Climate Change, Extreme Weather Events and International Migration*

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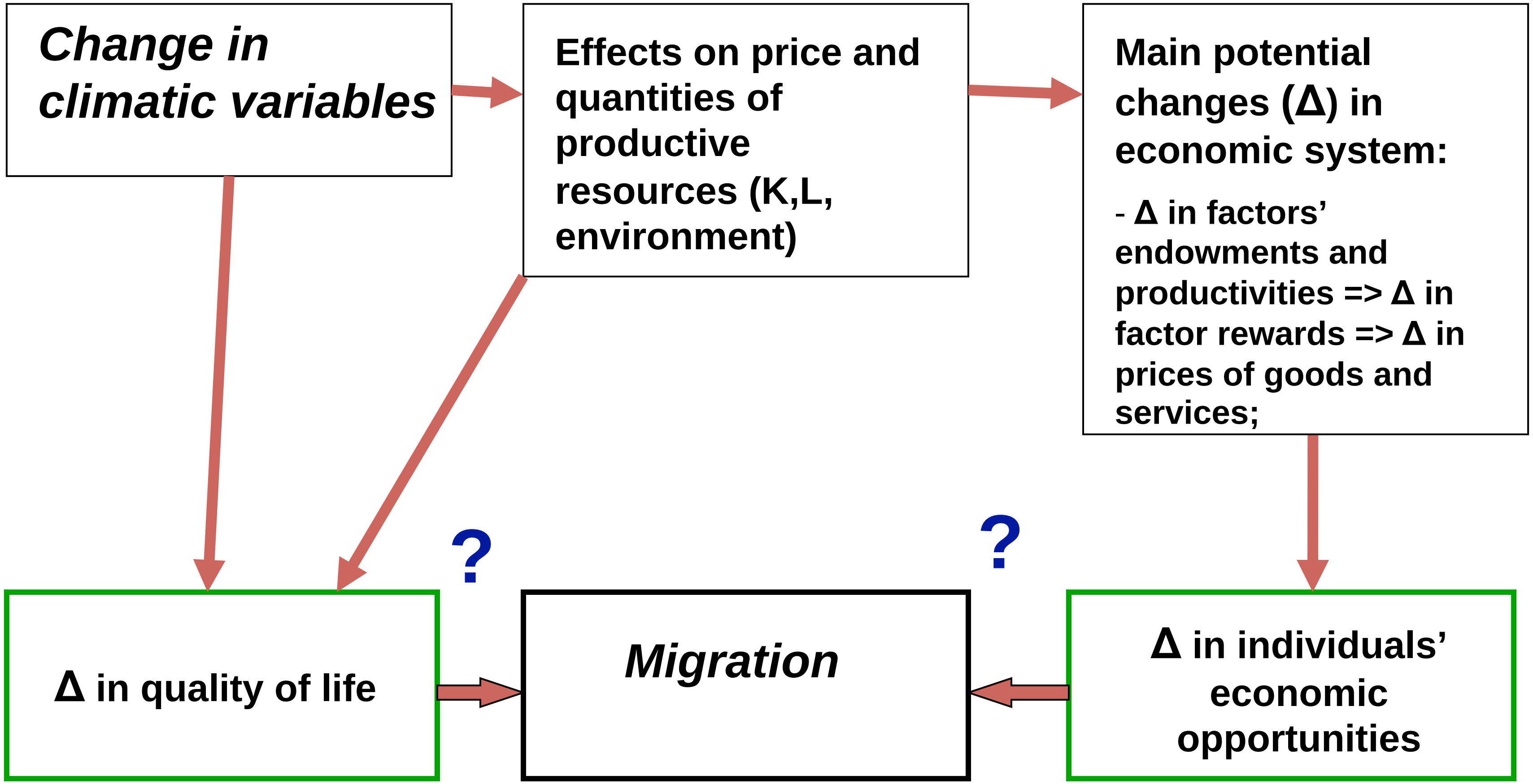
1. Road Map

- **Research question(s):** *Is climate change a push factor for international migration flows? If yes, which type of climate shocks matters? Which vulnerability factors may limit or enhance (international) migration?*
- **Motivation and background**
- **Methodology and data description**
- **Empirical findings**
- **Some conclusive remarks**

2. Climate change and migration: what are the links?



3. What do we know?

- Estimates of climate-induced migrants (at 2050) range from a few hundreds thousand (Meyers, 2001) to 1 billion (Christian Aid, 2007), but… these are measures of population at risk rather than predicted flows!

- Beyond rule of thumb approach: A thin but growing (empirical) scientific base which uses a large variety of methodology.

