Emigration intentions and Risk Aversion: Causal Evidence from Albania *

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Abstract

Estimating the impact of risk aversion on emigration at the individual level is complicated by selection issues. In this paper, we use original data from Albania on mobility intentions and elicited risk aversion to provide causal estimates on this relationship. Our identification strategy relies on the occurrence of two earthquakes during data collection that unambiguously led to upward shifts in risk aversion as shown in a companion paper (Beine et al., 2021). While OLS estimates fail to capture a (negative) relationship between risk aversion and emigration intention, a Control Function strategy using the two earthquakes as instruments uncovers such a relationship. We argue that our results highlight a new channel through which risk preferences explain the trapped population phenomenon documented in the climate change and migration literature.

Keywords: Emigration; Risk Aversion; Earthquakes; Trapped Population Phenomenon
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1 Introduction

Risk preferences of individuals exert important effects on their economic and social behavior. One of these effects concerns mobility intentions and decisions: relatively more risk-averse agents are likely to exhibit different location preferences which may materialize in different mobility decisions compared to less risk averse ones. While economic theory identifies several channels through which these risk preferences can affect mobility intentions and outcomes, the empirical identification of these relationships is subject to important challenges. This may explain why the empirical literature assessing the existence of these relationships has provided heterogeneous findings, casting doubt on the nature of the link between risk aversion and human mobility.

The associated empirical analysis faces several important issues. A first concern is the difference between mobility intentions and mobility outcomes. While risk aversion can affect the intention to move, it can also affect how these intentions translate into actual outcomes. A second challenge concerns the measurement of risk aversion. While some papers use self-reported measures of risk preferences, other studies rely on measures elicited through incentivized games and experiments. Finally, a third important issue concerns the impact of selection and confounding factors in the econometric analysis of the relationship between risk aversion and mobility (intentions and/or actual decisions).

One's degree of risk aversion may potentially be affected by many factors. Some of these factors are likely to also impact this individual's location decisions, thereby creating a potential selection problem. While the econometrician can capture some of these factors in the data, it is nevertheless unlikely that one can account for all factors affecting risk aversion and mobility in the econometric model. This in turn creates an endogeneity problem. Given the high number of confounding factors, the direction and the size of this selection bias are difficult to anticipate.[1] This issue is therefore an empirical one that requires specific solutions in order to deliver consistent estimates of the relationship between risk aversion and mobility. The primary aim of this paper is to provide such a solution.

We analyze the impact of risk aversion on location preferences (intentions to migrate). We

[1] For instance, experiences accumulated in childhood fall into this category, and are difficult to measure. A good example would be an individual who has been during his/her childhood in touch with subsequent emigrants who became successful entrepreneurs abroad. Such an experience could negatively impact his degree of risk aversion and make him more prone to emigrate, inducing a negative bias between risk aversion and intended emigration. On the contrary, direct or indirect experience of bad shocks in the past could at the same time increase risk aversion and the propensity to leave, leading to a positive bias in the estimated impact. An example of such a confounding factor would be personal exposure to the consequences of Ponzi games that plague the Albanian economy in the 90's.

use data from a survey that we conducted in the second half of 2019 in Tirana, Albania. Using these data helps us address the three concerns mentioned. First, Albania has exhibited an annual emigration rate averaging of 3% since 2004, very high by international standards, so that intentions expressed in our survey may well translate into actual subsequent departures. Second, the survey captures many individual characteristics of individuals (e.g., their location preferences) as well as information about each individuals risk preference, which was elicited through an incentivized game. Finally, a unique characteristic of these data is that, during the data-collection period, two important earthquakes hit the population of Tirana. In a companion paper (Beine *et al.* (2020a)) we have documented strong evidence that these quakes significantly increased the degree of risk aversion of individuals. Hence, we utilize these exogenous shocks to carry out a Control Function Estimation, i.e. the counterpart of the instrumental variable analysis for discrete choice models, of the impact of risk aversion on emigration intentions, addressing the third concern mentioned.

Our results show that naive (OLS) estimates do not indicate any significant relationship between risk aversion and emigration intentions. In contrast, when the Control Function estimation is carried out, we find clear evidence that risk aversion acts as a negative self-selection factor of emigration. The story told by our IV estimation is that earthquakes made the local people of Tirana more risk averse, which lowers their expressed intentions to leave their current location; but this effect is not picked up by OLS regressions. The findings have clear implications in explaining the trapped-population phenomenon (Black *et al.* (2012)). An increasing number of studies have documented that experiencing a natural disaster did not lead people to move out of the affected area and sometimes even increased their willingness to stay. Most of these papers have rationalized the findings by emphasizing the role of liquidity constraints that prevent people to implement their desires of mobility. In this paper, to our knowledge new to the literature, we document a risk- aversion channel of natural disasters such as earthquakes and emphasize that such shocks can also play a negative role on the mere expressed intention to move.

The paper is organized as follows. Section 2 provides information about the context and the data that we use. Section 3 details the model and provides the specificities of our approach with respect to the existing literature. Section 4 presents and discusses the results while section 5 briefly concludes.

2 Context, key data and Experimental Design

2.1 Sample and descriptive statistics of the field study

Our field study was designed to collect information about the migration intentions of the Albanian population. Albania is an ideal case for this study as it has a history of out-migration starting in 1990 soon after the fall of communism. Albania has exhibited an emigration rate that is very high by international standards. This in turn emphasizes the importance of focusing on intentions since they are likely to translate into actual departures. Our study covers the population of Tirana, which is the capital of the country hosting about one third of the native population. Nine trained enumerators conducted the data collection. The enumerators, wearing badges with the logo of the University of Luxembourg and carrying a tablet, randomly intercepted potential subjects (aged 16 and over) and invited them to participate in our survey. Details about the design of the survey can be found in Beine *et al.* (2020b) and Beine *et al.* (2020a). The fieldwork started on August 31, 2019 (following a one-month pilot phase) and ended on December 30, 2019.

Our sampling strategy is stratified at the level of a district. The city of Tirana is comprised of 11 districts called "mini-bashki". The design of the survey is such that interviews are spread evenly in all the districts and that each enumerator has the same relative activity across the districts. In total, 2,374 individuals were randomly intercepted, 1,504 agreed to participate and 1,502 completed the survey.[2] Figure (1) provides the exact locations of all the completed interviews.

An interview took on average about 20 minutes. Each interview involved three different sections. The first section included the baseline characteristics of the subjects: sociodemographic information, such as age, gender, income, education, and family situation. The second part involved an experimental section with choices regarding migration intentions. The third and last part included laboratory incentivized games to elicit individual preferences about risk and time. Participants were informed about the details of the financial incentives of the games only at the start of this last section.[3].

[2] For three subjects, the number of years of education is missing.

[3] More precisely, individuals were informed upon interception that they could earn some money. Nevertheless, the details about the possible amounts, the nature of the games, and the way they would be paid were given at the start of the third module, i.e. after subjects had already agreed to participate. They were rewarded with a voucher consisting of a top-up of their mobile phones. The amount of the voucher was based on the outcomes of one of the two games played in the third part of the survey; the application randomly selected which of the games to use for financial reward. The average amount earned is around 1300 Lek (10 Euros) and the maximum potential reward is 3000 Lek (25 Euros). These amounts are quite large; the average earnings per month in Albania is about 30,000 Lek (250 euros, see Table (2)).

Figure 1: Distribution of the interviews across the city of Tirana

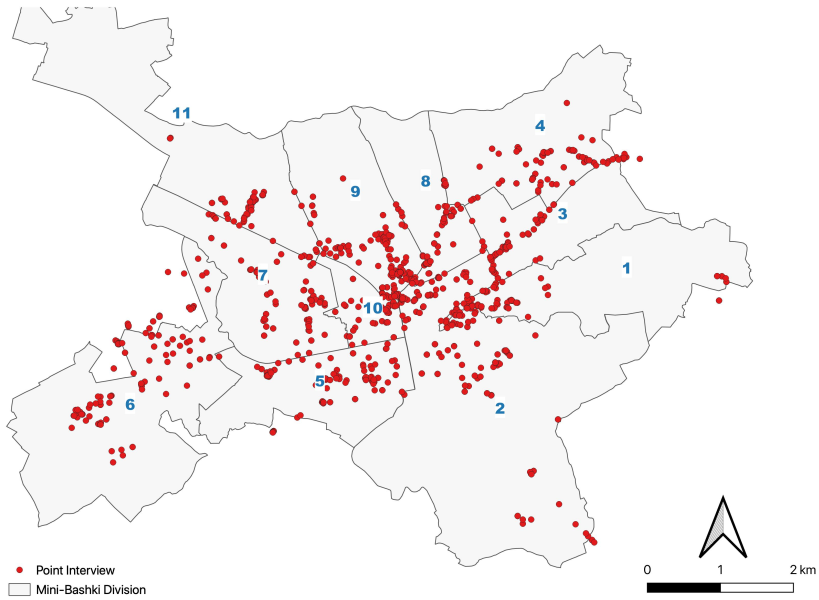


Table (2) provides descriptive statistics of the baseline sample regarding the main socio-demographic characteristics of the subjects participating in the survey. The second column gives the average value in the sample while the third column provides an equivalent measure for the population, using official statistics.[4] Since we stratified the sample by gender, location and time of day, we have a balanced sample in terms of gender. Content in the third column suggests that our sample is quite representative of the population of Tirana in terms of the main characteristics such as age, number of children or number of education years.[5]

[4]Figures reported in the third column are from various sources: row 2 is from www.instat.gov.al, row 3 is from https://www.statista.com/statistics/443999/fertility-rate-in-albania, rows 1 and 4 are from https://invest-in-albania.org/this-is-the-average-household-size-in-tirana, row 5 from http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/ALB.pdf, row 6 from www.instat.gov.al/media/5577/labour-market-2018-press-release.pdf, but note that, in Albania, the informal employment is estimated to be between 30- 60%, see http://www.ilo.org/wcmsp5/groups/public/@europe/@ro-geneva/@sro-budapest/documents/publication/wcms_167170.pdf. If we account for informal employment, the employment level should be 88%. Row 7 is from http://www.instat.gov.al/al/temat/censet/censusi-i-popullsis%C3%AB-dhe-banesave and row 8 from http://www.instat.gov.al/en/themes/labour-market-and-education/wages/.

[5]The official average monthly income in Albania is higher but only includes those employed. The average monthly income in Albania is 51,870, which is equal to 415 euros per month.

