Economics Bulletin

Volume 44, Issue 4

The role of loss aversion in shaping environmental relocation decisions

Jiakun Zheng
Aix Marseille Univ, CNRS, AMSE, Centrale Marseille, Marseille, France.

Yanyin Li
School of Finance, Renmin University of China

Abstract

This paper utilizes data from the 2017 China Household Finance Survey (CHFS) to examine the impact of loss aversion on individuals' willingness to relocate due to environmental concerns. We find that individuals who are more loss averse are less likely to consider moving, resulting in what is called the status-quo bias. In addition, we find that individuals with stronger family ties as measured by the number of siblings and higher household fixed assets are more susceptible to these effects, implying that they are more attached to their current place of residence and less likely to relocate.

We thank Ling Zhou and one anonymous referee for constructive comments. This work was supported by the Research Funds of Renmin University of China (Grant No.23XNH008 and 22XNF006). Jiakun Zheng gratefully acknowledges financial support from the research grant ANR LONGTERMISM of the French National Research Agency (ANR-17-CE03-0010-01), from the French government under the ``France 2030" investment plan managed by the French National Research Agency (reference: ANR-17-EURE-0020) and from Excellence Initiative of Aix-Marseille University-A*MIDEX. Zheng would also like to acknowledge the funding of the National Natural Science Foundation of China (Grant no. 72303232).

Citation: Jiakun Zheng and Yanyin Li, (2024) "The role of loss aversion in shaping environmental relocation decisions", *Economics Bulletin*, Volume 44, Issue 4, pages 1263-1270

Contact: Jiakun Zheng - jiakun.zheng@outlook.com, Yanyin Li - liyanyin@ruc.edu.cn.

Submitted: July 14, 2023. **Published:** December 30, 2024.

1. Introduction

Environmental issues, such as climate risks and air pollution, can prompt individuals to relocate or choose settlements to avoid potential health hazards (Boas et al., 2019). The World Bank estimates that the climate crisis could force 216 million people from six regions of the world to migrate within their own borders by 2050 (Clement et al., 2021). Similarly, Chen et al. (2022) found that a 10% increase in air pollution would reduce China's county-level population by about 2.8% due to net out-migration. However, the decision to relocate for environmental reasons may be challenging.

One potential challenge is that individuals may succumb to the status quo bias because of loss aversion--losses are perceived as more significant than gains (Kahneman and Tversky, 1979). Particularly, individuals with higher loss aversion may develop stronger attachments to their current home, friends, and community environment, which reduces the likelihood of seeking change (Clark and Lisowski, 2017; Huber and Nowotny, 2020). This effect can make residents unwilling to relinquish their current location, even if it means exposing themselves and their families to environmental hazards. Consequently, loss aversion limits the capacity of individuals and communities to adapt to evolving environmental conditions.

In this paper, we utilize data from the 2017 China Household Finance Survey (CHFS) to test this hypothesis. Our analysis confirms that individuals with a higher degree of loss aversion are indeed less willing to relocate. This finding highlights the inhibiting effect of loss aversion on individuals' propensity to move, despite environmental concerns. When considering migration due to environmental concerns, there is a clear trade-off between the benefits, such as improved health, and the costs, such as the loss of intangible or fixed assets attached to the current location, including family ties and household fixed assets. Given that these factors play a significant role in the decision-making process for migration, it becomes crucial to explore how they interact with loss aversion in shaping relocation decisions. Recognizing this, we further examine the moderating role of family ties, specifically measured by the number of siblings (Niu et al., 2020), and household property share. Our investigation reveals a highly significant effect, indicating that family ties and household fixed assets can further intensify the impact of loss aversion on relocation intentions.

By shedding light on the intricate interplay between loss aversion, the costs associated with migration (i.e., family ties and household fixed assets) and relocation decisions, our study contributes to a more nuanced understanding of the complexities surrounding family relocation. Moreover, as "environmental relocation" is a subset of general relocation, our research findings also provide valuable insights into the broader context of relocation decisions for various factors. Overall, our paper contributes to the growing body of knowledge in this field, enabling policymakers and stakeholders to develop more informed strategies and interventions to address the challenges associated with family relocation.

The rest of this paper is organized as follows. Section 2 describes the survey instrument and the data. Section 3 reports empirical results. We conclude in section 4.