Piguet (2010) classification of existing studies:

(1) *ecological inference* based on area characteristics (mainly multivariate analysis as in our study) – Munshi QJE 2003 on Mexican provinces; Barrios et al 2006 on urbanization in SSA; Reuveny et al 2010;

(2) *individual sample surveys* – Findley 1994 on Mali; Massey et al 2004 on Nepal;

(3) *time series analysis* – Kniveton et al 2009 on Mexico (main limit: study of co-evolution of climate and migration dynamics without controlling for other vaiables);

(4) *multilevel analysis* (combine ecological data and individual data) – Henry et al (2004) on Burkina Faso (rainfall deficits discourage moves toward more distant destinations)

(5) Agent Based Modelling – Black et al 2008 on Burkina Faso

(6) Qualitative/Ethnographic – a large number of studies (ex. McLeman et al 2008 on 1930s drought in eastern Oklahoma) which emphasize the multicasuality of migration

Key insights from existing studies

(i) The crucial importance of additional factors – institutions, financial capital/relative level of development, “relationship” capital such as access to diasporas, etc. - in shaping the links between climate change and migration;

(ii) International migration is a costly adaptation strategy;

(iii) Qualitative studies / survey based studies highlights the importance of the type of shocks

4. Empirical Methodology

We employ a modified version of the pseudo-gravity model of Ortega & Peri (2009) in order to investigate the determinants of bilateral international migration:

$$\ln(migration)_{ijt} = \beta_1(income)_{it-1} + \beta_2(employment)_{it-1} + \beta_3(distance)_{ij} + \beta_4(\Delta Climate)_{it-n} + D_i + D_{jt} + e_{ijt}$$

- ✓ The model is based on a theoretical model of migration choice across multiple destination (Grogger and Hanson 2008)
- ✓ We focus on push factors (mainly past climate anomalies) and we use fixed effects;
- ✓ We control for unobserved destination country and time-varying characteristics (D_{jt})

5. The data

- **Immigration flows** in 26 OECD countries from 165 countries of origin (OECD International Migration Database; IMD) from 1990 to 2001;

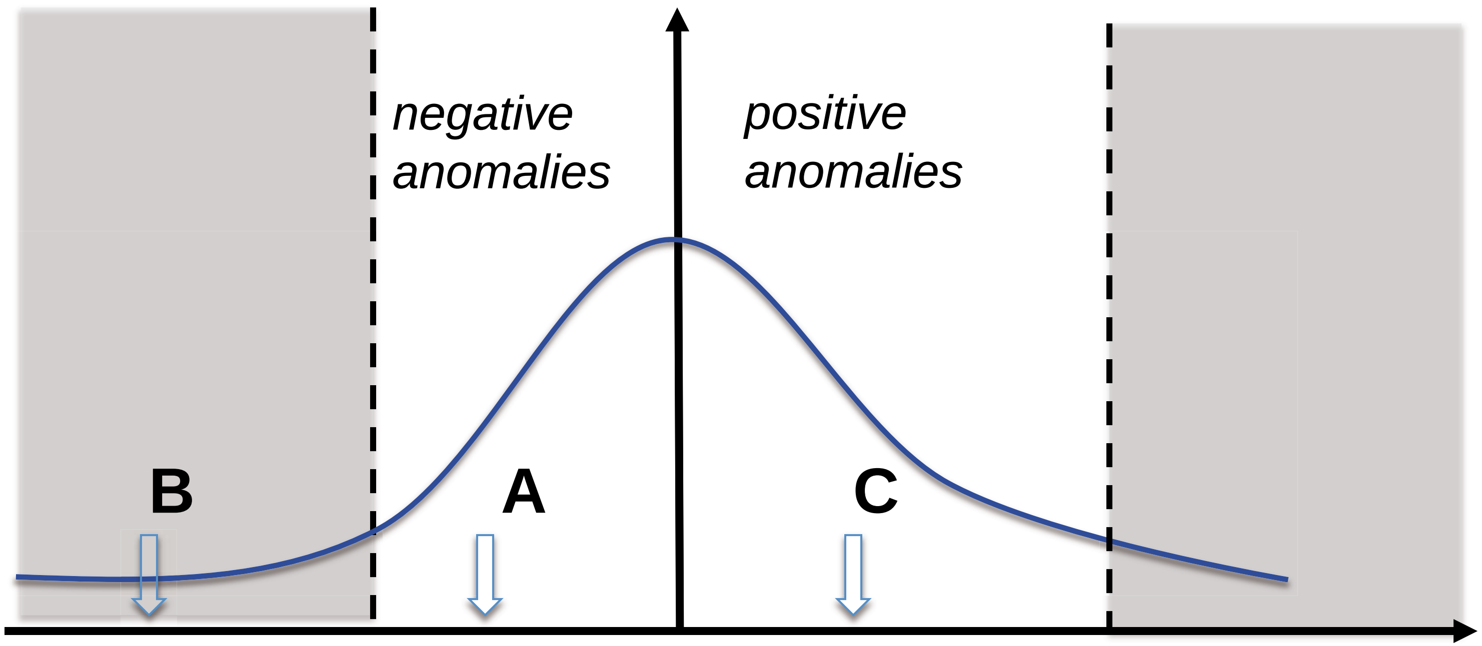
- **Climate variables:** country level average precipitation and temperature (until 2000), TYN CY 1.1 database, Mitchell et al. (2003); climate anomalies are computed with respect to 1961-1990 mean values