Table 1: Baseline descriptive statistics of key variables of the field experiment

	Mean	Census Data	Min	Median	Max	Obs.
Male	0.500	0.51	0.00	0.00	1.00	1502
Age	32.91	34.50	17.00	28.00	78.00	1502
Number Children	0.79	0.80	0.00	0.00	7.00	1502
Household members	3.80	3.00	0.00	4.00	12.00	1502
Years of schooling	14.10	15.20	0.00	15.00	25.00	1499
Employment status	0.81	0.88	0.00	1.00	1.00	1502
House ownership	0.64	0.74	0.00	1.00	1.00	1502
Individual income*	28.38	29.85	0.00	28.00	1800.00	1502
Friends ever migrated	0.98	n.a	0.00	1.00	1.00	1502

Notes: All data are from the 2019 Baseline survey.

*Individual income is in thousands of Leks. Adjusting for the employment rate in our sample, comparable average income for those employed is 35,039 in our sample.

2.2 Intended migration

One of the main objectives of our study was to analyze the extent to which migration intentions and desired destination countries are conditioned by risk and time preferences. Our choice for studying this phenomenon in Albania was motivated by the fact that Albania has one of the highest desired emigration rates in the world. Indeed, over the 2015-2017 period, the Gallup World Poll survey gives an estimated desired emigration rate of 60% for Albania. During that time, Albania was ranked 4th in the World in terms of desired emigration rate, behind Sierra Leone, Liberia, and Haiti. Our data confirm this macro-evidence: 71.5% of the subjects in our data were planning to emigrate in the future at the time of the interview.

2.3 Elicited risk preferences

The second key variable of our study is the level of risk aversion. Our data in fact measure both risk and time preferences. We elicit these preferences through two games conducted during the field study. More precisely, at the start of the last module, the subjects were asked to participate in two tasks and to make decisions that involved real money. Individuals were endowed with an initial amount of 1,000 Lek (approximately eight Euros) and were told that, depending on their choices during the games, more money could be earned.[6] The initial endowment was divided into 100 coins (tokens), each with a value of 10 Lek.

For risk preferences, we rely on an adaptation of the Gneezy & Potters (1997) elicitation method, providing a measure of risk preference in the context of financial decision-making with real monetary payoffs.[7] The enumerators asked the subjects to look at the tablet where 100 tokens appeared along with a bag representing the risky asset. The game was explained as follows:

"We will give you a reward for participating to our survey, which will be calculated from the way you make some decisions. You have an initial budget of 1000 Lek. Suppose that, out of these 1000 Lek, you put some of them into the bag. The bag will return the amount of coins you decide to invest and multiply it 3 times with a chance of 50% or will return nothing with a chance of 50%. How many coins are you willing to put into the bag and how much are you going to keep for yourself?"

The game was explained twice (or more if needed) to make it clear for the subjects. Regarding the elicitation of risk preference, the choice of the number of tokens is the only decision made in the experiment (Charness *et al.* (2013)).[8] We record the number of tokens invested in the risky asset and then use that amount as a measure of risk preference; the higher the number of tokens invested, the less risk averse the subject is.

The average number of tokens invested in the risky asset before the first earthquake is about 42 of 100, which is slightly lower (although in line with) the existing literature for this test.[9][10] Consistent with other studies, we find that women invest on average four tokens less

[6]The maximum payoff of the first game is 3000 Lek (25 Euros).

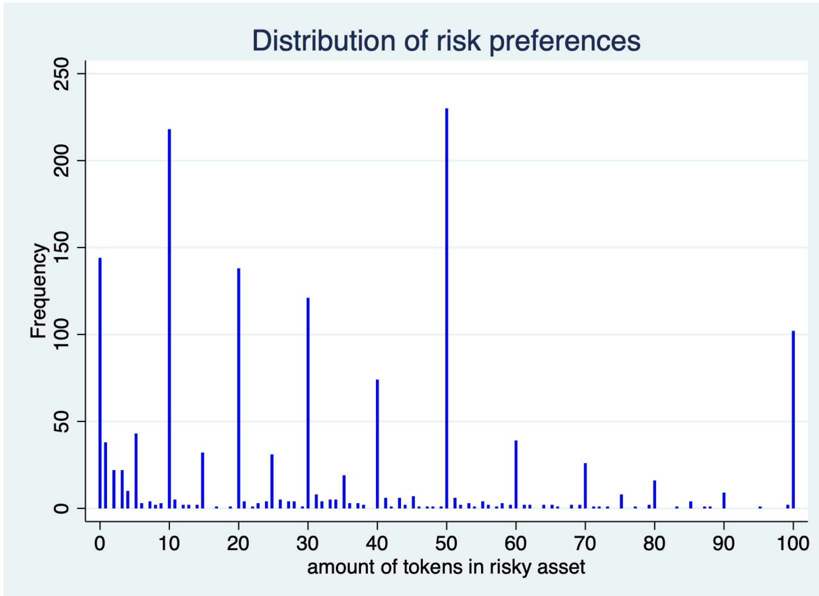
[7]The simplicity of this method and the fact that it provides a good metric for capturing differences in attitude towards risk across individuals (see Charness *et al.* (2013)) make it attractive to use in field surveys.

[8]Note that in the experiment, we also elicit time preferences.

[9]While we are not aware of a prior baseline for Albania, the rate observed before the first earthquake is not greatly different from some measures obtained in other studies (Charness *et al.* (2013)). Dasgupta *et al.* (2019) using the same test, find a proportion of about 48%. In the lab, Charness & Viceisza (2016) find that students invested 44.6% of the endowment in the risky asset. More recently, Holden & Tilahun (2020), using the GP game in Ethiopia, find an average proportion of 53.5%. The slightly lower pre-earthquake rate might be explained by the fact that part of the population experienced a very long and harsh dictatorship lasting during forty-six years. In addition, in the 1990's Albania experienced a very unstable financial environment that was triggered by major Ponzi schemes. Also note that the endowment was equivalent to a days pay for the average worker, more than is usually seen in such studies; people are more risk-averse over higher stakes (Holt and Laury, 2002).

[10]"Located along the Adriatic and Ionian Seas, Albania is earthquake-prone and registers seismic activity every few days." `https://abcnews.go.com/Technology/wireStory/albania-inspects-quake-damages-sees-100-aftershocks-65777824`.

Figure 2: Frequency distribution of investment in the risky asset



than men, i.e. are more risk averse. 144 subjects decided to invest zero tokens in the risky asset, whereas 102 invested their entire endowment in the risky asset. Figure (2) provides the distribution of the number of tokens invested in the risky asset in our sample.

In the subsequent econometric analysis, we measure risk aversion as the minus the number of tokens invested in the risky asset. An increase in this variable therefore corresponds to an increase in risk aversion.

2.4 Earthquakes

While our field experiment was in progress, two major earthquakes stroked Tirana. On September 21, a first earthquake hit Durres, 30 kilometers west of Tirana. The intensity at the epicenter was considered severe (VIII) and reached 5.6 on Richter scale.[11] While no one was killed, 108 people were injured and many buildings were destroyed and damaged. Even though Albania is known to be a seismic area, it was the most violent event of that kind in the last 40 years. Tirana was affected, with intensities varying from light (V), to strong (VI) and very strong (VII) depending on the exact location in the city as shown in Figure 4 (displayed in Appendix C).

On November 26, a second earthquake occurred in Albania, hitting the area of Mamurras, 30km North to Tirana. This earthquake was more violent, reaching 6.4 on the Richter

[11] https://earthquake.usgs.gov/earthquakes/eventpage/us60005lrf/map

scale at the epicenter.[12] This second quake was deadly, killing 52 people in different areas including Tirana, and more than 3000 people were reported to be injured. It was the strongest earthquake to hit Albania in more than 40 years, its deadliest earthquake in 99 years and the world's deadliest earthquake in 2019. Tirana was also affected, with reported intensities by the USGS going from strong (VI) to very strong (VII) and violent (VIII), as shown in Figure 5 (displayed in Appendix C). Aftershocks were also felt in Tirana, with less intensity. The second earthquake amplified the feeling of panic and danger. One reason is that most people had not experienced such an event in their entire life.[13] Albania received international aid from many European countries and the European Union to overcome the chaotic situation and mitigate the short-run consequences of the earthquakes.

In the following econometric analysis, we use each earthquake as an exogenous shock affecting the degree of risk aversion to identify the causal relationship between risk aversion and intended emigration. In a benchmark analysis, we create two dummy variables indicating whether an individual was interviewed after the first and the second quakes, respectively. In an extension, we make use of the recorded intensity of these earthquakes by exact location of the individuals at the time of their interview.

3 The impact of risk aversion on intended emigration

3.1 Background from the existing literature

Our paper studies the relationship between risk aversion and intended international migration. This specific approach needs to be put in perspective with the other studies of the existing literature devoted to the issue. The existing empirical literature exhibits a significant degree of heterogeneity in terms of concepts and methodologies, which may in part explain the diversity of the results yielded by the statistical analyses.

There are several reasons for the disparities in the results across studies. First, existing studies use different concepts of human mobility. Some studies focus only on international migration (see for instance Nowotny (2014)), others look at the fact that people move, regardless of whether the destination is a foreign country or not ((Goldbach & Schlüter (2018))), yet other studies consider internal migration only (Jaeger *et al.* (2010),Dustmann

[12] `https://earthquake.usgs.gov/earthquakes/eventpage/us70006d0m/map?shakemap-code=us70006d0m&shakemap-source=us&shakemap-intensity=true&shakemap-mmi-contours=false&shakemap-stations=true`.

[13] Connecting this to our data, this means that 74.90% of the people in our experiment were not born when the last major earthquake occurred, and 10.05% were less than 10 years old at that time.

et al. (2021), Paz & Uebelmesser (2021) or Hao *et al.* (2016)). We contribute to this literature by investigating the *intention* to migrate internationally. To put our findings in perspective it is important to stress that, in Albania, most migration is external. This is especially the case for inhabitants of Tirana that constitute the population of interest in our paper. This reflects the fact that Tirana is by far the most developed area of the country, so that attractive alternative internal destinations are relatively scarce. We therefore suggest that our concept of mobility is comparable with those allowing for internal mobility in larger countries, such as in Jaeger *et al.* (2010).

