Climate variability and international migration: an empirical analysis

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ONLINE APPENDIX

Appendix 1. *List of countries included in the empirical analysis*

Origin countries (128)

East Asia and Pacific: Brunei Darussalam, Cambodia, China, Fiji, Indonesia, Laos, Malaysia, Mongolia, North Korea, Papua New Guinea, Philippines, Solomon Islands, Thailand, Vietnam.

South Asia: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka.

Sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cape Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of Congo, Cote d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mal, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Togo, Uganda, Zambia, Zimbabwe

Middle East and North Africa: Algeria, Bahrain, Egypt, Libya, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen.

Latin America and Caribbean: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, Venezuela.

Europe and Central Asia: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Romania, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

OECD destination countries (number of countries: **29**; in parentheses we report the starting year of series only for countries with incomplete observations)

Europe and Middle East: Austria (1996), Belgium, Czech Republic (1995), Denmark, Finland, France (1995), Germany, Hungary (1995), Iceland (1999), Israel (1998), Italy (1998), Luxembourg (1996), Netherlands, , Norway, Poland (1998), Portugal, Slovenia (1998), Spain (1997), Sweden, Switzerland (1997), Turkey (1995), United Kingdom.

American continent: Canada, Chile (2000), United States.

Australian and asian continent: Australia, Japan, Korea, New Zealand (1994).

Appendix 2. *Covariates included in the empirical analysis*: description and data sources*

Variable	Description and source
Bilateral migration flows	***Main source.*** Bilateral migration flows per year are taken from the OECD International Migration Database (freely available on http://stats.oecd.org/Index.aspx?DataSetCode=MIG).
	As an ***alternative source***, we use bilateral migration flows by year are taken from the UN Population Division - International Migration Database (freely available at http://esa.un.org/unmigration/MigrationFlows.html).
$P_{MAD,t-n}$ *Intra-annual rainfall variability i*	Mean Absolute Deviation (MAD) of monthly precipitation over the period considered / long-term MAD (period 1901-1990). An index > 1 implies higher variability in rainfall compared to the usual level of variability.
$P_{surplus,t-n}$ *Precipitation (or temperature) surplus*	Sum of monthly differences between precipitation (or temperature) over the period considered (year lag 1, 3 or 5) and monthly long-term averages. Positive values implies higher precipitation (or temperature) than the long-term mean. The variable is calculate both in absolute values – respectively in mm or Celsius degrees – and in percentage of the long-term mean.
$P_{anomaly,t-n}$ *Precipitation (or temperature) anomalies*	Sum of monthly precipitation (or temperature) shocks over the period considered (year lag 1, 3 or 5) that **are <u>at least one standard deviation above or below the long-term averages</u>**. Positive values implies excess precipitation (or temperature).
$P_{(+)anomaly,t-n}$ *Positive precipitation anomalies (per cent values; lag1)*	Sum of monthly precipitation (or temperature) shocks over the period considered (year lag 1, 3 or 5) that are **<u>equal or larger than one standard deviation above the long-term averages</u>**.
$P_{(-)anomaly,t-n}$ *Negative precipitation anomalies (% values; lag1)*	Sum of monthly precipitation (or temperature) shocks over the period considered (year lag 1, 3 or 5)that are **<u>equal or larger than 1 standard deviation below the long-term averages</u>**.
GDP per capita in the origin country (ln; lag 1)	As proxy of the wage rate, we used the (log) per capita GDP in the origin country. These data are taken from the United Nations Statistics Division Database.
Employment rate in the origin country (ln; lag 1)	Percentage of the active workforce which is employed. Source: World Bank – World Development Indicators database.