2. Survey instrument and data

We utilize data from the 2017 China Household Finance Survey (CHFS), a nationally representative survey that includes multiple modules. It is important to note that only a household head was allowed to answer the survey. For this study, we only use the questions that measure respondents' willingness to relocate due to

environmental concerns, loss aversion, and sociodemographic information.

Willingness to relocate due to environmental concerns. Respondents were asked the following question 'If you could afford it, would you relocate for environmental reasons?' Responses were converted into a numerical measure, with a value of 0 for "No", a value of 1 for "Yes, I would like to move elsewhere in the country", and a value of 2 for "Yes, I would like to move abroad" . To eliminate motivations for relocating other than environmental factors, we excluded responses of "Yes, I would like to move abroad" from the sample. This latter group accounted for only 6% of the full sample (193 out of 3,087 respondents).[1] Since respondents were explicitly instructed to assume they could afford the cost of relocation, we can reasonably assume that monetary costs were not a significant factor in their decision-making process. This framing allows us to focus on the impact of non-monetary costs, specifically family ties, while minimizing potential wealth effects.

Loss aversion coefficient of the respondents. Respondents were presented with a scenario where there was a 50% chance of losing 100 yuan and a 50% chance of winning X yuan, and they were then asked to state the minimum amount of X needed to play this game. Response options included ¥150, ¥200, ¥250, ¥300, and above ¥300. For small-stake choices, risk preferences are governed by loss aversion, as argued by Rabin (2000). Assuming linearity in utility and probability weighting (e.g., Kahneman and Tversky 1979), a respondent who chose the option ¥200 exhibits a degree of loss aversion of 2. For the subsequent analysis, we convert these options into five different levels of loss aversion, namely 1, 2, 3, 4, and 5. The higher the value of this measure, the more loss averse respondents are. Numerous studies (Khan, 2017; Ainia and Lutfi, 2019; Nagy et al., 2020) have shown that loss aversion coefficients measured in this way can effectively explain and predict actual decision-making behavior in various domains (e.g., finance, healthcare), including situations involving significant gains or losses.

The remaining questions in the survey collected information on the sociodemographic characteristics of the respondents. Following previous research on mobility and migration (Clark and Lisowski, 2017), we selected a set of respondents' and household-level explanatory variables. Personal characteristics included age, gender, marital status, education level, health level, and the location of household registration. Household characteristics include total household assets, share of property value and household size. In addition, in the empirical analysis, we used the respondents' perceptions of pollution in the area where they live, the forest cover of their province and the percentage of people affected by natural disasters as control variables for environmental relocation.

To ensure the quality of our sample, we exclude respondents under 18 years old and eliminated missing values and obvious outliers through data cleaning. Our final sample consists of approximately 3,000 households, distributed across 27 provinces in the mainland China.[2] Table 1 displays the summary statistics

[1] When only comparing the groups choosing 0 and 2, the estimated coefficient of loss aversion is negative but not significant due to the small size of the subgroup choosing 2. Additionally, it is smaller than the estimated coefficient of loss aversion when only comparing the groups choosing 0 and 1. Assuming the subgroup choosing 2 as having the strongest intention to move does not change our main results using the ordered probit model. We report these results in the online appendix：
https://docs.google.com/document/d/141S3bCE1lKoRnGncwN7iAKOGaZRURlvD/edit?usp=drive_link&ouid=103986343724368235026&rtpof=true&sd=true

of all variables, and Table A1 in the appendix provides detailed definitions of the variables. Among respondents, 48.8% stated that they would relocate within the country due to environmental concerns if they could afford it. The average degree of loss aversion is 3.14 with a median of 3, both significantly larger than 2 (p-value=0.0000), indicating that most of our respondents are loss averse.

Table 1. Summary Statistics.