Second, studies differ in terms of whether they focus on mobility outcomes or on mobility intentions. To paraphrase Borjas (1987), each movement starts with an intention, and it is as important to understand the reason that shape this intention as the determinants of the outcome. Risk aversion is likely to play a role in the intention of moving out of the country or not, i.e. be a factor of self-selection. It also likely plays a role in the translation of these intentions into actual actions, i.e. is a factor of out-selection. If risk aversion plays a role only as a self-selection factor, its impact on outcomes should reflect the negative impact on mobility intentions. In contrast, if risk aversion plays both a self-selection factor and an out-selection-factor, then its impact should be amplified with respect to the one on mobility intentions. In general, the specific roles of risk aversion have different implications, for in instance in terms of policies aiming to affect migration.[14] Most of the existing literature looks at the role of risk preferences on mobility outcomes and only very few studies focus on mobility intentions rather than actions (see nevertheless Nowotny (2014)). The focus on intentions provides us with a complimentary analysis of this literature by isolating the impact of risk aversion as a potential self-selection factor of human mobility.

Third, existing studies in the literature differ in terms of the measurement of risk aversion. Early studies tend to use self-reported levels of risk aversion, for instance, extracted from surveys whereas more recent ones elicit risk preferences through incentivized games and experiments.[15] This distinction is of importance as empirical evidence shows that the way risk aversion is measured matters for the findings: Goldbach & Schlüter (2018), for instance, show that using self-reported measures of risk does not provide any evidence of an impact of risk aversion on mobility; however, experimental games that elicit risk preference do provide such evidence. The variety of approaches and methodological choices is reflected in terms of

[14]For instance, a policy program willing to foster people to move should provide insurance to more risk averse individuals if risk aversion plays a role a self-selection factor. Policies helping risk-averse people to implement their mobility choices into real actions could be provided if risk aversion belongs to out-selection factors.

[15]See Charness *et al.* (2013) for a survey.

heterogeneity of findings. Jaeger *et al.* (2010), Dustmann *et al.* (2021), Paz & Uebelmesser (2021) and Goldbach & Schlüter (2018) find that less risk averse individuals are keener to move. In contrast, Hao *et al.* (2016) do not find any association between migration and risk preferences under state uncertainty and document rather a positive association with the willingness to compete in strategic interactions

Fourth, the existing literature paid little attention to endogeneity issues arising in the estimation of the impact of risk aversion on mobility. Endogeneity issues in the estimation of impact of risk preferences on emigration are related either to cases of reverse causality or to selection issues. Reverse causality might be due to the fact that emigration it-self can induce a change in the preferences in terms of risk, patience, trust or other aspects of economic behaviour. Using the experience of immigrants in New Zealand that are selected through a lottery program, Gibson *et al.* (2015) do not find any evidence that beliefs and preferneces of immigrants have changed after a decade of migration. Jaeger *et al.* (2010) investigate to what extent their results are subject to reverse causality and do not find evidence for such a case. Furthermore, this issue mainly applies to the case of actual movement while our analysis focuses on emigration intentions.

Risk aversion is nevertheless likely to be correlated with many other individual characteristics of individuals, which raises concerns about selection. For instance, ones birthplace, ones historical social background, or the specific events occurring at an early age can shape the level of risk aversion of individuals. Some of these dimensions can also have long-lasting effects on mobility intentions and outcomes. Since many of these factors are difficult, if not impossible, to observe in the data, estimation techniques dealing with selection bias are needed. In this paper, we adopt a Control Function approach, that can be seen as the counterpart of the instrumental variable approach for discrete choice models, to address the selection issue.

3.2 Econometric approach

The econometric model that we bring to the data takes the following form:

$$Pr(M_i) = \alpha_1 + \beta_1 R_i + X_i'\gamma_1 + \epsilon_i \quad (1)$$

where M_i is a dummy variable indicating if subject i intends to migrate ($M_i = 1$) or not ($M_i = 0$) and therefore $Pr(M_i)$ is the probability that the subject i expresses the intention to emigrate from Albania. R_i is a measure of risk aversion as elicited by our experimental game (defined as minus the number of coins put on the risk asset). X_i is a vector of personal characteristics such as age, gender, education level, marital status, income, employment or home ownership. ϵ_i is a random term capturing the role of unobserved factors of emigration. Given that the predicted dependent variable is a probability, we use the Logit model by assuming that ϵ_i follows a logistic distribution.[16]

As described above, the estimation of equation (1) is likely to be biased by the presence in ϵ_i of factors not included in X_i but affecting the choice of emigration and correlated with risk aversion R_i. To address this issue, we conduct an estimation by control function (CF). As was shown by Wooldridge (2010), IV estimation on non linear models delivers undesirable properties and the CF approach is the appropriate technique in this context.[17] Since discrete choice models involve non linear specifications, the CF approach is one of the most popular techniques to treat endogeneity issues in this context. Guevara (2015) and Guevara (2021) provide recent surveys and Guevara & Ben-Akiva (2011) delivers an example of application to the modelling of residential location choices.

The CF approach involves two steps. In a first step, the suspected endogenous variable R_i is regressed on the covariates X_i and the vector of instruments Z_i:

$$R_i = \delta + X_i'\zeta + Z_i'\lambda + \nu_i. \tag{2}$$

In the second step, residuals $\hat{\nu_i}$ from equation (2) are included as an additional control variable in equation 3 to yield new estimates of the structural equation:

$$Pr(M_i) = \alpha_2 + \beta_2 R_i + X_i'\gamma_2 + \theta\hat{\nu_i} + \xi_i. \tag{3}$$

Note that we herewith exclude the variables in vector Z from entering the second stage equation (3) as control variables. Under the appropriate conditions for the validity of this exclusion restriction, the new estimate of the impact of risk aversion, β_2, is no longer subject to the endogeneity issue occurring in the estimation of equation (1).

3.3 Validity of the exclusion restrictions

To construct the vector Z_i, we make use of the two earthquakes that occurred during our survey.[18] The first variable in Z_i, say $Z_i^{(1)}$, takes the value 0 (1) for all participants that

[16] We also use the probit model and the linear probability model as robustness checks and find very similar results.

[17] See in particular Wooldridge (2010), chapter 15 for an exposition of the CF approach in the context of binary response models. In the linear case, IV and CF estimators give identical estimates. In section 4.4., we estimate the linear probability model using IV and the results are qualitatively and quantitatively similar to the CF results from the Logit specification.

[18] Note that the second earthquake is not a replica of the first, both earthquakes have different epicenters.

where interviewed before (after) the first earthquake. The second variable in Z_i, say $Z_i^{(2)}$, takes the value 0 (1) for all participants interviewed before (after) the second earthquake. The first variable allows us to pick up the effect of the first earthquake, the second allows us to pick up the *cumulative* effect of the second earthquake.

Our identification strategy hinges on the validity of the restriction that excludes Z_i from the set of regressors in equation 3. This restriction is similar in nature to that of an instrumental variable and two conditions need to be fulfilled:

1. the vector Z_i needs to be a good predictor of the level of risk aversion,

2. conditional on R_i and the other covariates X_i included in equation (1) , the vector of Z_i should be orthogonal to ϵ_i.

The first condition can be tested through the estimation of equation 2 and indeed, in the results presented below, we show it is met in our data. These results are in line with those obtained in Beine et al. (2020) who show that both earthquakes exerted a significant increase in risk aversion (and impatience). Note also that the magnitude of these two effects is quite strong. To illustrate, Beine *et al.* (2020a) show that the effects of each earthquake on individuals' risk aversion is equivalent to four times the gender gap in risk preferences.

The second condition states that, once accounting for the impact of the two earthquakes on risk aversion and on other determinants captured in X_i, the two earthquakes should not exert any direct effect on the willingness to move out of Albania. Since this condition is key, some discussion about its validity is necessary. In the next subsections we provide two sets of arguments to support the validity of this assumption: i) we rely on the existing literature studying the impact of natural disasters (and, in particular, earthquakes) on human mobility and argue that there is little evidence of a correlation between the two phenomena and ii) use the fact that we have two earthquakes and hence two instruments in our data to partially test weaker forms of exclusion restrictions.

3.3.1 Insights from the existing literature

Our first argument in support of the validity of our exclusion restriction draws from empirical results in the recent literature addressing the question of the impact of earthquakes on human mobility. It is important to note that earthquakes have key features that distinguish them from other natural disasters such as droughts and floods: earthquakes are unpredictable in terms of frequency of occurrence, season, magnitude, and location, and do not relate directly to factors of climate change. These features make earthquakes particularly interesting events to use in empirical studies as their exogeneity is difficult to question.

Naturally, a growing strand of the literature has dedicated attention to these events and attempts to address the question: do earthquakes impact international human mobility? This literature delivers little evidence of a relationship. Recent papers do not find any sizeable impact of these shocks on international emigration. A notable example is Spitzer *et al.* (2020) who look at the impact of the Messina-Reggio Calabria Earthquake that occurred in 1908, a period of mass emigration in Italy. Despite massive destructions, this major earthquake was not found to affect emigration from the affected areas. A potential explanation is the high attachment to the land of the affected inhabitants. These findings are fully confirmed by Basile *et al.* (2021) who carry out a causal analysis of the impact of three recent earthquakes that hit Italy in 2009, 2012 and 2016. They do not find any impact of these natural disasters on mobility and only a very moderate impact of the first earthquake on internal migration and only for foreign residents of the affected regions (but not for Italian citizens). In short, recent work on the impact of earthquakes on international emigration find no evidence of such a relationship.

Still, it could be argued that the lack of clear impact of earthquakes on international mobility is the result of various offsetting economic mechanisms that might undermine our exclusion restriction. A first such mechanism could operate through variations in income and employment. The drop in income and amenities in the affected area generates a potential incentive effect for emigration. This potential positive effect can materialize in higher intentions through an income channel (the income differential between the origin and potential external destinations increases) or through a labor-market channel (people lose their job due to the destructions caused by the disaster). In our econometric specification, we account for both income levels and employment situation, which restores the conditional orthogonality of the instruments (earthquakes) and the error term in the presence of this first type of economic mechanism. So, the econometric estimation should account for earthquakes having effects on income or jobs.

