

CLIMATE CHANGE AND INTERNAL MIGRATION: A CASE STUDY OF IRAN

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I) INTRODUCTION

- A temperature rise of **1.1°C** to **6.4°C** by the end of this century (Solomon, 2007).
- LDC's would probably bear most of the damage, but does it going to stop there?
- Iran, in particular, could be more disposed as
 - Average annual temperature and precipitation are

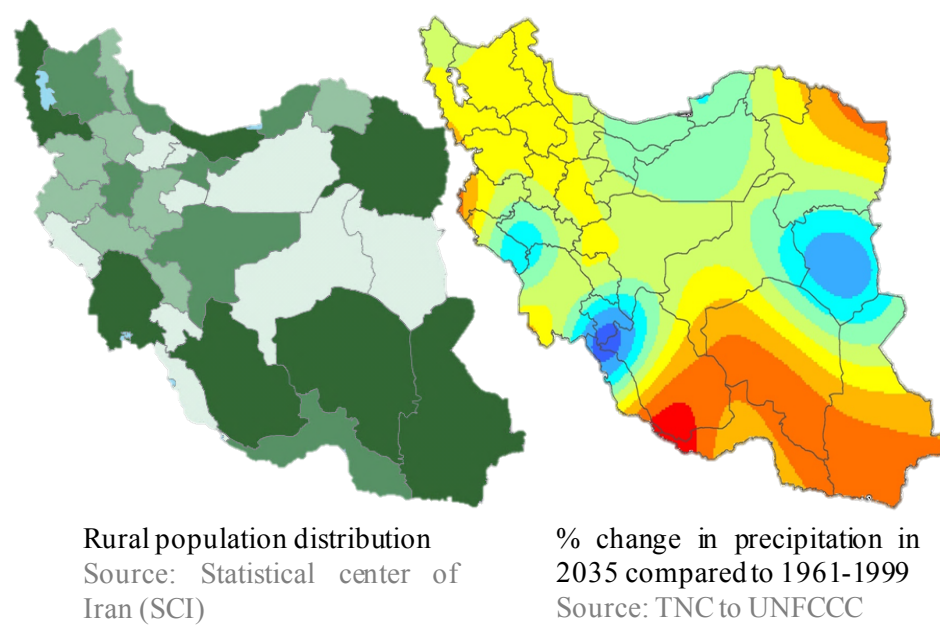
- Average annual temperature and precipitation are

In Iran: **17°C** and **326mm**;

Globally: **1138mm** and **19°C** (WB).

- **80%** of the country is arid or semi-arid;
- **20%** of the land is desert;
- **9%** is forest (SNC to UNFCCC, 2010).

- Iran is going to get warmer and drier by **1.8°C** and **18%** by **2035**, respectively. (TNC to UNFCCC, 2015).