- **Bilateral stock of emigrants** by OECD countries of destination and by nationality (country of origin) in 1990s, Docquier et al. (2007);

- **Other database employed:** United Nations Statistics Division (National Accounts Estimates of Main Aggregates Database, Millennium Development Goals Indicators, World Urbanization Prospects: The 2007 Revision), CEPII Distances Database, World Development Indicators database

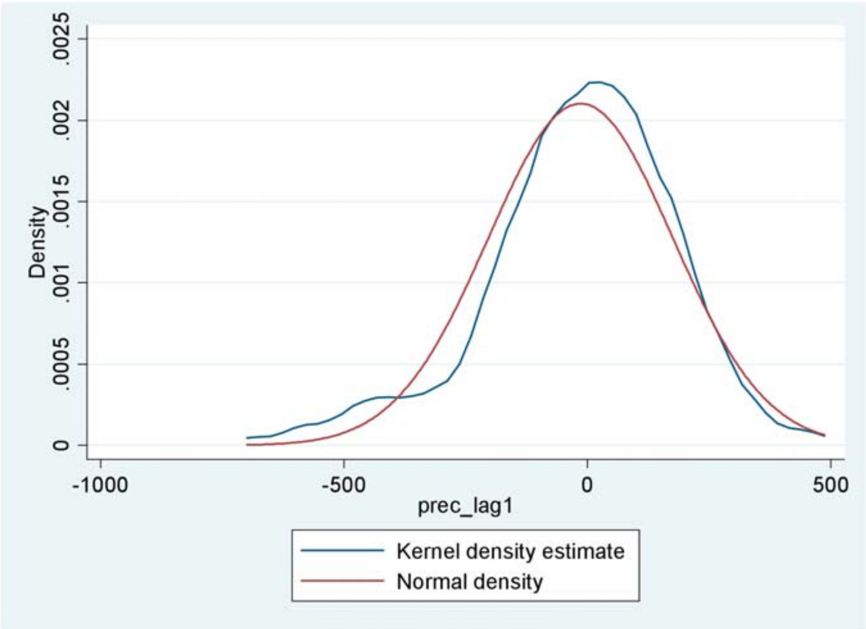
Identifying climate shocks (1)

For all 165 (migration) sending countries we compute (i) **the long-term mean of precipitations and temperatures** and (ii) the main features of climatic anomalies' distribution (StDev, 90th and 10th percentiles, kurtosis, skewness)



Country *X* distribution of climatic anomalies

Gabon

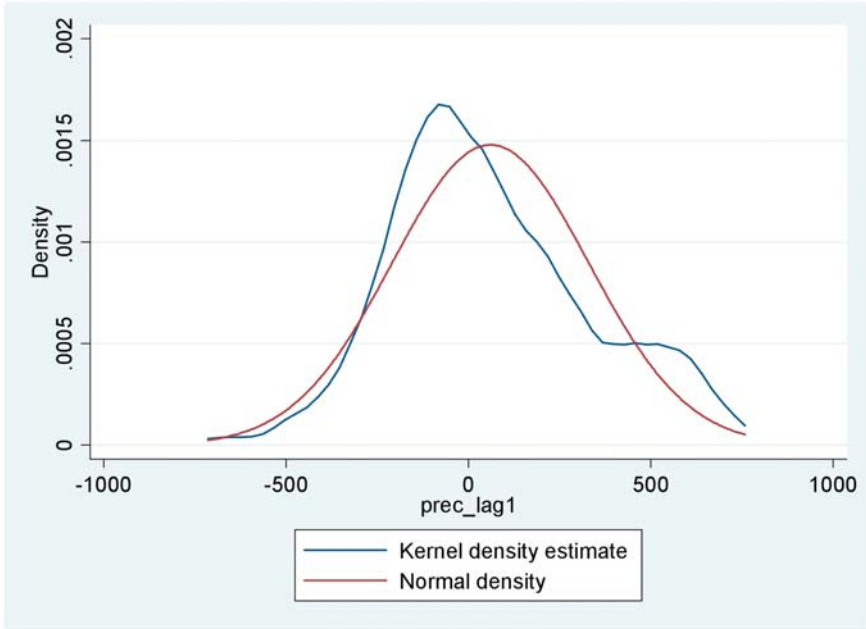


Precipitations:

skewness: -0,97

kurtosis (excess): 2,46

Bangladesh



Precipitations:

skewness: 0,63

kurtosis (excess): 0,60

Identifying climate shocks (2)

Climatic variables (precipitation/temperature) employed in the analysis:

- absolute level;
- anomalies wrt countries' mean values (absolute value / percentage value);
- positive (negative) anomalies;
- squared values of anomalies (non linear effects);
- extreme anomalies (above a certain threshold; 1 StDev, 90th and 10th percentiles);
- positive (negative) extreme anomalies;

Time dimension. For all the above variables we consider the anomalies at **lag -1, -3 and -5** (mean and cumulated values) .

6. Methodological constraints

➢ **Data constraints**:

✓ Migration data: missing info on South-South migration flows; limited time-span and country coverage;

✓ Identification of climate anomalies: yearly data aggregated at the country-level might mask high intra-borders variations, and seasonal shifts

➢ **Complexity of links:** direct and indirect effects are at work, including other push factors of international migration flows

6. Estimation results: first step

Dependent variable: **Bilateral migration flows ij (in log)**	Baseline	mod 1 PREC	mod 2 PREC	mod 3 PREC	mod 4 TEMP	mod 5 TEMP	mod 6 TEMP
GDPper capita i (lag 1; ln)	-0.211** (0.0759)	-0.329*** (0.0862)	-0.341*** (0.0867)	-0.330*** (0.0925)	-0.322*** (0.0901)	-0.328*** (0.0903)	-0.320*** (0.0895)
Employment rate difference ij (lag 1)	0.0239*** (0.00698)	0.0234* (0.0130)	0.0238* (0.0134)	0.0246* (0.0133)	0.0244* (0.0132)	0.0240* (0.0131)	0.0236* (0.0137)
Network migrants ij (1990s; ln)	0.519*** (0.0314)	0.608*** (0.0374)	0.608*** (0.0374)	0.608*** (0.0373)	0.608*** (0.0373)	0.608*** (0.0373)	0.608*** (0.0373)
Irrigated land % i (change lag - lag 1)	-0.167*** (0.0575)	-0.0124 (0.128)	-0.0226 (0.127)	-0.0213 (0.128)	-0.0175 (0.125)	-0.0196 (0.126)	-0.0140 (0.125)
Distance ij (ln)	-0.512*** (0.139)	-0.356** (0.148)	-0.356** (0.148)	-0.356** (0.148)	-0.356** (0.148)	-0.356** (0.148)	-0.356** (0.148)
Common language (dummy)	0.637*** (0.155)	0.511*** (0.146)	0.511*** (0.146)	0.511*** (0.146)	0.511*** (0.146)	0.511*** (0.146)	0.511*** (0.146)
Precipitation (mean past 3years; absolute value in mm)		-0.000241 (0.000219)					
Precipitation anomalies (mean past 3years; absolute value in mm)			-0.000469 (0.000293)				
Precipitation anomalies (mean past 3years; % value wrt mean 1961-1990)				-0.302 (0.331)			
Temperature (mean past 3years; absolute value in °C)					0.0339 (0.0908)		
Temperature anomalies (mean past 3years; absolute value in °C)						0.0985 (0.0933)	
Temperature anomalies (mean past 3years; % value wrt mean 1961-1990)							0.622 (0.547)
Constant	8.184*** (1.389)	6.547*** (1.359)	6.576*** (1.337)	6.545*** (1.342)	6.023*** (1.648)	6.455*** (1.367)	6.436*** (1.377)
Observations	15,021	7,598	7,598	7,598	7,598	7,598	7,598
R-squared	0.846	0.837	0.837	0.837	0.837	0.837	0.837

Note: dependent variable ln(migration flows ij +1)t. Regressions include origin country fixed effects and 286 (26x11) destination-country-by-year fixed effects. Robust standard errors clustered by country of destination in parentheses. Observations are weighted by the population of destination countries. *** p<0.01, ** p<0.05, * p<0.1

Main results from a simple specification à la Barrios et al (2006)