The second economic mechanism is a financial channel: by decreasing the resources available to fund the mobility process, earthquakes prevent people to move, even those willing to do so (the trapped population). This mechanism acts as a negative out-selection factor of mobility. Given that our dependent variable is about the intention to move, this mechanism nevertheless does not prevail or at least is significantly mitigated in our analysis.[19]

[19]It could be indeed argued that intentions can also be influenced by the out-selection factors such as liquidity constraints to the extent that constrained individuals will internalize the impossibility to move in their statements of mobility. Nevertheless, once again, even in this case, controlling for income and employment will close this channel of influence and will restore the orthogonality condition between earthquakes and mobility intentions.

To sum up, in light of the existing evidence about the impact of earthquakes and given that we focus on intentions of international mobility and that we control for income and employment in our specification, we argue that our exclusion restriction is valid.

3.3.2 Insights from additional regressions

Our second argument supporting the validity of our exclusion restriction is empirical in nature. Note that since the vector Z_i contains two variables owing to the occurrence of two earthquakes, whereas only one is required for identification, we can relax our exclusion restriction. We could indeed estimate the second stage equation (3) by excluding only one. We can estimate the second stage structural equation:

$$Pr(M_i) = \alpha_2 + \beta_2 R_i + X_i'\gamma_2 + \mu_j Z_i^{(j)} + \theta\hat{\nu}_i + \xi_i \tag{4}$$

where $j \in \{1, 2\}$.

The parameter μ_j now captures the direct effect of the j-th earthquake on the intention to migrate and the model is identified by the exclusion of $Z_i^{(k)}$, $k \neq j \in \{1, 2\}$.

Results show first that $\mu_1 = \mu_2 = 0$ cannot be rejected. In words this means that we do not find evidence of a direct effect of the first (reps. second) earthquake on migration intentions conditional on the second (resp. first) having no direct effect. Second, the magnitude of the coefficient β_2 does not change much across specifications of the structural equation (versions of the exclusion restriction). In the presence of endogeneity bias, changing the set of controls, generally changes the incidence of the selection bias and hence estimates of the coefficient of the endogenous regressor. This evidence therefore provides additional support for our exclusion restriction.

4 Results

4.1 Logit estimation

Table 2 reports the estimations using a logit model. In column (1), we account for the level of income, employment, and home ownership. Columns (2) and (3) report the results with more parsimonious specifications. Since the logit link function is non-linear, we also report the computed marginal effect of risk preference, either in terms of one additional unit of risk aversion, or in terms of an increase of one standard deviation in risk aversion. Results show no significant impact of risk aversion on the intention to emigrate. The point estimate of the coefficient of risk aversion suggests that more risk-averse individuals would be more inclined

Table 2: Logit Estimation of Risk Aversion on Probability of Emigration

(Dependent variable: Intention to emigrate)			
	(1)	(2)	(3)
Risk aversion	0.00227	0.00237	0.00225
	(0.00226)	(0.00225)	(0.00225)
Age	-0.0756***	-0.0770***	-0.0757***
	(0.00814)	(0.00787)	(0.00776)
Male	0.116	0.108	0.106
	(0.133)	(0.132)	(0.132)
Log(Income)	-0.0984***	-0.0990***	-0.0767***
	(0.0220)	(0.0220)	(0.0196)
Employment	0.489**	0.487**	-
	(0.217)	(0.217)	
Home owner	0.104	-	-
	(0.152)		
Education years	-0.0324	-0.0334	-0.0281
	(0.0257)	(0.0256)	(0.0255)
Nber of children	0.0940	0.0902	0.0821
	(0.0921)	(0.0919)	(0.0911)
Past migration	0.460***	0.448***	0.459***
	(0.166)	(0.165)	(0.164)
Relatives migrated	0.279	0.271	0.298
	(0.381)	(0.381)	(0.381)
Marital status	-0.0660	-0.0633	-0.0697
	(0.0508)	(0.0506)	(0.0503)
rate_of_patience	-1.817***	-1.809***	-1.899**
	(0.626)	(0.626)	(0.621)
Constant	3.739***	3.894***	3.986***
	(0.714)	(0.677)	(0.677)
Observations	1499	1499	1499
Pseudo R^2	0.1455	0.1453	0.1425
Marg. Eff Risk (+1)	0.000	0.000	0.000
Marg. Eff Risk (+1 SD)	0.011	0.011	0.011

Standard errors in parentheses ** $p < 0.1$,* $p < 0.05$, *** $p < 0.01$

Risk aversion is increasing in the degree of risk aversion and is measured by the opposite of the number of tokens put by the respondent in the risky asset.

to emigrate, but the estimate is not significantly different from 0 at usual significance levels. A possible explanation for this result could be that the logit estimate of the impact of risk aversion on emigration is biased by selection on unobservable variables. We address this issue in the following section.

4.2 Control Function estimation

Table 3 reports the estimation results of the first stage of the CF approach fitting the relation between earthquakes and risk aversion. In columns (1)-(3), we use the two instruments based on the time of the interview: before the first earthquake (reference case), after the first earthquake but before the second, or after the second earthquake. In columns (4-6), we use a single instrument capturing the number of earthquakes faced by the individual at the time of the interview (0 if interviewed before the first, 1 if interviewed in-between, and 2 if interviewed after the second earthquake). In line with Beine *et al.* (2020a), we find strong evidence that earthquakes raised risk aversion of affected individuals. All else equal, the estimates in columns (1) to (3) suggest the first earthquake increases risk aversion by about 7%, and the second one by an additional 10%. Overall, compared to those interviewed before the first earthquake, individuals interviewed after the second earthquake experienced an increase in risk aversion that is equivalent in magnitude to four times the effect of gender on risk. Results in columns (4-6) yield a similar conclusion. The results of the first stage of the CF estimation collected in Table 3 suggest that the earthquakes are strong instruments of risk aversion.

Table 4 reports the estimation results of the second stage of the Control Function approach. The main difference with the results presented in Table 2 is the significant impact of risk aversion on the intention to emigrate. Results suggest that risk aversion significantly reduces emigration intentions. In all specifications and for both sets of instruments, the estimate of risk aversion is significantly different from 0 at the 1% level. This is in sharp contrast with the results obtained from the logit estimation in Table 2. This suggests that failure to control for selection on unobservables leads to a (positive) bias in the effect of risk aversion. This interpretation is backed up by the positive sign and the high significance of the coefficient of the residuals $\hat{\nu}_i$ of the first-stage equation in specification 3.

The discrepancy between the results of Table 2 and Table 4 is indeed due to an endogeneity problem: risk aversion is likely correlated with omitted factors of the intention to emigrate in specification (1). The comparison between the Logit and the CF estimates point to a positive selection in the estimation of the effect of risk aversion on the intention to emigrate. The CF estimation generating the results in Table 3 allows one to correct for the

Table 3: First stage of CF: Impact of earthquakes on risk aversion

(Dependent variable: Level of Risk Aversion)						
	(1)	(2)	(3)	(4)	(5)	(6)
After 1st earthq	6.773**	7.140***	7.181***	-	-	-
	(2.169)	(2.161)	(2.157)			
After 2nd earthq	16.44***	16.81***	16.89***	-	-	-
	(2.567)	(2.560)	(2.546)			
Nber Earthq	-	-	-	8.440***	8.597***	8.637***
				(1.262)	(1.259)	(1.252)
Age	0.151	0.109	0.108	0.149	0.108	0.107
	(0.0914)	(0.0884)	(0.0883)	(0.0914)	(0.0884)	(0.0883)
Male	-3.052**	-3.252**	-3.247**	-3.067**	-3.259**	-3.254**
	(1.471)	(1.468)	(1.467)	(1.471)	(1.468)	(1.467)
Log(Income)	-0.835***	-0.851***	-0.888***	-0.838***	-0.853***	-0.890***
	(0.225)	(0.225)	(0.191)	(0.225)	(0.225)	(0.191)
Employment	-0.628	-0.699		-0.627	-0.696	
	(2.282)	(2.283)		(2.282)	(2.283)	
Home owner	3.180			3.072		
	(1.769)			(1.766)		
Education years	-0.289	-0.314	-0.323	-0.284	-0.308	-0.317
	(0.296)	(0.296)	(0.294)	(0.296)	(0.296)	(0.294)
Nber of children	-1.213	-1.359	-1.351	-1.269	-1.404	-1.395
	(1.110)	(1.108)	(1.108)	(1.109)	(1.107)	(1.106)
Past migration	-2.187	-2.539	-2.575	-2.262	-2.594	-2.630
	(1.816)	(1.807)	(1.802)	(1.814)	(1.805)	(1.801)
Relatives migrated	2.667	2.443	2.401	2.505	2.307	2.266
	(4.635)	(4.637)	(4.633)	(4.632)	(4.634)	(4.630)
Marital status	-1.114	-1.040	-1.030	-1.143*	1-.067	-1.057
	(0.571)	(0.569)	(0.568)	(0.570)	(0.568)	(0.567)
Rate_of_patience	-18.02**	-17.63**	-17.42**	-17.43**	-17.12**	-16.91**
	(7.591)	(7.594)	(7.559)	(7.565)	(7.568)	(7.533)
Constant	-29.34***	-25.11***	-25.23***	-30.08***	-25.89***	-26.01***
	(8.378)	(8.046)	(8.034)	(8.341)	(7.991)	(7.979)
Observations	1499	1499	1499	1499	1499	1499
R^2	0.069	0.067	0.066	0.068	0.066	0.066

Notes. Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Risk aversion is increasing in the degree of risk aversion and is measured by the opposite of the number of tokens put by the respondent in the risky asset. Cols (1-3) : instruments: interview done after first or second earthquake. Cols (4-6) : instrument: Nber of earthquakes faced by subject.