Common language	Dummy variable which equals to 1 if a significant proportion of the population in the two countries share the same language; 0 otherwise. Source: CEPII database (www.cepii.fr)
Colonial ties	Dummy variable which equals to 1 if two countries have ever had a colonial link; 0 otherwise. Source: CEPII database (www.cepii.fr)
Contiguity	Dummy variable, which equals to 1 if two countries share a common border Source: CEPII database (www.cepii.fr)
Distance	Geographical distances between capitals. Data are taken from the CEPII database (www.cepii.fr).
Network migrants ij	Stock of migrants from origin country i in destination country j in 1960. Source: Ozden *et al*. (2011), Global Bilateral Migration Database – World Bank
Armed conflicts at origin country	Sum of the annual number of episodes of armed conflict in the origin country. Source: Major Episodes of Political Violence database of the Center for Systemic Peace.
Natural Disasters at origin country	Sum of the number of.natural disasters in the origin country. Source: Major Episodes of Political Violence database of the Center for Systemic Peace.
Quality of institutions at origin country	Quality of political institutions of origin countries is captured through the Political Institutional Quality Index ranging between 0 and 1. For more details, see Kuncic (2014).
Agricultural GDP share	Percentage of Agriculture share of GDP. Source: World Bank – World Development Indicators database.
Population at origin country	Demographic conditions in origin countries are captured by the total population. Data are collected by the United Nations World Urbanization Prospects Database.

* Climate covariates are computed by using monthly precipitation and temperature data over the period 1901-2000, based on Mitchell *et al*. (2003). See section 3.2 for the formula applied for the computation of each variable above.

Appendix 3. *Summary statistics*

Variable	Obs	Mean	Std. Dev.
Bilateral migration flows ij (OECD database)	14.066	1,25	5,54
Bilateral migration flows ij (UN Population Division database)	23.265	0,76	4,54
GDP per capita i (lag 1; ln)	13.652	7,01	1,23
Employment rate i (lag 1; ln)	12.094	58,65	11,67
Population i (ln)	13.741	8,62	2,30
Armed Conflicts i (dummy)	14.066	0,21	0,41
Natural Disasters i	14.066	2,31	3,85
Quality of institutions i	12.595	0,42	0,16
Distance ij (ln)	13.943	8,74	0,69
Common language (dummy)	13.943	0,14	0,35
Colony (dummy)	13.943	0,06	0,23
Contiguity (dummy)	13.943	0,01	0,09
Network migrants ij (1960s; ln)	9.776	4,82	2,97
Agricultural GDP share (% GDP; ln)	12.155	2,74	0,90
Precipitation i (absolute value; lag1)	13.575	1.239,76	880,07
Precipitation i (absolute value; lag3)	13.575	1.236,91	856,15
Precipitation i (absolute value; lag5)	13.575	1.233,05	853,09
Intra-annual rainfall variability i (lag 1)	13.575	1,03	0,34
Intra-annual rainfall variability i (lag 3)	13.575	1,04	0,24
Intra-annual rainfall variability i (lag 5)	13.575	1,03	0,20
Precipitation anomalies (sum of absolute values; lag3)	13.575	191,78	169,37
Temperature surplus (wrt long-term mean, lag 3)	13.575	0,47	0,34
Temperature anomalies (wrt longterm mean, lag 3)	13.575	0,75	0,41
Precipitation anomalies (% values; lag 3)	13.575	2,13	10,68
Positive precipitation anomalies (% values; lag 3)	13.575	9,67	9,79
Negative precipitation anomalies (% values; lag 3)	13.575	7,54	4,98
Precipitation anomalies (% values; lag 5)	13.575	2,07	9,65
Positive precipitation anomalies (% values; lag 5)	13.575	9,57	9,17
Negative precipitation anomalies (% values; lag 5)	13.575	7,50	4,19
Temperature anomalies - Rainy season (% of mean value; lag 3)	13.575	1,66	2,79
Temperature anomalies - Rainy season (% of mean value; lag 5)	13.575	1,38	2,07
Temperature anomalies - Dry season (% of mean value; lag 3)	13.575	-10,15	98,21
Temperature anomalies - Dry season (% of mean value; lag 5)	13.575	-8,68	76,61
Precipitation anomaly - Rainy season (% of mean value; lag 1)	13.575	16,28	17,66
Precipitation anomaly - Dry season (% of mean value; lag 1)	13.575	20,22	18,89
Precipitation anomaly - Rainy season (% of mean value; lag 3)	13.575	16,34	13,32
Precipitation anomaly - Dry season (% of mean value; lag 3)	13.575	20,44	12,81
Precipitation anomaly - Rainy season (% of mean value; lag 5)	13.575	16,19	12,27
Precipitation anomaly - Dry season (% of mean value; lag 5)	13.575	20,24	10,74

