations. The FEMA NRI is a one-time snapshot of hazard exposure and do not capture changes in risk perception over time or disaster-specific lived experiences of residents. Future work could use longitudinal hazard exposures data to assess whether repeated experiences with climate hazards dampen or amplify the effects observed in this study. Additionally, while we control for many observable characteristics and include fixed effects, endogeneity concerns remain. For example, it is likely that areas with high telework rates also invest in climate resilience or attract specific demographics who are more tolerant of risk. Further studies using instrumental variable strategies, for example, could explore these questions more deeply.

From a policy perspective, our study sheds light on population projection, workforce development, and telework policies. Additionally, the findings can inform how communities (should) prepare for and manage population flows in an era of growing climate risk and flexible work. If teleworkers are moving into high-risk areas, planners and local governments may face increased pressure on housing, infrastructure, and emergency services. Furthermore, emergency planning and services should also pay attention to the growing telework population and communities such as the recovery of utilities and transportation, which are not only their life necessities but also essential for their jobs and productivity. Conversely, lower-risk areas with limited telework infrastructure may struggle to attract or retain new residents. A better understanding of how telework and climate risk jointly shape migration can support more forward-looking investments in adaptation, housing policy, and regional labor market planning.

Conclusion

Remote work and climate hazards are two powerful forces transforming how and where people live and work. Remote work has decoupled job location from place of residence, giving individuals new freedom to relocate based on personal preferences rather than workplace proximity. At the same time, environmental risks such as floods, hurricanes, and heatwaves are reshaping the safety and livability of many regions. These trends raise an important question: do climate hazards deter remote workers from migrating into high-risk areas, or does the flexibility of telework diminish concern about environmental exposure?

To address this question, we construct a panel dataset of U.S. census tracts from 2013 to 2023, combining data on telework and migration from the American Community Survey with climate risk scores from FEMA's National Risk Index. Our empirical strategy centers on estimating interaction effects between remote work prevalence and climate hazard exposure on interstate in-migration rates. We implement both contemporaneous and lagged models, controlling for state and year fixed effects and a rich set of covariates.

Our results indicate that remote work is generally associated with increased in-migration to higher-risk areas. This finding is clearest when we use the composite hazard risk score, and it holds across multiple specific hazards including riverine flooding, hurricanes, tornadoes, droughts, and cold waves. These patterns suggest that the migration-enhancing effect of remote work is not strongly constrained by environmental risk. In contrast, extreme heat exhibits a slight negative interaction, while winter weather has no significant moderating effect, indicating that comfort-related or chronic risks may exert more subtle influence on locational choices.

These findings have some important implications. First, they suggest that remote workers may prioritize lifestyle amenities, affordability, or personal preferences over safety from environmental hazards. As a result, regions vulnerable to climate risks – especially coastal or scenic areas – could continue to see population inflows, increasing exposure and potentially complicating adaptation planning. Second, the findings highlight the need for policymakers to consider telework trends when forecasting population growth and planning for infrastructure, housing, and disaster preparedness. Areas attracting remote workers may face rising demand for services, while others may need to improve digital infrastructure or climate resilience to remain attractive. Our study also contributes conceptually by showing that migration is not solely a response to environmental push or economic pull factors, but the product of their interaction. Thus, we expand existing literature on climate migration and remote work, offering new insights into how labor market flexibility reshapes sensitivity to environmental risks.

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