Table 4: Impact of risk aversion on emigration: Control Function

(Dependent variable: Intention to emigrate)						
	(1)	(2)	(3)	(4)	(5)	(6)
Risk aversion	-0.0332**	-0.0317**	-0.0333***	-0.0311**	-0.0298**	-0.0315**
	(0.0132)	(0.0130)	(0.0129)	(0.0135)	(0.0132)	(0.0131)
Age	-0.0719***	-0.0752***	-0.0739***	-0.0720***	-0.0753***	-0.0739***
	(0.00825)	(0.00791)	(0.00781)	(0.00826)	(0.00791)	(0.00781)
Male	0.0110	-0.00159	-0.00736	0.0171	0.00450	-0.00170
	(0.138)	(0.139)	(0.138)	(0.139)	(0.139)	(0.138)
Log(income)	-0.124***	-0.124***	-0.106***	-0.122***	-0.123***	-0.104***
	(0.0240)	(0.0240)	(0.0222)	(0.0241)	(0.0241)	(0.0223)
Employment	0.427*	0.424*	-	0.430**	0.427*	-
	(0.218)	(0.218)		(0.218)	(0.218)	
Home owner	0.239	-	-	0.231	-	-
	(0.160)			(0.161)		
Education years	-0.0480*	-0.0496*	-0.0454*	-0.0469*	-0.0485*	-0.0444*
	(0.0265)	(0.0265)	(0.0264)	(0.0265)	(0.0265)	(0.0264)
Nber children	0.0537	0.0459	0.0375	0.0560	0.0484	0.0397
	(0.0932)	(0.0934)	(0.0926)	(0.0933)	(0.0934)	(0.0926)
Past Migration	0.359**	0.337**	0.341**	0.365**	0.343**	0.347**
	(0.170)	(0.170)	(0.170)	(0.170)	(0.171)	(0.170)
Relatives migrated	0.347	0.328	0.355	0.343	0.325	0.352
	(0.382)	(0.381)	(0.382)	(0.382)	(0.382)	(0.382)
Marital status	-0.115**	-0.108**	-0.115**	-0.112**	-0.105**	-0.112**
	(0.0540)	(0.0533)	(0.0529)	(0.0541)	(0.0534)	(0.0530)
Patience	-2.733***	-2.685***	-2.793***	-2.673***	-2.630***	-2.741***
	(0.716)	(0.712)	(0.704)	(0.717)	(0.713)	(0.705)
$\hat{\nu}_i$	0.0367***	0.0353***	0.0369***	0.0345**	0.0333**	0.0350***
	(0.0134)	(0.0132)	(0.0131)	(0.0137)	(0.0135)	(0.0133)
Constant	3.190***	3.554***	3.610***	3.216***	3.569***	3.625***
	(0.740)	(0.688)	(0.689)	(0.743)	(0.689)	(0.690)
Observations	1499	1499	1499	1499	1499	1499
Pseudo R^2	0.1497	0.1493	0.1467	0.1491	0.1487	0.1464
Marg. Eff Risk aversion (+1)	-0.006***	-0.005***	0.006***	-0.005**	-0.005**	-0.005**
Marg. Eff Risk aversion (+1 SD)	-0.178***	-0.168***	-0.178***	-0.164***	-0.157***	-0.167***

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Risk aversion is increasing in the degree of risk aversion and is measured by the opposite of the number of tokens put by the respondent in the risky asset. Cols (1-3) : instruments: interview done after first or second earthquake. Cols (4-6) : instrument: Nber of earthquakes faced by subject.
$\hat{\nu}_i$ stand for the residual of the first stage equation (3.

presence of such a bias.

What might be a possible story behind such a selection bias? Confounding factors that would, for instance, increase risk aversion and induce an individual to intend to leave fall into this category. In the Albanian context, personal exposure to the consequences of Ponzi games that plagued the Albanian economy in October 1997 could lead to such a bias.[20] A respondent who would have been in touch with people (family members, neighbors or colleagues) broken by the pyramid schemes might have become more averse to risk. Such a shock also creates a deep distrust in the institutions, which might increase the desire to leave. In such a case, this results in a negative bias between our measure of risk preference and the intention to emigrate.

Marginal effects of risk aversion are also reported in Table 4 and suggest a sizeable impact on the intention to emigrate: an increase of 10 units of our measure of risk aversion, decreases the probability to want to move intentionally by 5%. Expressed in different units, an increase of one standard deviation in risk aversion results in a decrease of the probability of intending to emigrate by about 17 percentage points.

As a robustness check we also provide results for a probit specification of the second stage in appendix A; results are virtually unchanged, both from a qualitative and a quantitative point of view. We also report the results of a reduced form analysis where we regress through a Logit model the probability to emigrate on the earthquake variables. The results are reported in Table 9). The estimates are negative and significant, especially for the second earthquake, in line with the story associated to the CF estimation: by increasing risk aversion, the occurrence of earthquakes leads to a decrease in the intention to emigrate.

These results shed a new light on the trapped-population phenomenon (Black, 2012). Most studies finding a negative effect of natural disasters on human mobility have emphasized liquidity constraints as the main channel rationalizing the data. In other words, after a natural disaster, affected individuals would like to move, but are restrained by poverty or liquidity constraints, forcing them to stay put. Our results tell a different (albeit complementary) story: by increasing risk aversion, natural disasters can reduce one's willingness to move. The existence of such a mechanism implies different types of policy interventions can be implemented by authorities. For instance, if the purpose is to help people to move after a natural disaster, the liquidity constraint channel would imply a policy funding their mobility process. The risk-aversion channel that we highlight argues rather in favor of an insurance design provided by the authorities to the affected individuals. Of course, these channels are

[20]For a description of the Ponzi games in Albania and its consequences for the economy, see for instance Sadiraj (1999).

not mutually exclusive.

4.3 Accounting for intensity of earthquakes

Even though the epicenters of both earthquakes were located outside Tirana, different parts of the city were affected differently. Interestingly, the way the earthquakes waves spread and the resulting intensity of the shaking does not directly correlate with the distance from the epicenter. As a result, depending on their location at the time of the occurrence of earthquakes, individuals were exposed differently to the shaking and could be affected in a different way in terms of risk aversion. We attempt to account for the varying intensity by proxying the location of individuals at the time of the occurrence of earthquakes in the first stage of the CF estimation of equation 3.

We use the interview location as a proxy in our analysis, given that we know neither the individual's residence (data privacy) nor his or her exact location during the shaking(s). So, we implicitly assume that the interview location is a good proxy for residence. With this caveat in mind, the main goal of the analysis is to generate a new set of instruments based on some additional information and to check whether the new estimates of the impact of risk preferences on emigration intentions are stable across these different sets. Weak instruments or obvious failures of the exclusion restriction often result in unstable estimates of the structural equation.

To take advantage of this variation, we compute a level of intensity as follows for every individual. We start from the information retrieved from the shaking maps provided for each earthquake by the USGS. The shaking map of the first earthquake on September 21 provides 15 locations within Tirana with the exact geodesic coordinates as can be seen in Figure (4) in Appendix C. A level of intensity is provided for each location. These range from level III (light shaking) to level IV (strong shaking) and to level V (very strong shaking). For the second earthquake on November 26, 14 locations are available, with three levels of intensity (strong, very strong and violent shaking, i.e. level IX) as shown in Figure (5) in Appendix C. We combine this information with the precise location of the interviews, assuming this reflects some vicinity with the location of the individual at the time of the earthquake. For the second treated group, we use the information from the second earthquake only.[21] We then compute the intensity of the closest sport associated to the location of the interview for every individual.[22]

[21]Statistically speaking, we could account for their location at the time of the first earthquake, but this would require some additional information for these individuals.

[22]Based on this assignment, for the first earthquake, we have 140 individuals exposed to light shaking,

Table 5: First stage of CF: Impact of intensity of earthquakes on risk

	(1)	(2)	(3)	(4)
(Dependent variable: Level of Risk Aversion)				
Intensity 1st	0.992	-	-	-
	(0.685)			
Intensity 2nd	6.614***	-	6.916***	-
	(1.293)		(1.256)	
First earthq strong	-	1.173	3.464**	4.250
		(1.542)	(1.659)	(2.508)
Second earthq strong	-	11.50***	-	2.465
		(2.756)		(3.194)
First earthq	-	-	-	3.081
				(3.075)
Second earthq	-	-	-	15.37***
				(2.892)
Age	-0.142	-0.128	-0.138	-0.149
	(0.0919)	(0.0922)	(0.0918)	(0.0914)
gender	3.135**	3.111**	3.186**	3.094**
	(1.479)	(1.484)	(1.478)	(1.470)
Log(Income)	0.811***	0.778***	0.823***	0.862***
	(0.227)	(0.227)	(0.227)	(0.226)
Employment	0.987	1.420	0.853	0.324
	(2.296)	(2.300)	(2.295)	(2.287)
Home owner	-3.396	-3.407	-3.350	-3.238
	(1.775)	(1.782)	(1.773)	(1.774)
Education years	0.321	0.353	0.316	0.286
	(0.298)	(0.298)	(0.297)	(0.296)
Nber of children	1.101	1.035	1.134	1.166
	(1.115)	(1.119)	(1.115)	(1.110)
Past migration	2.663	2.972	2.677	2.185
	(1.823)	(1.830)	(1.822)	(1.819)
Relatives migrated	-1.804	-1.888	-1.831	-2.755
	(4.660)	(4.675)	(4.655)	(4.637)
Marital status	1.133**	1.180**	1.169**	1.111
	(0.574)	(0.576)	(0.573)	(0.571)
Patience	23.26***	25.07***	23.14***	18.95**
	(7.525)	(7.535)	(7.516)	(7.605)
Constant	22.54***	19.37**	22.87***	29.42***
	(8.262)	(8.210)	(8.230)	(8.377)
Observations	1499	1499	1499	1499

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Instruments: Col (1) :intensity of earthquakes. Col (2): occurrence of strong earthquakes.

Col (3) : occurrence of strong intensity for 1st earthq. and intensity level of 2nd earthq.

Col (4) : occurrence of strong intensity earthquakes and occurrence of 2nd earthq.

Table 5 reports the first stage of the CF estimation using the information about intensity. In column (1), we simply use the intensity level of both earthquakes on a scale ranging from 0 (not exposed) to 3 (very strong exposure). Notice that intensity levels are specific to each earthquake and are not comparable across earthquakes. In column (2), we just use the occurrence of strong earthquakes (i.e., earthquakes with strong or very strong levels). In column (3), we use a specific combination of instruments used in columns (1) and (2). In particular we use a dummy capturing strong exposition for the first earthquake and a variable reflecting the intensity level of the second one. The purpose of this estimation is to use two instruments that can be seen as strong as opposed to the combination of instruments used in columns (1) and (2). In the last column, we use the full possible combination of intensity levels and strong earthquakes as instruments. Results show that, especially for the second earthquake, intensity matters for the impact of these events on risk preferences.