		N	Mean	Std. Dev.	Min	Max
Key variables	*Willingness to relocate*	2894	0.49	0.50	0.00	1.00
	Loss aversion	3104	3.14	1.70	1.00	5.00
Control variables	*Age*	3103	50.62	10.50	36.00	66.00
	Education	3101	3.77	1.72	1.00	7.00
	Gender	3104	0.17	0.37	0.00	1.00
	Married	3096	0.96	0.20	0.00	1.00
	Health	3103	2.37	0.98	1.00	5.00
	Rural	3104	0.31	0.46	0.00	1.00
	Asset	3103	13.08	1.62	8.82	16.21
	Household size	3104	1.18	0.47	0.00	2.08
	Housing ratio	2744	0.67	0.26	0.06	0.99
	Pollution	3097	3.01	1.13	1.00	5.00
	Forest	3104	32.96	17.32	5.82	66.80
	Affected	3104	0.08	0.06	0.00	0.33

3. Empirical results

To examine the effect of loss aversion on willingness to relocate due to environmental concerns, we employ the econometric model in Equation (1). Since willingness to relocate is a dummy variable, we run probit regressions.[3] In addition to the usual control variables X_i such as gender, age, marital status, and education level,[4] we also control for province-fixed effects $Province_p$ to address potential problems with unobserved location attributes.

$$Willingness\ to\ relocate_i = \beta_1 Loss\ aversion_i + X_i + Province_p + \varepsilon_{i,p} \quad (1)$$

Table 2 summarizes the regression results. In the unconditional model (see column (1) in Table 2), the estimated coefficient of loss aversion is significantly negative, suggesting that the more loss averse people are, the less they are willing to relocate due to environmental concerns. Loss aversion remains a significant explanatory variable when we add further control variables (see columns (2), (3) and (4) in Table 2). It is interesting to note that older people and people living in rural areas are less willing to relocate, while people living in areas that are more polluted are more willing to relocate.

[3] We reach the same conclusion when OLS regressions are used, instead. See more details in the online appendix.

[4] We conducted additional checks and processed combinations of variables that may be correlated. The variance inflation factors (VIF) are all well below 10, indicating that the control variables in this study do not suffer from significant issues of covariance. See more discussions in the online appendix.

Loss aversion and willingness to move may be influenced by common individual characteristics, leading to endogeneity of the results. To address the problem of biased estimation results due to potential endogeneity, we employ an instrumental variable (IV) approach to obtain consistent and unbiased estimation results. Following the existing literature (Balsa et al., 2015; Browne et al., 2021), we choose the average degree of loss aversion of residents in the same community as the instrumental variable in the model. Wald test result is shown at the bottom of column (5) in Table 2, which proves the validity of our instrumental variable. Our analysis shows that after controlling for the endogeneity of loss aversion, the effect of loss aversion on willingness to relocate remains significant and the magnitude of the effect becomes larger (see column (5) of Table 2).

Table 2. Loss aversion and willingness to relocate.

	(1)	(2)	(3)	(4)	(5)
			Probit		IV-probit
Variables			Willingness to relocate		
Loss aversion	-0.036***	-0.034**	-0.035**	-0.034**	-0.092***
	(-2.64)	(-2.48)	(-2.33)	(-2.22)	(-2.65)
Age			-0.018***	-0.018***	-0.018***
			(-6.33)	(-6.03)	(-5.94)
Education			0.017	0.013	0.011
			(0.93)	(0.72)	(0.59)
Gender			0.008	-0.016	-0.020
			(0.10)	(-0.22)	(-0.27)
Married			0.130	0.137	0.108
			(0.81)	(0.84)	(0.65)
Health			0.047*	0.036	0.019
			(1.65)	(1.25)	(0.67)
Rural			-0.281***	-0.246***	-0.258***
			(-4.17)	(-3.61)	(-3.88)
Asset			-0.008	-0.009	-0.007
			(-0.33)	(-0.40)	(-0.31)
Household size			0.064	0.049	0.011
			(1.02)	(0.78)	(0.18)
House ratio			-0.073	-0.090	-0.147
			(-0.67)	(-0.81)	(-1.34)
Pollution				-0.062	0.169***
				(-0.58)	(7.28)
Forest				0.191***	-0.007***
				(8.09)	(-4.45)
Affected				-6.941	-0.340
				(-0.59)	(-0.70)
Constant	0.083*	-0.066	0.664*	2.824	0.972**
	(1.69)	(-0.73)	(1.68)	(0.60)	(2.53)
Wald Test					11.59***
Province FE	No	Yes	Yes	Yes	Yes

N	2894	2888	2547	2541	2495
adj. R2	0.0017	0.0194	0.0452	0.0642	

Notes: *, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

One potential concern with this type of stated-preferences study is whether the impact of loss aversion on willingness to relocate is real. In other words, can our measure of loss aversion predict actual behaviors when decisions need to be made? To provide some insight into this question, we examine the impact of loss aversion on health insurance purchasing. Consistent with existing literature on narrow framing (e.g., Zheng 2020; Chi et al. 2022), we find that more loss-averse respondents are less likely to purchase insurance (see Table 3). Thus, when it comes to real economic behaviors, our elicited measure of loss aversion demonstrates strong predictability.