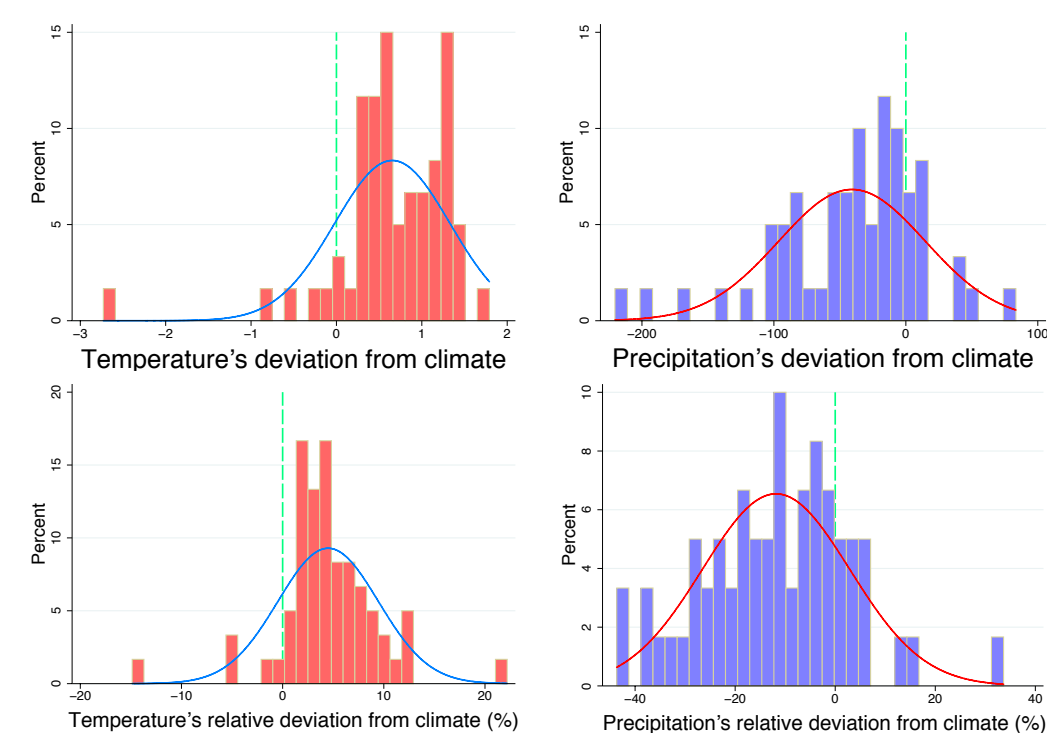


II) OBJECTIVES

- To determine the influencing factors on internal migration in Iran.
- To measure the effects of climate factors on internal migration in Iran.
- To suggest policies that could minimize the damage induced by climate change.

III) DATA

- Dataset: last two censuses by SCI covering **1996-2006** and **2006-2011**.
- The dataset covers the migration matrix for **30** provinces, two censuses and **1740 (30x29x2)** observations, with **870** different pairs.
- Average annual temperature is averaged values from daily observations (NCCO).



Summary of variables

Category	Variable	Mean	Std. Dev.	Min	Max
Dependent	Emigration (n')	476.54	1147.61	0.4	17262.9
Gravity vars	Population (n')	2322965	2367752	516836	1.40e+07
	Distance (km)	866.78	431.37	115.81	2171.33
Labor vars	Educated (%)	81.97	4.53	63.66	90.83
	Educated rural (%)	75.02	4.2	59.84	82.41
	Urban share (%)	61.13	12.84	35.45	94.56
	Unemployment (%)	13.47	5.66	6.78	30.39
Economic vars	GDP growth (%)	24.90	6.77	11.21	53.45
	GDP per capita (\$)	3.64e+07	3.05e+07	7264778	1.62e+08
Environmental vars	Average T (°C)	16.94	4.03	9.86	27.25
	Average Pr (mm)	326.34	259.25	42.7	1352.98
	T deviation (°C)	0.68	0.69	-2.76	1.82
	Pr deviation (mm)	-42	56.63	-222.18	84.469
	T deviation rate (%)	4.49	4.97	-14.86	22.19
	Pr deviation rate (%)	-11.82	14.73	-43.67	33.64

- Precipitation is the sum of precipitation throughout a year – for each province (NCCO).

- **90%** of internal emigrations in Iran occur in a radius of **625km**. The average distance of provinces is **867km**.

- **64%** of Iranians live in urban areas (SCI).

- Population growth is **2.23%** in urban areas and **-0.62%** in rural (SCI).