The results presented in Table 6 show a high level of stability for the impact of risk aversion on intended emigration. The point estimates of risk preference in the CF estimation of the Logit are quite stable across the four sets of instruments. They are similar in terms of magnitude (and significance) with those obtained in Table 4 using instruments simply based on the timing of the occurrence of the earthquakes. The marginal effects associated with these estimates are also in line with those provided in Table 4. An increase of 10% in the level of risk aversion leads to a 5 to 9% decrease in the intention to emigrate, a very similar magnitude to those previously found. The bottom line of these findings is that the results found in this paper for the effect of risk aversion are quite robust to alternative sets of instruments based on the earthquakes, which reassures us that the benchmark results are not driven by a specific choice of exogenous shocks.

4.4 Effects of damages and expectations of reconstruction

We look specifically here at two possible mechanisms through which earthquakes could impact emigration intentions. These mechanisms can affect the validity of the exclusion restriction. Therefore, it is worth discussing them and checking with additional regression to what extent they influence our findings.

411 to strong shaking and 448 to very strong shaking. For the second earthquakes, we have 146, 105 and 23 individuals exposed respectively to strong, very strong and violent shaking.

Table 6: CF estimation using intensity of earthquakes

(Dependent variable: Intention to emigrate)				
	(1)	(2)	(3)	(4)
Risk Aversion	-0.0487***	-0.0444***	-0.0511***	-0.0321**
	(0.0157)	(0.0152)	(0.0197)	(0.0127)
Age	-0.0701***	-0.0705***	-0.0696***	-0.0720***
	(0.00830)	(0.00829)	(0.00840)	(0.00825)
Gender	-0.0375	-0.0253	-0.0466	0.0132
	(0.141)	(0.141)	(0.146)	(0.138)
Log(income)	-0.135***	-0.132***	-0.137***	-0.123***
	(0.0247)	(0.0246)	(0.0262)	(0.0239)
Employment	0.396*	0.405*	0.381*	0.433**
	(0.219)	(0.219)	(0.221)	(0.218)
Home owner	0.307*	0.290*	0.318*	0.237
	(0.165)	(0.164)	(0.172)	(0.160)
Education years	-0.0552**	-0.0532**	-0.0560**	-0.0476*
	(0.0267)	(0.0267)	(0.0272)	(0.0264)
Nber children	0.0347	0.0397	0.0326	0.0545
	(0.0938)	(0.0937)	(0.0948)	(0.0931)
Past migration	0.315*	0.329*	0.310*	0.364**
	(0.172)	(0.171)	(0.175)	(0.170)
Relatives migrated	0.383	0.375	0.393	0.344
	(0.382)	(0.383)	(0.383)	(0.382)
Marital status	-0.137**	-0.131**	-0.141**	-0.114**
	(0.0556)	(0.0552)	(0.0580)	(0.0538)
Patience	-3.141***	-3.029***	-3.195***	-2.704***
	(0.751)	(0.744)	(0.811)	(0.710)
$\hat{\nu}_i$	0.0521***	0.0478***	0.0541***	0.0356***
	(0.0158)	(0.0154)	(0.0199)	(0.0130)
Constant	2.945***	3.004***	2.892***	3.202***
	(0.752)	(0.751)	(0.775)	(0.739)
Observations	1499	1499	1499	1499
Pseudo R^2	0.1514	0.1508	0.1495	0.1497
Marg. Eff Risk Loving (+1)	-0.008***	-0.007***	-0.009***	-0.005**
Marg. Eff Risk Loving (+1 SD)	-0.266***	0.241***	-0.281***	-0.170***

Standard errors in parentheses ** $p < 0.1$,* $p < 0.05$, *** $p < 0.01$

Risk aversion is increasing in the degree of risk aversion and is measured by the opposite of the number of tokens put by the respondent in the risk asset.

$\hat{\nu}_i$ stand for the residual of the first-stage equation (5)

Table 7: CF Estimation: accounting for damages and reconstruction perspectives

(Dependent variable: Intention to emigrate)					
	(1)	(2)	(3)	(4)	(5)
	Damages			Reconstruction	
Risk Aversion	-0.0284**	-0.0330**	-0.0241*	-0.0375**	-0.0334**
	(0.0138)	(0.0134)	(0.0143)	(0.0168)	(0.0131)
Age	-0.0809***	-0.0847***	-0.0752***	-0.0742***	-0.0713***
	(0.0103)	(0.00909)	(0.00761)	(0.00921)	(0.00849)
Male	0.0861	0.00799	0.0319	-0.0121	-0.0144
	(0.166)	(0.154)	(0.144)	(0.156)	(0.142)
Income	-0.129***	-0.123***	-0.0924***	-0.117***	-0.120***
	(0.0276)	(0.0263)	(0.0234)	(0.0252)	(0.0240)
Employment	0.391	0.271	-	0.438*	0.392*
	(0.264)	(0.249)		(0.226)	(0.220)
Home owners	0.237	0.211	0.148	0.234	0.265
	(0.193)	(0.176)	(0.168)	(0.181)	(0.162)
Education years	-0.0295	-0.0539*	-0.0342	-0.0486	-0.0465
	(0.0316)	(0.0291)	(0.0263)	(0.0306)	(0.0268)
Nber children	0.154	0.135	-	0.0684	0.0693
	(0.113)	(0.0990)		(0.107)	(0.0972)
Past migration	0.461**	0.361**	0.391**	0.389**	0.361***
	(0.207)	(0.182)	(0.174)	(0.198)	(0.177)
Relatives migrated	0.687	0.362	-0.242	0.440	0.499
	(0.445)	(0.415)	(0.461)	(0.401)	(0.390)
Marital status	-0.108	-0.143***	-0.159***	-0.0995*	-0.106*
	(0.0656)	(0.0606)	(0.0494)	(0.0596)	(0.0542)
Patience	-2.155**	-2.094**	-2.610***	-2.724***	-2.872***
	(0.875)	(0.819)	(0.731)	(0.820)	(0.731)
$\hat{\nu}_i$	-0.0328**	-0.0359***	-0.0280*	-0.0399**	-0.0365***
	(0.0142)	(0.0138)	(0.0145)	(0.0171)	(0.0133)
Constant	2.861***	3.850***	4.295***	2.941***	2.936***
	(0.894)	(0.805)	(0.806)	(0.820)	(0.756)
Observations	1029	1204	1432	1278	1446
Pseudo R^2	0.1663	0.1640	0.1481	0.1550	0.1484
Marg. Eff Risk Loving (+1)	-0.005**	-0.005**	-0.004*	-0.006**	-0.006***
Marg. Eff Risk Loving (+1 SD)	-0.110**	0.132***	-0.099**	-0.132***	-0.130***

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Col (1) : individuals exposed to highest intensity levels excluded. Col (2) Home owners exposed Col (1) : to highest intensity levels excluded. Col (3) Individuals interviewed after launch of Post-Disaster Needs Assessment of international Donors excluded. Col. (4) Self-employed individuals excluded. Col. (5) Individuals working in sectors benefitting from reconstruction excluded.

4.4.1 Effects of damages on willingness to emigrate

A first mechanism involves the impact of damages on the willingness to emigrate. A concern might be that if a respondent was personally affected by destructions or degradation to their belongings (mainly their home), this could increase their propensity to emigrate. Unfortunately, due to unexpected nature of the earthquakes, we did not collect any information regarding the individual exposition to damages and destruction. Nevertheless, we carry out a couple of additional regressions to assess whether our results are affected by such a possibility. First, in the following section, we carry out some analysis allowing for some deviation from the exclusion restriction in the CF procedure. We show that if the deviation goes in the aforementioned direction (positive impact of quakes on intended mobility), our CF estimates of the effect of risk aversion will be even more negative.

Second, we carry-out additional regressions. First, we conduct sub-sample regressions, excluding individuals that were likely to be exposed to the highest level of intensity of both quakes. The idea is that these individuals were more likely to be affected by serious damages. The results are reported in column (1) of Table **??**. Second, we follow the same idea, but exclude only highly exposed individuals who are home owners, to the extent that the quakes affected mainly the buildings in Tirana. The results of this exercise are reported in column (2) of Table **??**. The results of these two variants are in line with the previous estimations. In particular, the impact of risk aversion and the extent of selection are in lines with the previous regressions based on the full sample of respondents.

4.4.2 Expectations of benefits from reconstructions

A second mechanism goes in the opposite direction. Individuals might form expectations of higher economic activity and future income due to the rebuilding of the damaged or destructed infrastructures. While we control for contemporaneous levels of income and employment, these might not capture quite well the expectations of future personal incomes associated to the potential benefits of the post-disaster adjustment process. If individuals form these positive expectations, this might decrease their expected gap between future income at origin and at destination, hereby decreasing their propensity to move in the future.

In order to account for such a mechanism, we carry out two additional types of regressions. First, the possibility of rebuilding the infrastructure is intrinsically related to international aid. Albania being a low income country by European standards, the country has little capacity to engage in a large plan of this kind on its own. After the second quake, the Albanian government officially requested some financial aid from some international organizations. On December 16, a first meeting was held by the European Union, the United Nations and the

World bank to launch a Post-Disaster Needs Assessment (PDNA). The PDNA was necessary for the organisation of the Donors' Conference and served as a basis for the reconstruction and rehabilitation efforts. On February 17 2020, at the Donors' Conference, the EU, the member states and other donors pledged 1.15 billion for reconstruction in Albania. This represents roughly an international aid of about 400 per inhabitant.

While the confirmation of the international aid occurred outside our sample period, it could be argued that after the launch of the PDNA, individuals had greater expectations of future income and employment due to the possible benefits of the reconstruction. Therefore we first carry out regressions excluding individuals surveyed after the launch of the PDNA. The results are reported in column (3) of Table **??**.

Given that the amount of international aid per capita remains modest in terms of magnitude, a second adjustment focuses on the type of individuals that could specifically benefit from the reconstruction efforts. First, individuals that are self-employed are definitely more likely to benefit from future activities of this type. We therefore carry out regressions excluding individuals that are self-employed (as opposed to salaried individuals or jobless ones). The results are reported in column (4) of Table **??**. A third adjustment is to account for the sector of economic activity of the respondents that we collected in our survey. Using the NACE codes of economic activity, we define specific sectors that could benefit from reconstruction efforts. [23] We then exclude individuals that are employed in these sectors. The results are reported in column (5) of Table. The results in columns 3 to 5 are in line with the previous estimations. They suggest that our estimation results are similar when we consider a context in which the expectation mechanism is less likely to prevail.