Table 3. Loss aversion and demand for health insurance

	(1)	(2)
	Probit	
Variables	Health insurance	
Loss aversion	-0.068***	-0.051**
	(-3.16)	(-2.11)
Controls	No	Yes
Constant	-1.002***	-3.991***
	(-7.94)	(-4.58)
Province FE	Yes	Yes
N	2,056	1,792
adj. R2	0.0149	0.0969

Notes: *, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

When considering migration due to environmental concerns, individuals face a clear trade-off between the benefits, like improved health, and the costs, such as losing intangible or fixed assets associated with their current location, including family ties and household property. We further analyze and explore the moderating effects of family ties and household wealth status on the relationship between loss aversion and willingness to relocate. Our hypothesis is that individuals with stronger family ties and greater household fixed assets may be more attached to their current place of residence. To measure the strength of family ties, we use the number of siblings at the head of the household, which is the same as in some previous studies (e.g., Niu et al., 2020), where the median number of siblings at the head of the household in our sample is 2.3 and the mean is 2.5 (SD= 1.527). To measure the strength of household fixed assets, we use the ratio of household property to total assets, and the descriptive statistics are shown in Table 1.

Table 4. Loss aversion, family ties and willingness to relocate.

	(1)	(2)
	Probit	
Variables	Willingness to relocate	
Number of siblings × Loss aversion	-0.020**	
	(-2.16)	
House ratio × Loss aversion		-0.107*
		(-1.90)
Number of siblings	0.069**	
	(1.99)	
Loss aversion	0.017	0.037
	(0.57)	(0.92)
Age	-0.018***	-0.018***
	(-5.42)	(-6.10)
Education	0.008	0.011
	(0.39)	(0.60)
Gender	-0.078	-0.018
	(-0.92)	(-0.24)
Married	0.101	0.139
	(0.55)	(0.83)
Health	0.031	0.036
	(0.96)	(1.27)
Rural	-0.232***	-0.246***
	(-3.00)	(-3.64)
Asset	-0.000	-0.008
	(-0.01)	(-0.33)
Household size	0.016	0.049
	(0.21)	(0.77)
House ratio	-0.086	0.290
	(-0.63)	(1.28)
Pollution	0.186***	0.192***
	(7.03)	(8.14)
Forest	-0.064	-0.062
	(-0.59)	(-0.57)
Affected	-7.045	-7.145
	(-0.56)	(-0.57)
Constant	2.747	2.585
	(0.56)	(0.53)
Province FE	Yes	Yes
N	2004	2541
adj. R2	0.0668	0.0651

Notes: *, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

The estimated coefficient of the interaction term between loss aversion and the number of siblings is

significantly negative (see column (1) of Table 3). Similarly, the estimated coefficient of the interaction term between loss aversion and the share of family property is significantly negative (see column (2) of Table 3). These results suggest that family ties and household asset share moderate the effect of loss aversion on migration intentions. In sum, our findings indicate that family ties and household fixed asset shares amplify the effect of loss aversion on migration decisions.

4. Conclusion

In this paper, we examined the effect of loss aversion on individuals' willingness to relocate due to environmental concerns. Our results suggest that the greater individuals' loss aversion, the less willing they are to relocate, even if relocation would help protect them from environmental risks. However, it is worth noting that the context in which we assess loss aversion differs from actual decision contexts involving non-monetary losses and gains. Future studies could aim to develop context-dependent measures of loss aversion, which may perform even better in predicting behaviors. When individuals contemplate migration due to environmental concerns, they encounter a clear trade-off: the benefits include improved health, while the costs involve losing intangible or fixed assets associated with their current location, such as family ties and household property. We observe that these factors moderate the effect of loss aversion. Our study thus provides a more nuanced understanding of migration decisions. We hope our study can inform policies and practices that better support families and communities facing environmental challenges.