- No stat significant effects on int migration flows when considering jointly climate anomalies of different nature
- …. Results are robust for different time specification of anomalies (lag 1, 3 and 5)

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VARIABLES	2A TEMP	2B TEMP	2C TEMP	2D TEMP
GDPper capita i (lag 1; ln)	-0.304***	-0.299***	-0.272***	-0.292***
	(0.0892)	(0.0883)	(0.0858)	(0.0999)
Employment rate difference ij (lag 1)	0.0261*	0.0280**	0.0301**	0.0249*
	(0.0132)	(0.0126)	(0.0127)	(0.0136)
Network migrants ij (1990s; ln)	0.627***	0.709***	0.674***	0.608***
	(0.0352)	(0.0399)	(0.0312)	(0.0372)
Irrigated land % i (change lag - lag 1)	-0.0114	-0.0319	-0.0222	-0.00852
	(0.123)	(0.117)	(0.126)	(0.126)
Distance ij (ln)	-0.334**	-0.304*	-0.276*	-0.356**
	(0.148)	(0.154)	(0.158)	(0.148)
Common language (dummy)	0.485***	0.451***	0.432***	0.511***
	(0.141)	(0.142)	(0.138)	(0.146)
Temperature anomalies (mean past 3years; % value wrt mean 1961-1990)	2.048***		6.592**	2.943
	(0.636)		(2.479)	(2.537)
Temperature anomalies (mean past 3years; % value wrt mean 1961-1990) * **Network migrants ij**	-0.362***		-1.327***	
	(0.0950)		(0.346)	
Temperature anomalies (mean past 3years; % value wrt mean 1961-1990) * **GDPper capita i**				-0.386
				(0.373)
Temperature anomalies (mean past 3years) (**squared**)			-2.181**	
			(0.876)	
Temperature anomalies (mean past 3years) * Network migrants ij (**squared**)			0.617***	
			(0.203)	
Temperature anomalies (mean past **5years**; % value wrt mean 1961-1990)		1.277**		
		(0.485)		
Temperature anomalies (mean past **5years**; % value wrt mean 1961-1990) * **Network migrants ij**		-0.192***		
		(0.0633)		
Constant	6.019***	6.453***	5.019***	6.279***
	(1.375)	(1.364)	(1.478)	(1.422)
Observations	7,598	7,598	7,598	7,598
R-squared	0.839	0.837	0.840	0.837

Note: dependent variable ln(migration flows ij +1)t. Regressions include origin country fixed effects and 286 (26x11) . destination-country-by-year FE. Robust standard errors clustered by country of destination in parentheses. Observations are weighted by the population of destination countries. *** p<0.01, ** p<0.05, * p<0.1

TEMPERATURE ANOMALIES AND MIGRATION NETWORKS

- Anomalies in the past 3 (or 5) years are significantly associated with higher migration outflows but the existence of bilateral *networks seems to mitigate the effect*;

- …. But the effects are non linear (using model 2C): a network which is 1% larger that the mean value implies that the average shocks leads to a bilateral outmigration flow which is 4% larger

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VARIABLES	2A PREC	2B PREC
GDPper capita i (lag 1; ln)	-0.304***	-0.253***
	(0.0867)	(0.0890)
Employment rate difference ij (lag 1)	0.0232*	0.0233*
	(0.0134)	(0.0132)
Network migrants ij (1990s; ln)	0.608***	0.608***
	(0.0374)	(0.0373)
Irrigated land % i (change lag - lag 1)	-0.0290	-0.0277
	(0.127)	(0.128)
Distance ij (ln)	-0.356**	-0.355**
	(0.148)	(0.148)
Common language (dummy)	0.512***	0.513***
	(0.146)	(0.146)
Precipitation anomalies (mean past **3years**; in mm)	0.00237*	
	(0.00119)	
Precipitation anomalies (mean past **3years**; in mm)* GDPper capita i	-0.000398**	
	(0.000160)	
Precipitation anomalies (mean past **5years**; in mm)		0.00599***
		(0.00120)
Precipitation anomalies (mean past **5years**; in mm)* GDPper capita i		-0.000890***
		(0.000182)
Constant	6.343***	6.031***
	(1.357)	(1.391)
Observations	7,598	7,598
R-squared	0.838	0.838

Note: dependent variable ln(migration flows ij +1)t. Regressions include origin country fixed effects and 286 (26x11) destination-country-by-year FE. Robust standard errors clustered by country of destination in parentheses. Observations are weighted by the population of destination countries. *** p<0.01, ** p<0.05, * p<0.1