4.5 Plausibly exogenous earthquakes

While we have focused on several specific mechanisms that could invalidate the validity of our exclusion restriction, it could be argued that other mechanisms could also be at work. Since the universe of potential mechanisms is quite large, the discussion of the validity of the restrictions boils down to an empirical issue. Therefore, we conduct an additional econometric approach that does not rely on the choice of specific mechanisms to further characterize the conditions under which our results hold. Conley *et al.* (2012) develop a useful approach allowing to evaluate the validity of the results of an instrumental-variable approach when the instrument(s) can to a large extent be considered exogenous but for which modest deviations from the exclusion restriction can be considered. The general idea

[23]These sectors are Construction (F code), Manufacture of electrical equipment (CJ code), Repair and installation of machinery and equipment (CM code) and Real estate activity (L).

is that using such instruments might still be useful instead of simply dropping them from the analysis, as a strict view of IV would require.

An important contribution from Conley *et al.* (2012) is to quantify the size of deviations from the exclusion restriction under or over which the instrumental estimation of the structural equation remains valid. We use this approach to further document the type and the size of such a deviation for earthquakes under which our results of risk aversion on intended emigration do and do not hold. Conley *et al.* (2012) develop different approaches to evaluate the estimations of the structural parameters under different deviations from the exclusion restriction. We use one of these approaches, namely the Union of Confidence Intervals, under the assumption that the support of the size of the deviation is known. The idea is to estimate the bounds of the key estimate of the structural equation for different patterns of deviation from the exclusion restriction, assuming the econometrician knows the support of these deviations. In our context, this allows to generate confidence intervals of the impact of risk aversion on intended emigration under different (non-zero) values of the direct impact of earthquakes in the structural equation. In other words, this allows to characterize the size (and the direction) of the direct effect of earthquakes on the probability of intended emigration that would be needed to invalidate our results.

To the best of our knowledge, the Conley *et al.* (2012) procedure is available only for linear specifications of regression models. Therefore, we first report results of our previous approach obtained using the linear probability model (LPM) instead of the Logit. While the LPM may give biased estimates, it often generates results that are qualitatively and quantitatively similar to specifications based on appropriate models of discrete choices, such as logit or probit.

To that aim, Table 8 reports results based on the LPM. In column 1, we report the results of an OLS regressions using the LPM. In column 2, we instrument risk preferences using the second earthquake only while in column 3, we use both earthquakes as instruments. The picture shown by the results of the table is in line with our previous logit-specification analysis. Failing to account for selection results in an insignificant effect of risk preference. Instrumentation with the earthquakes gives a negative and significant impact of risk aversion. The magnitudes of the effect are in line with the marginal effects estimated in Table 4: an increase of 10% in the level of risk aversion decreases emigration intentions by 5-6%. The F-statistics of the tests for weak instruments reported at the bottom of Table confirm that the earthquakes are strong predictors of risk preferences. On a more anecdotal basis, the Sargan test of overidentification in column 3 supports the exogeneity of earthquakes as instruments.

Based on these results, we compute the confidence intervals at the 90% level for the effect of risk aversion for various magnitudes of the deviations from the conditional orthogonality assumption of earthquakes on emigration intention. We consider symmetric deviations, i.e. positive and negative direct effects of earthquakes on emigration. More precisely, we consider different maximal values of the absolute effect of earthquakes on emigration. Figure 3 reports the patterns of these confidence intervals.

Two main comments arise from the patterns of Figure 3. First and most importantly, the Union of Confidence Interval analysis clarifies the type of deviation from the exclusion restriction which would be needed to invalidate the results. Patterns of the confidence intervals show that for the estimate to be insignificant, one has to consider a deviation in the form of a negative direct impact of earthquakes on emigration intentions. Therefore, the existence of a channel such as the amenity channel of natural disasters on human mobility (ref needed) would tend to make this impact more significant rather than less significant. Few channels exerting a negative direct impact of natural disasters have been documented in the literature. One possibility would be that earthquakes could increase the feeling of social cohesion or group identity (Charness and Chen, 2020), leading people to be more prone to stay to participate in the needed rebuilding efforts.

Second, the Union of Confidence Interval analysis quantifies the strength that such a channel should have to offset direct effects (such as the higher incentive to leave due to a degraded living environment) and make our estimated effect of risk aversion insignificant. Using only the second earthquake as an instrument, Panel A of Figure 3 shows that our results hold to the extent that the second earthquake does not exert a (net) direct impact on the intention to stay lower than about 3%. If both earthquakes generate a (net) negative impact on the intention to stay, both effects should not exceed about 1.8% for our results to hold (see Panel B of Figure 3a. If both earthquakes are used in the first stage but only the second quake is thought to exert a direct impact on the intention to emigrate (hence only the first quake is used as an instrument), then this impact should not exceed 2.5% for our results to remain valid (see Panel C of Figure 3a.

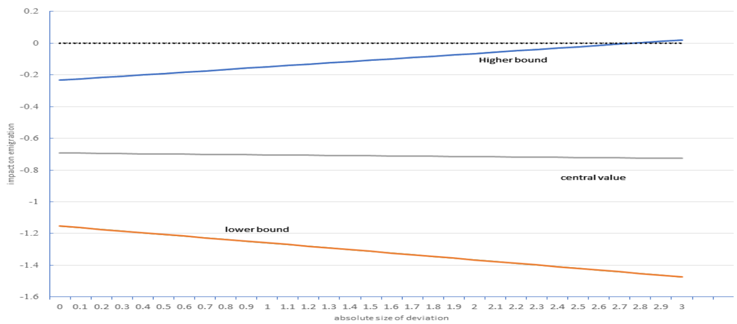
Table 8: Linear Probability Estimation of Risk Aversion on Emigration

(Dependent variable: Intention to emigrate)			
	(1) (OLS)	(2) (IV)	(3) (IV)
Risk Aversion	0.000385	-0.00693**	-0.00564**
	(0.000397)	(0.00280)	(0.00240)
Age	-0.0151***	-0.0142***	-0.0143***
	(0.00138)	(0.00157)	(0.00151)
Gender	0.0196	-0.00316	0.000824
	(0.0220)	(0.0261)	(0.0250)
Log(income)	-0.0143***	-0.0195***	-0.0186***
	(0.00332)	(0.00425)	(0.00402)
Employment	0.0917***	0.0758**	0.0786**
	(0.0323)	(0.0385)	(0.0372)
Home owner	0.0211	0.0498	0.0448
	(0.0283)	(0.0315)	(0.0301)
Education years	-0.00480	-0.00789	-0.00735
	(0.00456)	(0.00509)	(0.00490)
Nber children	0.0189	0.0107	0.0121
	(0.0182)	(0.0189)	(0.0182)
Past migration	0.0849***	0.0643*	0.0679*
	(0.0257)	(0.0314)	(0.0302)
Relatives migrated	0.0532	0.0685	0.0658
	(0.0883)	(0.0779)	(0.0754)
Marital status	-0.0134	-0.0235**	-0.0217**
	(0.00851)	(0.0103)	(0.00980)
Patience	-0.347***	-0.535***	-0.502***
	(0.124)	(0.144)	(0.136)
Constant	1.195***	1.075***	1.096***
	(0.134)	(0.143)	(0.137)
Observations	1499	1499	1499
R^2	0.1730	-	-
F 1st stage	-	35.67**	22.82**
Sargan test	-	-	1.048

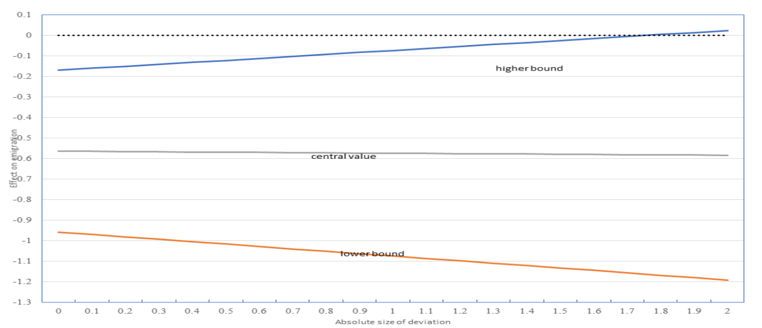
Robust standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Risk Aversion is decreasing in the degree of risk aversion and is measured by the opposite of the number of tokens put by the respondent in the risky asset.
Instruments : Col 2: second earthquake only; Col 3: : 2 earthquakes.

Figure 3: Bounds of estimates under symmetric deviations from the exclusion restriction

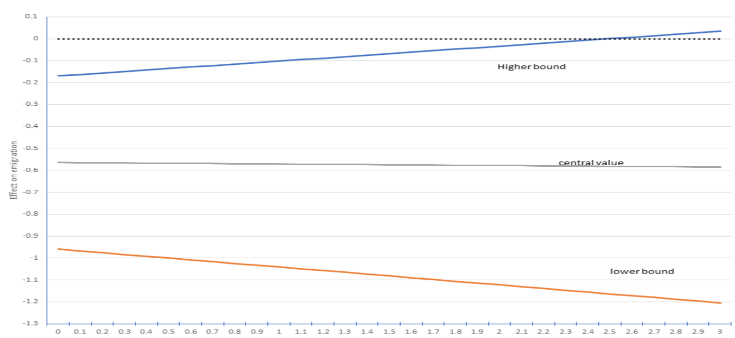
(a) Second earthquake as instrument only. Symmetric deviations



(b) 2 earthquakes as instruments. Symmetric deviations on both instruments



(c) 2 earthquakes as instruments. Symmetric deviations on second earthquake only



Notes: The figures yield the upper bound, central value and lower bounds of the estimate of the effect of risk aversion on intended emigration under different values of the deviation from the assumption of orthogonality condition of earthquakes as instruments for a 90% confidence level. Bounds are predicted by the Union of Confidence Interval estimation procedure of Conley *et al.* (2012). The X-axis gives the absolute value of the size of the deviation from the orthogonality condition. In Panel A, second earthquake as instrument only. In Panel B, both earthquakes used as instruments and deviations for both instruments are considered. In Panel C, both earthquakes used as instruments and deviations for second earthquake only are considered.

5 Conclusion

The empirical investigation of the effect of risk preference on human mobility faces several challenges. One important challenge, which has so far not been addressed in detail in the existing literature, is selection on unobservables. Factors of emigration that are unobservable to the econometrician are also likely to be correlated with risk preferences of individuals, inducing some bias in the estimation of these preferences on human mobility. In this paper, we address this issue using exogenous shocks associated to the occurrence of two earthquakes during a field study conducted in Tirana, Albania. These earthquakes were found to significantly increase risk aversion, which was elicited using games conducted during the field experiments.