References

Ainia, N. S. N., & Lutfi, L. (2019). The influence of risk perception, risk tolerance, overconfidence, and loss aversion towards investment decision making. *Journal of Economics, Business, & Accountancy Ventura*, *21*(3), 401-413.

Balsa, A. I., Gandelman, N., & González, N. (2015). Peer effects in risk aversion. *Risk Analysis*, 35(1), 27-43.

Boas, I., Farbotko, C., Adams, H., Sterly, H., Bush, S., Van der Geest, K., Wiegel, H., Ashraf, H., Baldwin, A., Bettini, G. and Blondin, S. (2019). Climate migration myths. *Nature Climate Change*, *9*(12), pp.901-903.

Browne, M. J., Hofmann, A., Richter, A., Roth, S. M., & Steinorth, P. (2021). Peer effects in risk preferences: Evidence from Germany. *Annals of Operations Research*, *299*, 1129-1163.

Chen, S., Oliva, P., and Zhang, P. (2022). The effect of air pollution on migration: Evidence from China. *Journal of Development Economics*, 156, 102833.

Chi, Y., Zheng, J., and Zhuang, S. (2022). S-shaped narrow framing, skewness and the demand for insurance. *Insurance: Mathematics and Economics*, 105, 279-292.

Clark, W. A., and Lisowski, W. (2017). Prospect theory and the decision to move or stay. *Proceedings of the National Academy of Sciences*, 114(36), E7432-E7440.

Clement, V., Rigaud, K.K., De Sherbinin, A., Jones, B., Adamo, S., Schewe, J., Sadiq, N. and Shabahat, E., 2021. Groundswell part 2: Acting on internal climate migration. *World Bank*.

Huber, P., and Nowotny, K. (2020). Risk aversion and the willingness to migrate in 30 transition countries. *Journal of Population Economics*, 33(4), 1463-1498.

Kahneman, D., and Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*,

47(2), 263-292.
Khan, M. U. (2017). Impact of availability bias and loss aversion bias on investment decision making moderating role of risk perception. *Management & Administration (IMPACT: JMDGMA)*, *1*(1), 17-28.
Nagy, B. Z., Alt, M. A., Benedek, B., & Săplăcan, Z. (2020). How do loss aversion and technology acceptance affect life insurance demand? *Applied Economics Letters*, *27*(12), 977-981.
Niu, G., Wang, Q., Li, H., and Zhou, Y. (2020). Number of brothers, risk sharing, and stock market participation. Journal *of Banking and Finance*, 113, 105757.
Rabin, M. (2000). Risk Aversion and Expected-Utility Theory: A Calibration Theorem. *Econometrica*, 68(5), 1281-1292.
Zheng, J. (2020). Optimal insurance design under narrow framing. *Journal of Economic Behavior & Organization*, *180*, 596-607.

Appendix

Table A1. Descriptions of the variables.

Variables	**Description**
Willingness to relocate	Answer to the question "If you could afford it, would you move for environmental reasons?" 0 for "No", 1 for "Yes, I would like to move elsewhere in the country", and 2 for "Yes, I would like to move abroad".
Loss aversion	Loss aversion coefficient of the respondent. On a scale of 1 to 5, with a higher number indicating greater loss aversion.
Number of siblings	Number of siblings of the head of household.
Age	The age of the respondent.
Education	Education level of the respondent; 1for none, 2 for primary school, 3for junior high school, 4 for senior high school, 5 for junior college,6 for college,7 for bachelor, 8 for master, 9 for doctor.
Gender	Gender of the respondent;1 for female, 0 for male.
Married	Marital status of the respondent; 1 for married or cohabiting, 0 for otherwise.
Health	Respondents rated their health status on a scale of 1 to 5, with the higher the number, the healthier the person is.
Asset	Natural logarithm of the household's total wealth.
Rural	Registration status of the respondent; 1 for rural, 0 for otherwise.
Household size	Natural logarithm of family size.
Housing ratio	Proportion of household housing assets to total assets.
Pollution	Answer to the question "Do you think the environment (where the respondent lives) is seriously polluted?" On a scale of 1 to 5, with a higher number indicating a worse environment.
Forest	Per capita forest area of the province.
Affected	The proportion of people in the province affected by natural disasters in the last two years, relative to the total population.