Appendix 4. Part 1. Climate variability and international migration: alternative estimates using the UN Population Division international migration database

Dependent variable: Bilateral migration flows ij - UNPD data	Baseline	(1) PREC	(2) PREC	(3) PREC	(4) PREC	(5) PREC	(6) PREC	(7) PREC
GDP pc i (lag 1; ln)	-0.231**	-0.231**	-0.227**	-0.228**	-0.225**	-0.192*	-0.199**	-0.208*
	(0.0951)	(0.0955)	(0.0934)	(0.0930)	(0.0947)	(0.102)	(0.0978)	(0.110)
Employment rate i (lag 1; ln)	-0.00241	-0.00219	-0.00449	-0.00429	-0.00332	-0.00642	-0.00637	-0.00388
	(0.0147)	(0.0148)	(0.0133)	(0.0132)	(0.0149)	(0.0148)	(0.0149)	(0.0149)
Population i (ln)	1.628	1.630	1.660	1.681	1.630	1.573	1.658	1.576
	(1.033)	(1.033)	(1.036)	(1.025)	(1.026)	(0.992)	(1.029)	(1.002)
Armed Conflicts i (dummy)	-0.0118	-0.0108	-0.0113	-0.0112	-0.0112	0.00119	0.00222	-0.0124
	(0.0591)	(0.0590)	(0.0591)	(0.0596)	(0.0586)	(0.0603)	(0.0606)	(0.0591)
Natural Disasters i	0.0118***	0.0115***	0.0125***	0.0125***	0.0108**	0.0103**	0.0104**	0.0121***
	(0.00439)	(0.00438)	(0.00456)	(0.00463)	(0.00461)	(0.00428)	(0.00423)	(0.00446)
Quality of institutions i	-1.644**	-1.645**	-1.630**	-1.639**	-1.625**	-1.643**	-1.649**	-1.628**
	(0.774)	(0.774)	(0.766)	(0.778)	(0.767)	(0.756)	(0.762)	(0.751)
Distance ij (ln)	-0.982***	-0.982***	-0.984***	-0.983***	-0.982***	-0.986***	-0.982***	-0.985***
	(0.138)	(0.138)	(0.137)	(0.137)	(0.138)	(0.138)	(0.138)	(0.138)
Common language (dummy)	0.989***	0.989***	0.984***	0.985***	0.989***	0.983***	0.986***	0.985***
	(0.146)	(0.146)	(0.145)	(0.145)	(0.146)	(0.146)	(0.145)	(0.146)
Colony (dummy)	0.630*	0.631*	0.624**	0.625*	0.634**	0.628*	0.630*	0.630**
	(0.322)	(0.323)	(0.317)	(0.319)	(0.323)	(0.321)	(0.322)	(0.321)
Contiguity (dummy)	0.245	0.245	0.244	0.244	0.246	0.246	0.247	0.243
	(0.370)	(0.370)	(0.370)	(0.370)	(0.369)	(0.368)	(0.369)	(0.370)
Network migrants ij (1960s; ln)	0.246***	0.246***	0.246***	0.246***	0.245***	0.246***	0.245***	0.245***
	(0.0537)	(0.0538)	(0.0535)	(0.0536)	(0.0537)	(0.0536)	(0.0538)	(0.0538)
Precipitation i (absolute value; lag1)		-4.08e-05						
		(3.30e-05)						
Precipitation i (absolute value; mean of past 3 years)			0.000254					
			(0.000328)					
Precipitation i (absolute value; mean of past 5 years)				0.000344				
				(0.000496)				
Intra-annual rainfall variability i (lag 1)					0.0613			
					(0.0394)			
Intra-annual rainfall variability i (lag 3)						0.299***		
						(0.116)		
Intra-annual rainfall variability i (lag 5)							0.390**	
							(0.153)	
Precipitation anomalies (sum of absolute values; lag3)								0.000355
								(0.000368)
Temperature surplus (wrt long-term mean, lag 3)								
Temperature anomalies (wrt longterm mean, lag 3)								
Index of rainfall variability i (lag 3) * GDP pc i								
Index of rainfall variability i (lag 5) * GDP pc i								
Agricultural GDP i (lag 1; ln)								
Index of rainfall variability i (lag 3) * Agric GDP i								
Index of rainfall variability i (lag 5) * Agric GDP i								
Constant	-6.631	-6.643	-6.937	-7.192	-6.698	-6.363	-7.292	-6.162
	(8.723)	(8.725)	(8.769)	(8.692)	(8.660)	(8.385)	(8.775)	(8.400)
Observations	12,251	12,251	12,251	12,251	12,251	12,251	12,251	12,251
R-squared	0.779	0.779	0.780	0.779	0.779	0.782	0.780	0.780