PRECIPITATION ANOMALIES AND LEVEL OF DEVELOPMENT

- Anomalies in the past 3 (or 5) years are significantly associated with higher migration outflows but only in countries that are relatively poor (below average GDP pc as most African countries, China, Philippines; thereshold circa 1700 current us dollar);

Sign and type of anomalies: some results

Dependent variable: **Bilateral migration flows ij (in log)**	3A TEMPERATURE	3B TEMPERATURE	3C PRECIPITATION	3D PRECIPITATION
……(baseline vars omitted)……				
Positive temperature anomalies (mean past 3years; % value wrt mean 1961-1990)	6.155*** (1.547)	6.040* (3.376)		
Negative temperature anomalies (mean past 3years; % value wrt mean 1961-1990)	16.18** (7.350)	28.39* (14.40)		
Positive temperature anomalies (mean past 3years; % value wrt mean 1961-1990) * **Network migrants ij** (1990s; ln)	-1.206*** (0.279)			
Negative temperature anomalies (mean past 3years; % value wrt mean 1961-1990) * **Network migrants ij** (1990s; ln)	-2.524** (0.954)			
Positive temperature anomalies (mean past 3years; % value wrt mean 1961-1990) ***GDPper capita i** (lag 1; ln)		-0.938* (0.482)		
Negative temperature anomalies (mean past 3years; % value wrt mean 1961-1990) * **GDPper capita i** (lag 1; ln)		-3.855* (2.101)		
Positive precipitation anomalies (mean past 3years; % value wrt mean 1961-1990)			-0.174 (0.505)	
Negative precipitation anomalies (mean past 3years; % value wrt mean 1961-1990)			-2.352** (1.037)	-2.150** (0.984)
Positive precipitation anomalies (mean past 3years; % value wrt mean 1961-1990) * Network migrants ij (1990s; ln)			-0.0538 (0.0805)	
Negative precipitation anomalies (mean past 3years; % value wrt mean 1961-1990) * **Network migrants ij** (1990s; ln)			0.368* (0.179)	0.380* (0.185)
Constant	5.120*** (1.471)	6.178*** (1.381)	6.602*** (1.326)	6.509*** (1.361)
Observations	7,598	7,598	7,598	7,598
R-squared	0.840	0.838	0.838	0.838

VARIABLES	4A PREC	4B PREC	4C PREC	4D PREC	4E PREC
GDPper capita i (lag 1; ln)	-0.320***	-0.322***	-0.319***	-0.321***	-0.316***
	(0.0895)	(0.0907)	(0.0894)	(0.0896)	(0.0844)
Employment rate difference ij (lag 1)	0.0259*	0.0247*	0.0260*	0.0232*	0.0258*
	(0.0135)	(0.0132)	(0.0134)	(0.0133)	(0.0136)
Network migrants ij (1990s; ln)	0.608***	0.608***	0.608***	0.616***	0.602***
	(0.0374)	(0.0373)	(0.0373)	(0.0369)	(0.0375)
Irrigated land % i (change lag - lag 1)	-0.0212	-0.0187	-0.0214	-0.0292	-0.0106
	(0.127)	(0.127)	(0.127)	(0.123)	(0.129)
Distance ij (ln)	-0.357**	-0.356**	-0.357**	-0.353**	-0.358**
	(0.148)	(0.148)	(0.148)	(0.147)	(0.148)
Common language (dummy)	0.510***	0.511***	0.510***	0.506***	0.507***
	(0.146)	(0.146)	(0.146)	(0.146)	(0.146)
Extreme precipitation (above 90th percentile or below 10th percentile; average last 5 years; dummy)	-0.211**				
	(0.0887)				
Extreme **positive** precipitation (above 90th percentile; average last 5 years; dummy)		0.00943			
		(0.218)			
Extreme **negative** precipitation (below 10th percentile; average last 5 years; dummy)			-0.226**		
			(0.0971)		
Extreme **positive** precipitation (above 90th percentile; cumulated abs values in the last 5 years; dummy)				0.217**	
				(0.0910)	
Extreme **positive** precipitation (above 90th percentile; **cumulated abs values in the last 5 years**; dummy) * **Network of migrant ij**				-0.0403**	
				(0.0168)	
Extreme **negative** precipitation (below 10th percentile; **cumulated abs values in the last 5 years**; dummy)					-0.181*
					(0.0931)
Extreme **negative** precipitation (below 10th percentile; cumulated abs values in the last 5 years; dummy) * **Network of migrants ij**					0.0304**
					(0.0145)
Constant	6.461***	6.464***	6.455***	6.365***	6.465***
	(1.367)	(1.368)	(1.367)	(1.361)	(1.355)
Observations	7,598	7,598	7,598	7,598	7,598
R-squared	0.837	0.837	0.837	0.838	0.838