Our findings indicate first that failure to address the selection issue results in an insignificant estimated impact of risk aversion on intended emigration. If anything, the effect provided by naive regressions would suggest that a higher level of risk aversion would result in an increase in the willingness to emigrate, a finding at odds with the existing empirical literature and very difficult to rationalize at a theoretical level. Our subsequent results based on a Control Function estimation of risk aversion on intended emigration suggest that this result is subject to a significant selection bias. Using the two earthquakes as instruments of risk preferences, we obtain a negative impact of risk aversion on desired emigration. All in all, an increase of 10% in the level of risk aversion is found to decrease desired emigration by about 5%. This result is robust to several dimensions, including the underlying discrete-choice model (Probit instead of Logit) and alternative sets of instruments.

Another way to put these results into perspective is to consider their connection with the recent literature linking natural disasters and human mobility. A regression of desired emigration on the occurrence of the earthquakes that does not account for the level of risk aversion suggests that, if anything, earthquakes tend to decrease rather than to increase the desire to leave Albania. This is a result that is difficult to reconcile with any theoretical channel mentioned in the literature. The fact that we look at mobility intentions rather than outcomes tends to exclude the case for operating liquidity constraints, a channel that is often referred in this literature. Our result based on earthquakes used as instruments provide an alternative channel of explanation of these results. By increasing risk aversion, which acts as an impediment to the desire to move, earthquakes may ultimately result in less desired emigration. This documented channel of risk aversion sheds a new light on the phenomenon of trapped population that has been emphasized in the recent literature on the effects of climate change on migration.

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A Robustness check: Probit estimation (CF)

Table 9: Impact of risk aversion on emigration: Control Function, probit estimation

(Dependent variable: Intention to emigrate)

	(1)	(2)	(3)	(4)	(5)	(6)
Risk aversion	-0.0188**	- 0.0179**	-0.0191**	-0.0177**	-0.0169**	-0.0181**
	(0.00771)	(0.00757)	(0.00750)	(0.00783)	(0.00767)	(0.00760)
Age	-0.0428***	-0.0450***	-0.0442***	-0.0429***	-0.0450***	-0.0442***
	(0.00482)	(0.00462)	(0.00458)	(0.00483)	(0.00462)	(0.00458)
Male	0.00991	0.000978	-0.00151	0.0132	0.00436	0.00162
	(0.0808)	(0.0808)	(0.0807)	(0.0809)	(0.0809)	(0.0808)
Log(income)	-0.0697***	-0.0696***	-0.0585***	-0.0690***	-0.0689***	-0.0578***
	(0.0135)	(0.0135)	(0.0124)	(0.0135)	(0.0135)	(0.0125)
Employment	0.255**	0.251**	-	0.257**	0.253**	-
	(0.125)	(0.125)		(0.125)	(0.125)	
Home owner	0.154	-	-	0.150	-	-
	(0.0942)			(0.0944)		
Education years	-0.0274*	-0.0284*	-0.0257*	-0.0268*	-0.0279*	-0.0252
	(0.0156)	(0.0156)	(0.0155)	(0.0156)	(0.0156)	(0.0156)
Nber children	0.0314	0.0267	0.0211	0.0327	0.0281	0.0224
	(0.0557)	(0.0558)	(0.0556)	(0.0557)	(0.0557)	(0.0555)
Past Migration	0.226**	0.211**	0.215**	0.229**	0.214**	0.219**
	(0.0997)	(0.0997)	(0.0994)	(0.0998)	(0.0998)	(0.0995)
Relatives migrated	0.221	0.211	0.226	0.219	0.210	0.225
	(0.222)	(0.221)	(0.222)	(0.222)	(0.221)	(0.222)
Marital status	-0.0692**	-0.0643**	-0.0697**	-0.0677**	-0.0630**	-0.0685**
	(0.0317)	(0.0313)	(0.0311)	(0.0317)	(0.0313)	(0.0311)
Patience	-1.596***	-1.560***	-1.644***	-1.563***	-1.530***	-1.616***
	(0.422)	(0.419)	(0.415)	(0.422)	(0.419)	(0.415)
$\hat{\nu}_i$	0.0210***	0.0202***	0.0214***	0.0199**	0.0191**	0.0204***
	(0.00784)	(0.00771)	(0.00764)	(0.00797)	(0.00780)	(0.00774)
Constant	1.842***	2.077***	2.098***	1.858***	2.086***	2.106***
	(0.430)	(0.399)	(0.400)	(0.431)	(0.399)	(0.400)
Observations	1499	1499	1499	1499	1499	1499
Pseudo R^2	0.1493	0.1487	0.1461	0.1488	0.1482	0.1457
Marg. Eff Risk Loving (+1)	-0.005***	-0.005***	-0.006***	-0.005**	-0.005**	-0.005**
Marg. Eff Risk Loving (+1 SD)	-0.168***	-0.159***	-0.171***	-0.153***	-0.150***	-0.162***

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Risk aversion is increasing in the degree of risk aversion and is measured by the opposite of the number of tokens put by the respondent in the risk asset.

Instruments : Cols (1-3) : interview done after first or second earthquake. Cols (4-6): Nber of earthquakes faced by subject.

B Reduced form results

Table 10: Reduced Form Logit Estimation of the Impact of Earthquakes on Emigration

	(Dependent variable: Intention to emigrate)					
	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.0770***	-0.0787***	-0.0774***	-0.0764***	-0.0782***	-0.0771***
	(0.00818)	(0.00792)	(0.00782)	(0.00815)	(0.00790)	(0.00781)
Male	0.109	0.0993	0.0989	0.111	0.0999	0.0993
	(0.133)	(0.132)	(0.132)	(0.133)	(0.132)	(0.132)
Log(income)	-0.0974***	-0.0982***	-0.0771***	-0.0964***	-0.0973***	-0.0765***
	(0.0221)	(0.0221)	(0.0195)	(0.0221)	(0.0221)	(0.0195)
Employment	0.456**	0.454**	-	0.448**	0.447**	-
	(0.218)	(0.218)		(0.218)	(0.218)	
Home owner	0.121	-	-	0.137	-	-
	(0.153)			(0.152)		
Education years	-0.0379	-0.0390	-0.0340	-0.0380	-0.0393	-0.0345
	(0.0258)	(0.0258)	(0.0256)	(0.0258)	(0.0258)	(0.0256)
number of children	0.0871	0.0823	0.0762	0.0952	0.0900	0.0836
	(0.0921)	(0.0919)	(0.0912)	(0.0919)	(0.0917)	(0.0910)
Past Migration	0.424**	0.411**	0.421**	0.435***	0.421**	0.430***
	(0.166)	(0.166)	(0.164)	(0.166)	(0.165)	(0.164)
Relatives migrated	0.236	0.227	0.252	0.261	0.252	0.277
	(0.381)	(0.380)	(0.381)	(0.382)	(0.382)	(0.382)
Marital status	-0.0799	-0.0768	-0.0824	-0.0757	-0.0720	-0.0778
	(0.0509)	(0.0507)	(0.0504)	(0.0508)	(0.0505)	(0.0503)
Patience	-2.050***	-2.038***	-2.129***	-2.117***	-2.106***	-2.194***
	(0.640)	(0.640)	(0.635)	(0.639)	(0.639)	(0.634)
After 1st earthq	-0.000826	0.0129	-0.0110			
	(0.195)	(0.194)	(0.193)			
After 2nd earthq	-0.437*	-0.423*	-0.459**	-	-	-
	(0.226)	(0.226)	(0.224)			
Nber Earthq				-0.258**	-0.251**	-0.267**
				(0.113)	(0.113)	(0.113)
Constant	4.040***	4.205***	4.314***	4.137***	4.327***	4.433***
	(0.742)	(0.712)	(0.710)	(0.741)	(0.710)	(0.708)
Observations	1499	1499	1499	1499	1499	1499
Pseudo R^2	0.1493	0.1489	0.1465	0.1479	0.1474	0.1451
Marg. Eff 1st earthq	-0.000	0.002	-0.002	-	-	-
Marg. Eff 2nd earthq	-0.078*	-0.075*	-0.082**	-	-	-
Marg. nber earthq	-	-	-	-0.045**	-0.044**	-0.047**

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

C Intensity measures of earthquakes

Figure 4: Shake-map stations with the intensity of the 21 of September earthquake in Tirana

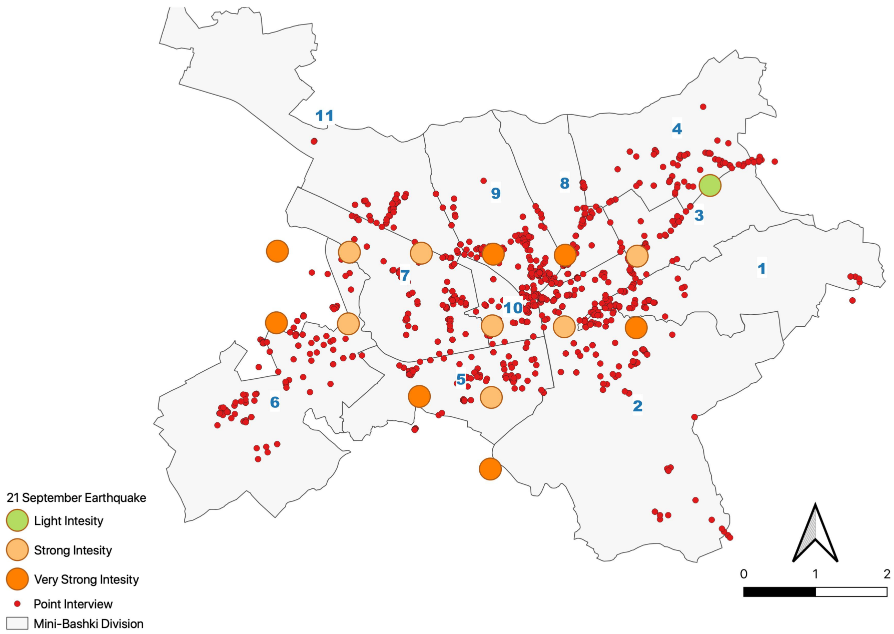

Figure 5: Shake-map stations with the intensity of the 26 of November earthquake in Tirana