IV) Methodology

- Newton's Universal Gravitation Law: $F = G \frac{m_1 m_2}{r^2}$

- Applied to migration: $M_{ij} = g \frac{P_1 P_2}{D_{ij}}$

- Econometrics form (Lowry, 1966) :

$$M_{ij} = \beta_0(g) + \beta_1(P_i) + \beta_2(P_j) + \beta_3(X_i) + \beta_4(X_j) + \beta_5(D_{ij}) + \epsilon_{ij}$$

- In this study, we estimate a gravity-type model augmented with climate variables while controlling for the established socioeconomic factors:

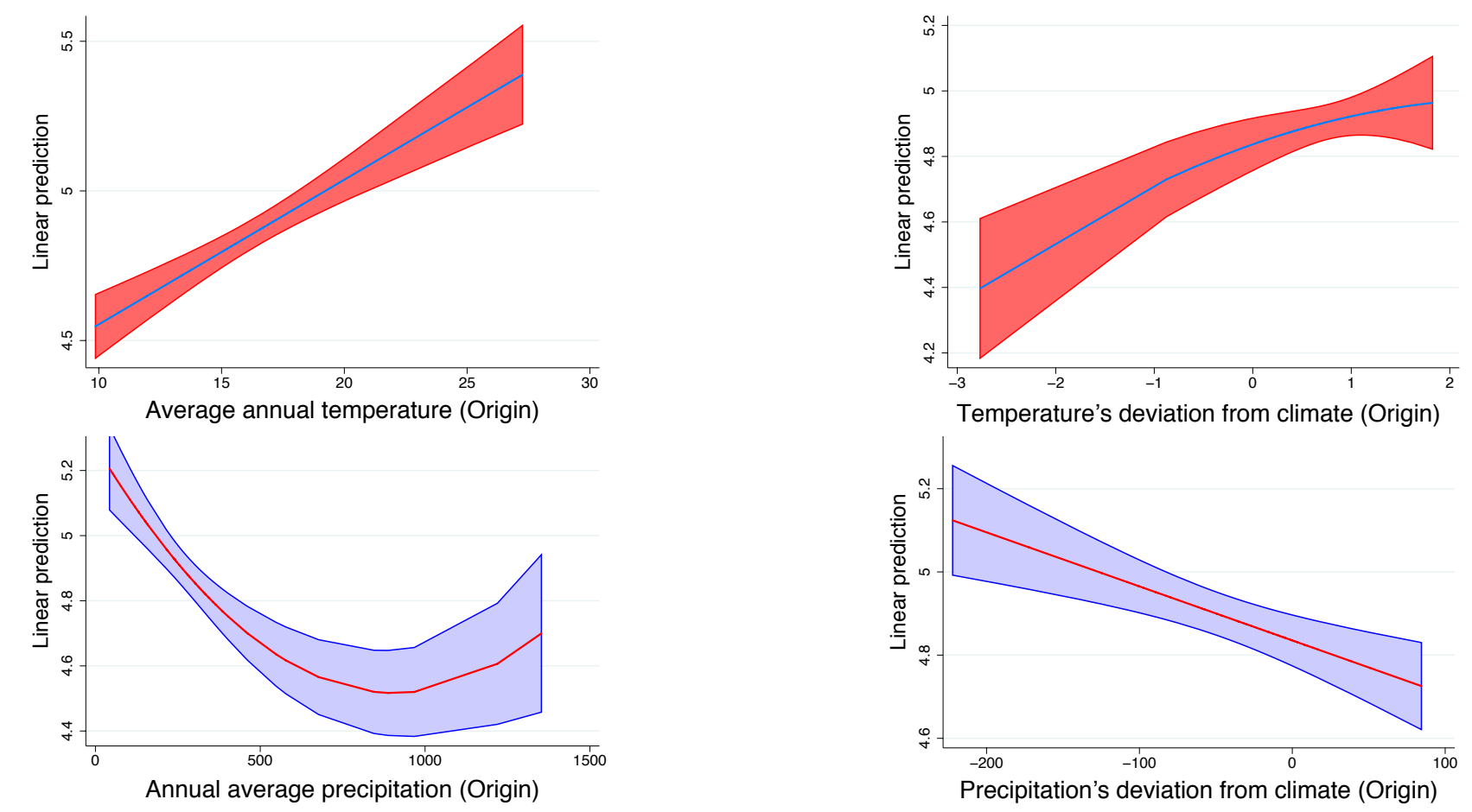
$$\log(M_{ij}) = \alpha(\text{Gravity vars}) + \beta(\text{Labour vars}) + \gamma(\text{Economic vars}) + \delta(\text{Environment vars}) + \tau D_{ij} + \omega_j + \epsilon_{ij}$$