Appendix 4. Part 1. (CONTINUED) Climate variability and international migration: alternative estimates using the UN Population Division international migration database

Dependent variable: Bilateral migration flows ij - UNPD data	Baseline	(8) TEMP	(9) TEMP	(10) PREC	(11) PREC	(12) PREC	(13) PREC
GDP pc i (lag 1; ln)	-0.231**	-0.232***	-0.227***	0.104	0.310***	-0.213***	-0.204***
	(0.0951)	(0.0887)	(0.0810)	(0.101)	(0.116)	(0.0696)	(0.0704)
Employment rate i (lag 1; ln)	-0.00241	-0.00229	-0.00216	-0.00625	-0.00702	-0.0108	-0.0120
	(0.0147)	(0.0150)	(0.0149)	(0.0152)	(0.0149)	(0.0168)	(0.0170)
Population i (ln)	1.628	1.612	1.629	1.544	1.749*	1.498	1.647*
	(1.033)	(0.984)	(1.028)	(1.007)	(1.014)	(0.963)	(0.990)
Armed Conflicts i (dummy)	-0.0118	-0.0102	-0.0156	0.00433	0.0102	-0.103**	-0.0960**
	(0.0591)	(0.0593)	(0.0684)	(0.0602)	(0.0581)	(0.0448)	(0.0436)
Natural Disasters i	0.0118***	0.0118***	0.0118***	0.0104**	0.0104**	0.0113***	0.0103***
	(0.00439)	(0.00452)	(0.00426)	(0.00422)	(0.00418)	(0.00396)	(0.00390)
Quality of institutions i	-1.644**	-1.643**	-1.646**	-1.669**	-1.665**	-1.336***	-1.314***
	(0.774)	(0.770)	(0.761)	(0.765)	(0.762)	(0.398)	(0.387)
Distance ij (ln)	-0.982***	-0.982***	-0.982***	-0.983***	-0.980***	-1.016***	-1.014***
	(0.138)	(0.138)	(0.138)	(0.139)	(0.139)	(0.135)	(0.135)
Common language (dummy)	0.989***	0.989***	0.988***	0.986***	0.989***	0.979***	0.981***
	(0.146)	(0.146)	(0.146)	(0.146)	(0.145)	(0.156)	(0.155)
Colony (dummy)	0.630*	0.631*	0.630*	0.631*	0.635**	0.579*	0.580*
	(0.322)	(0.323)	(0.324)	(0.323)	(0.323)	(0.338)	(0.338)
Contiguity (dummy)	0.245	0.245	0.245	0.242	0.244	0.334	0.337
	(0.370)	(0.370)	(0.370)	(0.366)	(0.366)	(0.364)	(0.364)
Network migrants ij (1960s; ln)	0.246***	0.246***	0.246***	0.246***	0.245***	0.247***	0.246***
	(0.0537)	(0.0538)	(0.0539)	(0.0536)	(0.0538)	(0.0523)	(0.0524)
Precipitation i (absolute value; lag1)							
Precipitation i (absolute value; mean of past 3 years)							
Precipitation i (absolute value; mean of past 5 years)							
Intra-annual rainfall variability i (lag 1)							
Intra-annual rainfall variability i (lag 3)					2.143***		-1.225**
					(0.612)		(0.550)
Intra-annual rainfall variability i (lag 5)					3.644***		-1.483**
					(0.858)		(0.663)
Precipitation anomalies (sum of absolute values; lag3)							
Temperature surplus (wrt long-term mean, lag 3)		0.0111					
		(0.0870)					
Temperature anomalies (wrt longterm mean, lag 3)			-0.0454				
			(0.326)				
Index of rainfall variability i (lag 3) * GDP pc i				-0.268***			
				(0.0914)			
Index of rainfall variability i (lag 5) * GDP pc i					-0.473***		
					(0.129)		
Agricultural GDP i (lag 1; ln)						-0.684**	-0.811**
						(0.342)	(0.364)
Index of rainfall variability i (lag 3) * Agric GDP i						0.507**	
						(0.206)	
Index of rainfall variability i (lag 5) * Agric GDP i							0.630***
							(0.229)
Constant	-6.631	-6.480	-6.627	-8.117	-11.62	2.999	-5.343
	(8.723)	(8.187)	(8.768)	(8.270)	(8.064)	(3.839)	(7.057)
Observations	12,251	12,251	12,251	12,251	12,251	11,283	11,283
R-squared	0.779	0.779	0.779	0.782	0.781	0.813	0.812