Note: dependent variable ln(migration flows ij +1)t. Regressions include origin country fixed effects and 286 (26x11) destination-country-by-year fixed effects. Robust standard errors clustered by country of destination in parentheses. Observations are weighted by the population of destination countries. *** p<0.01, ** p<0.05, * p<0.1

PRECIPITATION : EXTREME ANOMALIES

-Large negative shocks to precipitation might lead to a reduction in outflows (supports some existing survey-based evidence);

- complex role of established networks (positive = remittances? Yang&Choi2007 ; negative = a bridge to outmigration? McLeman on Oklahoma)

VARIABLES	4A TEMP	4B TEMP	4C TEMP
……(baseline vars omitted)……			
Extreme temperature (above/below **1 st dev**; cumulated abs values in the last **3 years**; dummy)	-0.308**		
	(0.146)		
Extreme temperature (above/below **1 st dev**; cumulated abs values in the last **3 years**; dummy) * **network migrants ij**	0.0503***		
	(0.0180)		
Extreme temperature (**above 90th percentile and below 10th percentile**; cumulated abs values in the last **3 years**; dummy)		-0.299*	
		(0.155)	
Extreme temperature (**above 90th percentile and below 10th percentile**; cumulated abs values in the last **3 years**; dummy) * **network migrants ij**		0.0465**	
		(0.0191)	
Extreme temperature (**above 90th percentile and below 10th percentile**; cumulated abs values in the last **5 years**; dummy)			0.422*
			(0.241)
Extreme temperature (**above 90th percentile and below 10th percentile**; cumulated abs values in the last **5 years**; dummy) * **GDP pc i**			-0.0567*
			(0.0324)
Constant	6.663***	6.659***	6.042***
	(1.355)	(1.355)	(1.439)
Observations	7,598	7,598	7,598
R-squared	0.838	0.838	0.837

TEMPERATURES: EXTREME ANOMALIES

- Pro-migration effect of networks;

- Higher level of developments associated with lower flows (reduced vulnerability);

- Negative temperature anomalies have larger impacts on out-migration than positive ones;

- Larger migrant networks (GDP per capita) seems to have a "mitigation effects" in case of temperature anomalies;

- …. But enhance out-migration in case of negative precipitation anomalies. An average drop in precipitation of 12% (=1 st dev) in the past 3 years is associated to an increase in bilateral flows of +3,3% (for mean value of bilateral network size)

11. Some conclusive remarks

- **Does climate change affect international migration flows?**

  => **Yes**….but under certain conditions (low level of development; established international migration networks; poor irrigation systems);

- **evidence of heterogeneous & non-linear effects** => predicting future scenario is a difficult task given the uncertainties on future climate scenario;

- **How strong is the link?** elasticity of migration flows to climate shocks are non-trivial for more vulnerable countries. Hence evidence on past shocks suggests that we should expect additional inflows into OECD countries as a consequence of adverse climatic shocks

- **IMPORTANT:** need to investigate the effects of climate shocks on internal displacement (urbanization) and South-South migration (which we are not able to investigate in this study

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11. APPENDIX – VARIABLE DESCRIPTION ANS SUMMARY STATS

Variable	Number of observations	mean	standard deviation	min	max
Bilateral migration flows ij (log)	20004	1,509405	6,219857	0	163,441
GDPper capita i (lag 1; ln)	22020	7,32101	1,410849	4,141379	11,59981
Employment rate difference ij (lag 1)	19655	-3,453569	12,90016	-45,2	33,5
Network migrants ij (1990s; ln)	17118	6,318642	3,028203	-1,187166	13,52166
Irrigated land % i (change lag - lag 1)	19531	0,0130973	0,0918523	-0,3933519	1,924138
Urbanization rate i (lag 1; % total population)	22278	50,63966	23,57055	0	100