- OLS regression for the main estimates, while allowing for clustered standard errors at province-pairs level to account for correlations in pairs

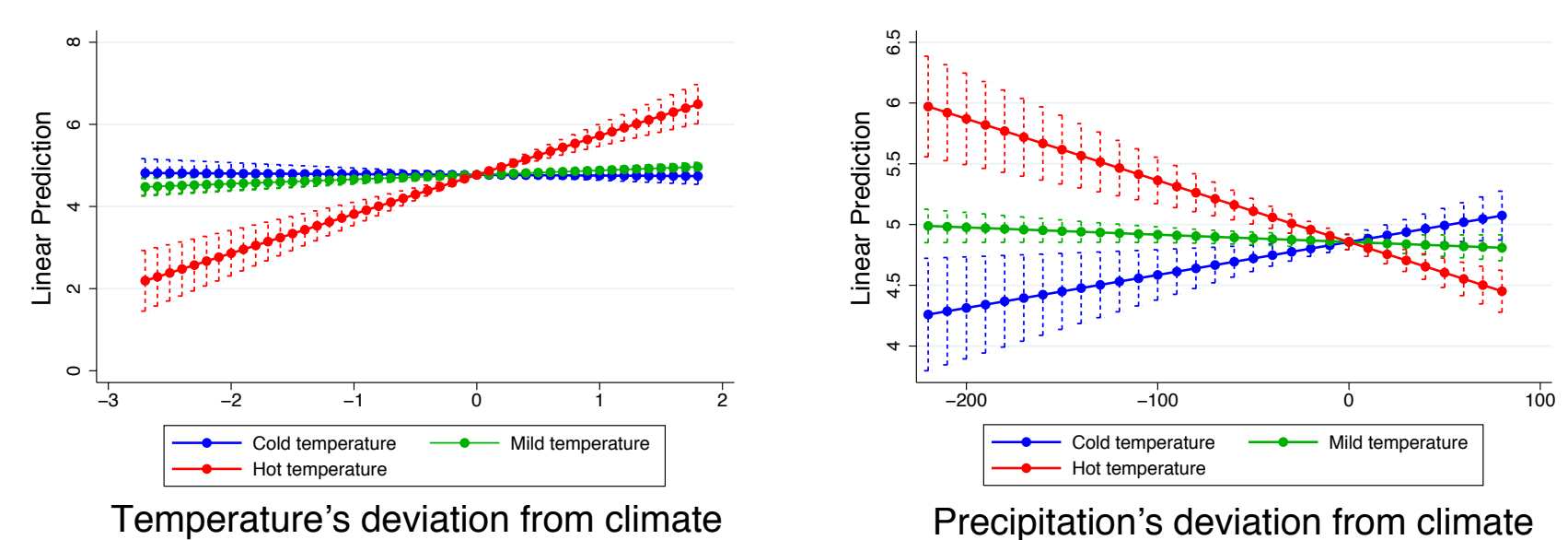
- To control for unobserved destination characteristics, destination district fixed effects are included as controls.