Note: ***, **, * denote statistical significance at 1, 5 and 10% respectively; estimates include origin and destination country fixed effects, destination country by time fixed effects. Robust standard errors (in parentheses) clustered by country of destination.

Appendix 4. Part 2. Climate variability and international migration: alternative estimates using the UN Population Division international migration database

Dependent variable: Bilateral migration flows ij - UNPD data	(1) PREC	(2) PREC	(3) PREC	(4) PREC	(1) TEMP	(2) TEMP	(3) TEMP
GDP pc i (lag 1; ln)	-0.235*** (0.0892)	-0.205* (0.108)	-0.213** (0.105)	-0.237*** (0.0892)	-0.236** (0.0958)	-0.236** (0.0970)	-0.224** (0.0963)
Employment rate i (lag 1; ln)	-0.00531 (0.0132)	-0.00650 (0.0137)	-0.00581 (0.0145)	-0.00442 (0.0139)	-0.00205 (0.0145)	-0.00206 (0.0144)	-0.00216 (0.0140)
Population i (ln)	1.757* (1.033)	1.636* (0.923)	1.704* (0.978)	1.762* (1.033)	1.609 (1.049)	1.610 (1.037)	1.549 (1.020)
Armed Conflicts i (dummy)	-0.0125 (0.0569)	-0.0143 (0.0564)	-0.0136 (0.0592)	-0.0133 (0.0590)	-0.0221 (0.0584)	-0.0221 (0.0584)	-0.0282 (0.0582)
Natural Disasters i	0.0114*** (0.00438)	0.0109** (0.00432)	0.0112*** (0.00431)	0.0116*** (0.00439)	0.0117*** (0.00438)	0.0117*** (0.00427)	0.0109** (0.00446)
Quality of institutions i	-1.639** (0.758)	-1.619** (0.736)	-1.591** (0.732)	-1.623** (0.770)	-1.639** (0.771)	-1.639** (0.768)	-1.608** (0.762)
Distance ij (ln)	-0.990*** (0.136)	-0.992*** (0.136)	-0.982*** (0.138)	-0.982*** (0.138)	-0.983*** (0.138)	-0.983*** (0.138)	-0.987*** (0.136)
Common language (dummy)	0.975*** (0.145)	0.974*** (0.145)	0.987*** (0.146)	0.986*** (0.146)	0.986*** (0.146)	0.986*** (0.146)	0.981*** (0.146)
Colony (dummy)	0.614* (0.318)	0.615* (0.318)	0.628* (0.322)	0.625* (0.321)	0.629* (0.322)	0.629* (0.322)	0.624* (0.321)
Contiguity (dummy)	0.236 (0.370)	0.239 (0.366)	0.243 (0.368)	0.240 (0.371)	0.246 (0.370)	0.246 (0.370)	0.245 (0.371)
Network migrants ij (1960s; ln)	0.246*** (0.0534)	0.246*** (0.0534)	0.245*** (0.0538)	0.245*** (0.0536)	0.245*** (0.0537)	0.245*** (0.0538)	0.245*** (0.0536)
Precipitation anomalies (% values; lag 3)	0.00676* (0.00368)						
Positive precipitation anomalies (% values; lag 3)		0.0123** (0.00528)					
Negative precipitation anomalies (% values; lag 3)		0.00208 (0.00784)					
Precipitation anomalies (% values; lag 5)			0.0148* (0.00808)				
Positive precipitation anomalies (% values; lag 5)			0.00158 (0.00953)				
Negative precipitation anomalies (% values; lag 5)				0.00805* (0.00469)			
Temperature anomalies - Rainy season (% of mean value; lag 3)					-0.0129** (0.00617)	-0.0136 (0.0348)	
Temperature anomalies - Rainy season (% of mean value; lag 3) * GDP pc i						0.000101 (0.00436)	
Temperature anomalies - Rainy season (% of mean value; lag 5)							-0.0327** (0.0145)
Temperature anomalies - Rainy season (% of mean value; lag 5) * GDP pc i							
Temperature anomalies - Dry season (% of mean value; lag 3)							
Temperature anomalies - Dry season (% of mean value; lag 3) * GDP pc i							
Temperature anomalies - Dry season (% of mean value; lag 5)							
Temperature anomalies - Dry season (% of mean value; lag 5) * GDP pc i							
Precipitation anomaly - Rainy season (% of mean value; lag 1)							
Precipitation anomaly - Dry season (% of mean value; lag 1)							
Precipitation anomaly - Rainy season (% of mean value; lag 3)							
Precipitation anomaly - Dry season (% of mean value; lag 3)							
Precipitation anomaly - Rainy season (% of mean value; lag 5)							