Variable	Number of observations	mean	standard deviation	min	max
Precipitation anomalies (lag 1; absolute value in mm)	11276	121,1362	151,7847	0,19	1518,963
Precipitation anomalies (mean past 3years; absolute value in mm)	11276	117,6304	109,9191	2,091113	716,0333
Precipitation anomalies (mean past 5years; absolute value in mm)	11276	115,1695	97,09559	3,408	634,2994
Precipitation anomalies (lag 1; % value wrt mean 1961-1990)	11276	0,1171314	0,1203451	0,0000723	1,137378
Precipitation anomalies (mean past 3years; % value wrt mean 1961-1990)	11276	0,113828	0,0898154	0,0059677	0,8784823
Precipitation anomalies (mean past 5years; % value wrt mean 1961-1990)	11276	0,1125185	0,0817394	0,0069942	0,7650908
Positive precipitation anomalies (lag 1; absolute value in mm)	11276	53,50751	118,5025	0	1518,963
Positive precipitation anomalies (mean past 3years; absolute value in mm)	11276	50,44085	67,065	0	566,742
Positive precipitation anomalies (mean past 5years; absolute value in mm)	11276	47,16397	53,43851	0	414,348
Negative precipitation anomalies (lag 1; absolute value in mm)	11276	67,62866	127,4114	0	1242,2
Negative precipitation anomalies (mean past 3years; absolute value in mm)	11276	67,18951	83,89347	0	626,4323
Negative precipitation anomalies (mean past 5years; absolute value in mm)	11276	68,0055	72,97366	0	492,4788
Positive precipitation anomalies (lag 1; % value wrt mean 1961-1990)	11276	0,0537114	0,1093943	0	1,137378
Positive precipitation anomalies (mean past 3years; % value wrt mean 1961-1990)	11276	0,0539507	0,0769604	0	0,8784823
Positive precipitation anomalies (mean past 5years; % value wrt mean 1961-1990)	11276	0,0524333	0,0688175	0	0,6532378
Negative precipitation anomalies (lag 1; % value wrt mean 1961-1990)	11276	0,06342	0,0965878	0	0,5679223
Negative precipitation anomalies (mean past 3years; % value wrt mean 1961-1990)	11276	0,0598773	0,0551379	0	0,3451388
Negative precipitation anomalies (mean past 5years; % value wrt mean 1961-1990)	11276	0,0600852	0,0443988	0	0,2686558
Extreme positive precipitation anomalies (mean past 3years; dummy; in the 90th percentile)	9615	0,025481	0,1575891	0	1
Extreme negative precipitation anomalies (mean past 3years; dummy; in the 10th percentile)	10167	0,0319662	0,1759187	0	1

Variable	Number of observations	mean	standard deviation	min	max
Temperature anomalies (lag 1; absolute value in °C)	11276	0,5147339	0,3966205	0	2,12
Temperature anomalies (mean past 3years; absolute value in °C)	11276	0,4882529	0,2662784	0,02	1,62
Temperature anomalies (mean past 5years; absolute value in °C)	11276	0,4487574	0,2212494	0,032	1,472
Temperature anomalies (lag 1; % value wrt mean 1961-1990)	11276	0,0515679	0,1618769	0	2,911765
Temperature anomalies (mean past 3years; % value wrt mean 1961-1990)	11276	0,0479073	0,1430774	0,0008203	2,323529
Temperature anomalies (mean past 5years; % value wrt mean 1961-1990)	11276	0,0437169	0,1212338	0,0013126	1,823529
Positive temperature anomalies (lag 1; absolute value in °C)	11276	0,4907396	0,4149303	0	2,12
Positive temperature anomalies (mean past 3years; absolute value in °C)	11276	0,4578896	0,2778405	0	1,62
Positive temperature anomalies (mean past 5years; absolute value in °C)	11276	0,4111116	0,224159	0,008	1,39
Negative temperature anomalies (lag 1; absolute value in °C)	11276	0,0239943	0,0932347	0	1,21
Negative temperature anomalies (mean past 3years; absolute value in °C)	11276	0,0303633	0,0704234	0	0,68
Negative temperature anomalies (mean past 5years; absolute value in °C)	11276	0,0376458	0,0661831	0	0,682
Positive temperature anomalies (lag 1; % value wrt mean 1961-1990)	11276	0,0369816	0,067201	0	0,7931771
Positive temperature anomalies (mean past 3years; % value wrt mean 1961-1990)	11276	0,032507	0,0484452	0	0,6439233
Positive temperature anomalies (mean past 5years; % value wrt mean 1961-1990)	11276	0,0290245	0,0396555	0	0,519403
Negative temperature anomalies (lag 1; % value wrt mean 1961-1990)	11276	0,0022402	0,0125936	0	0,2302772
Negative temperature anomalies (mean past 3years; % value wrt mean 1961-1990)	11276	0,003079	0,0104489	0	0,1567291
Negative temperature anomalies (mean past 5years; % value wrt mean 1961-1990)	11276	0,0038176	0,0108505	0	0,1471891
Extreme positive temperature anomalies (mean past 3years; dummy; in the 90th percentile)	11191	0,4522384	0,4977358	0	1
Extreme negative temperature anomalies (mean past 3years; dummy; in the 10th percentile)	3437	0,0043643	0,0659279	0	1