V) RESULTS

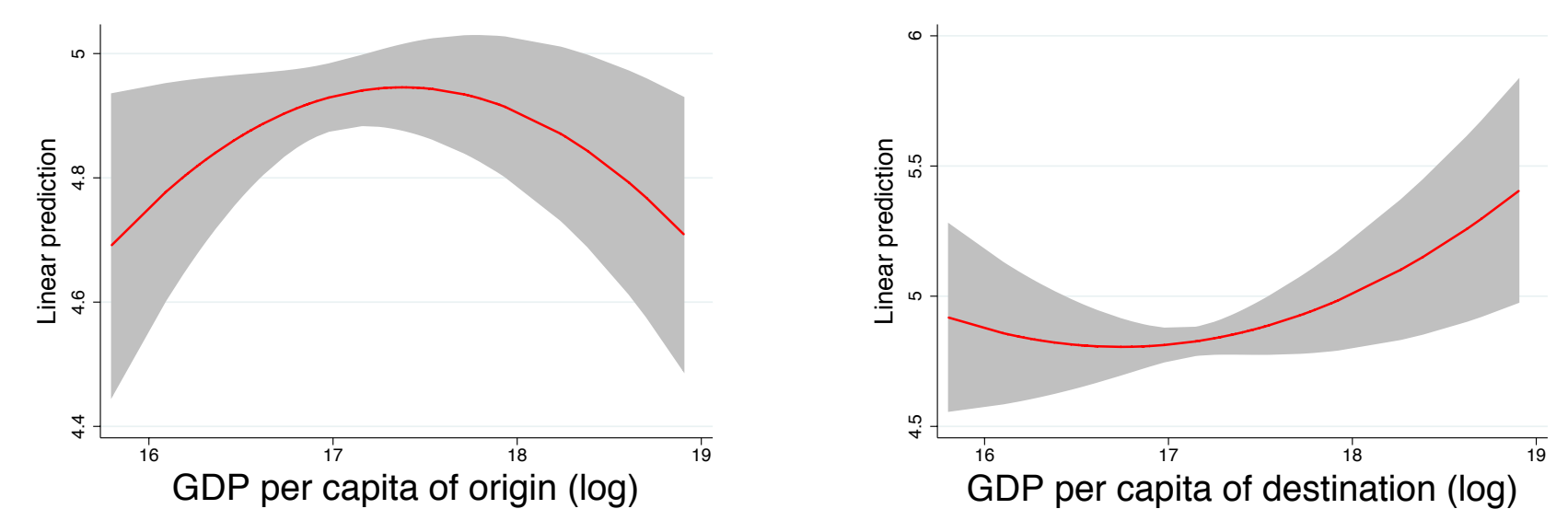
- i. In general, temperature has a positive, and precipitation a negative effect on emigration.



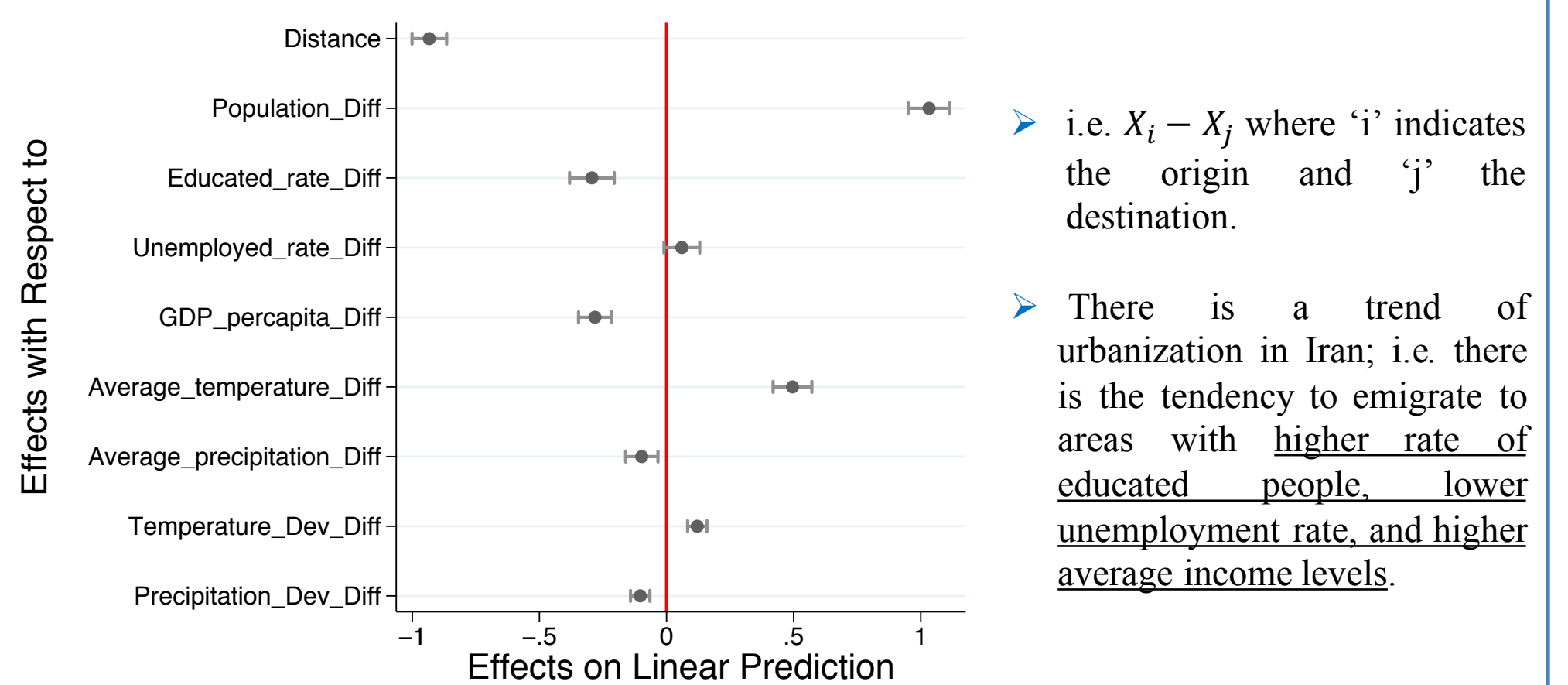
- ii. The effect of climate change is stronger in intense climates.