Precipitation anomaly - Dry season (% of mean value; lag 5)							
Constant	-7.699	-6.743	-7.546	-7.883	-6.327	-6.333	-5.647
	(8.779)	(7.839)	(8.423)	(8.800)	(8.939)	(8.859)	(8.700)
Observations	12,251	12,251	12,251	12,251	12,251	12,251	12,251
R-squared	0.783	0.785	0.779	0.779	0.780	0.780	0.784

Appendix 4. Part 2. (**CONTINUED**) Climate variability and international migration: alternative estimates using the UN Population Division international migration database

Dependent variable: Bilateral migration flows ij - UNPD data	(4) TEMP	(5) TEMP	(6) TEMP	(7) TEMP	(8) TEMP	(9) PREC	(10) PREC	(11) PREC
GDP pc i (lag 1; ln)	-0.220**	-0.269***	-0.304***	-0.278***	-0.311***	-0.220**	-0.183*	-0.193*
	(0.0989)	(0.0832)	(0.0905)	(0.0861)	(0.0901)	(0.0882)	(0.102)	(0.105)
Employment rate i (lag 1; ln)	-0.00134	-0.00369	-0.00371	-0.00357	-0.00327	-0.00305	-0.00528	-0.00511
	(0.0137)	(0.0149)	(0.0149)	(0.0147)	(0.0147)	(0.0145)	(0.0149)	(0.0156)
Population i (ln)	1.515	1.739*	1.789*	1.781*	1.832*	1.620	1.497	1.565
	(1.003)	(1.032)	(1.002)	(1.019)	(0.998)	(1.025)	(0.957)	(0.983)
Armed Conflicts i (dummy)	-0.0296	0.0641	0.0816	0.0854	0.0967	-0.0211	-0.0203	-0.0242
	(0.0571)	(0.0703)	(0.0673)	(0.0645)	(0.0641)	(0.0576)	(0.0591)	(0.0576)
Natural Disasters i	0.0107**	0.00516	0.00286	0.00447	0.00237	0.0100**	0.0102**	0.0101**
	(0.00442)	(0.00438)	(0.00428)	(0.00418)	(0.00415)	(0.00449)	(0.00428)	(0.00418)
Quality of institutions i	-1.598**	-1.478**	-1.346**	-1.431**	-1.304**	-1.664**	-1.641**	-1.551**
	(0.758)	(0.681)	(0.685)	(0.680)	(0.663)	(0.756)	(0.775)	(0.763)
Distance ij (ln)	-0.988***	-0.982***	-0.982***	-0.983***	-0.983***	-0.984***	-0.986***	-0.981***
	(0.136)	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)	(0.138)	(0.137)
Common language (dummy)	0.980***	0.988***	0.988***	0.989***	0.988***	0.986***	0.985***	0.989***
	(0.147)	(0.146)	(0.146)	(0.146)	(0.146)	(0.146)	(0.147)	(0.146)
Colony (dummy)	0.623*	0.635**	0.637**	0.636**	0.637**	0.631*	0.630**	0.633**
	(0.321)	(0.324)	(0.324)	(0.324)	(0.324)	(0.324)	(0.320)	(0.323)
Contiguity (dummy)	0.246	0.252	0.254	0.254	0.256	0.243	0.247	0.241
	(0.370)	(0.369)	(0.368)	(0.369)	(0.369)	(0.368)	(0.365)	(0.370)
Network migrants ij (1960s; ln)	0.245***	0.245***	0.245***	0.245***	0.245***	0.246***	0.245***	0.245***
	(0.0536)	(0.0540)	(0.0542)	(0.0540)	(0.0542)	(0.0537)	(0.0536)	(0.0540)
Precipitation anomalies (% values; lag 3)								
Positive precipitation anomalies (% values; lag 3)								
Negative precipitation anomalies (% values; lag 3)								
Precipitation anomalies (% values; lag 5)								
Positive precipitation anomalies (% values; lag 5)								
Negative precipitation anomalies (% values; lag 5)								
Temperature anomalies - Rainy season (% of mean value; lag 3)								
Temperature anomalies - Rainy season (% of mean value; lag 3) * GDP pc i								
Temperature anomalies - Rainy season (% of mean value; lag 5)	0.0143							
	(0.0403)							
Temperature anomalies - Rainy season (% of mean value; lag 5) * GDP pc i	-0.00691							
	(0.00463)							
Temperature anomalies - Dry season (% of mean value; lag 3)		-0.000457*	0.0063***					
		(0.000258)	(0.0014)					
Temperature anomalies - Dry season (% of mean value; lag 3) * GDP pc i			-0.00097***					
			(0.0002)					
Temperature anomalies - Dry season (% of mean value; lag 5)				-0.00109**	0.006**			
				(0.000450)	(0.0026)			
Temperature anomalies - Dry season (% of mean value; lag 5) * GDP pc i					-0.000988**			
					(0.000411)			
Precipitation anomaly - Rainy season (% of mean value; lag 1)						0.00123		
						(0.00165)		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Precipitation anomaly - Dry season (% of mean value; lag 1)						0.0021*** (0.0005)		
Precipitation anomaly - Rainy season (% of mean value; lag 3)							0.00574 (0.00528)	
Precipitation anomaly - Dry season (% of mean value; lag 3)							0.0046*** (0.00097)	
Precipitation anomaly - Rainy season (% of mean value; lag 5)								0.00363 (0.00477)
Precipitation anomaly - Dry season (% of mean value; lag 5)								0.00760** (0.00330)
Constant	-5.429 (8.575)	-7.523 (8.625)	-7.865 (8.321)	-7.921 (8.525)	-8.292 (8.302)	-6.628 (8.628)	-5.652 (8.011)	-6.353 (8.320)
Observations	12,251	12,251	12,251	12,251	12,251	12,251	12,251	12,251
R-squared	0.784	0.779	0.780	0.780	0.780	0.781	0.783	0.780

Note: ***, **, * denote statistical significance at 1, 5 and 10% respectively; estimates include origin and destination country fixed effects, destination country by time fixed effects. Robust standard errors (in parentheses) clustered by country of destination.

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