- iii. Very poor and very rich tend to emigrate less.



- iv. AME's for standardized bilateral differences with 95% CIs



VI) CONCLUSIONS

- People tend to leave warm and dry regions or areas which have experienced hot and/or dry periods. Although they do not necessarily go for the perfect climates, they tend to choose close destinations with relatively better climatic conditions.

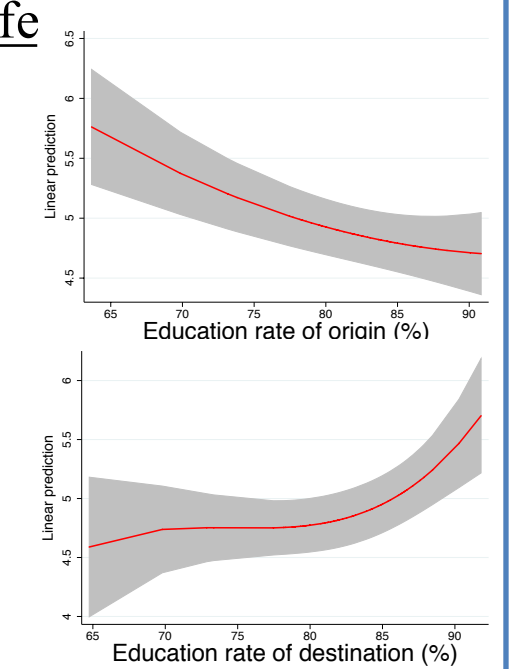
- **1°C** rise in temperature – in respect to climate – increases emigration by **11.4%**. This value is around **12.6%** for **100mm** fall in precipitation.

- Migration is not necessarily bad for the country or people. But when anyone that could leave, would, we are going to be left off with a number of secluded cities with bad climate, low rate of education, high rate of unemployment and low pay.

- There are a number of people that could not actually afford to emigrate and therefore, have to live through a bad quality of life without getting noticed.

Policy Implications

- Stimulating resilience by promoting individual-level innovation;
- Targeted financial assistance for vulnerable regions;
- introducing micro-insurances for weather-based anomalies;
- Separating 'Modernization' from 'Urbanization'.



AKNOWLEDGMENT

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