On the link between warming and civil conflicts: is migration a channel?

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Motivation

Migration is an important channel of adaptation where climate change threatens livelihoods

- American Dust Bowl in ‘30s: Hundreds of thousand families abandoned the region as a consequence of the large dust storms and desertification process

Human responses to environmental stress induce indirect effects that could be as substantial as the direct ones

Climate-induced migrants may interact with resources and populations of the receiving regions in a way that give rise to social unrest

Motivation

The existing literature on climate, migration and conflicts has been developed along three separated strands:

Motivation

- The direct link between temperature/precipitation change and emigration
- The connection between climate and violent conflicts and wars
- The link between migration and conflict
  - Refugees and international conflicts: refugees significantly increase the likelihood of militarized interstate disputes and increase the probability of a civil war in host countries
  - ’Sons of the Soil’ conflicts: civil strife between an indigenous ethnic group and recent migrants from other parts of the country
    - These conflicts combine an ethnic component and an indigenous component

Motivation

The connection between climate, migration and conflicts has been analysed in the literature but only:

- Applying a qualitative approach
  - Reuveny (2007): in 19 out of 38 cases climate induced migration causes conflicts. Case-studies approach, not causal link
- Considering only one type of climate-related event
  - Ghimire et al. (2015): flood-induced internal displacement fuels existing conflicts in origin. Not considered the effect of the outflows of displaced persons on conflict in third destination countries

Climate-Migrations-Conflicts/1

We postulate the existence of two potential mechanisms:

1) Where climate change increases migration, **climate-migrant** may trigger new **conflicts** or fuel existing ones in **receiving countries**

- Climate change may cause large and fast waves of migrants, which might not be smoothly absorbed in the **receiving regions**, in particular if language and cultural barriers between natives and migrants are high
- **Ethnic tension** is a possible channel through which migration causes conflicts

Climate-Migrations-Conflicts/2

2) Where climate change reduces migration: immobility may increase the risk of conflict in areas of origin

- Migration is expensive, and those most vulnerable to climate change are usually poor
- Immobility increases population pressure, exacerbates **scarcity of vital resources** and this leads to higher risks of conflicts
- Neo-Malthusian framework

Preview of the results

We find:

- **No evidence** of climate-induced migration's influence on incidence (onset) of civil **conflicts** in **destination countries**
- **Mild evidence** only in **destination countries** where the migration population has a larger linguistic distance with respect to natives (Hp: **ethnic tension channel**)
- **Evidence** of higher chances of **conflicts** in **origin countries** where **climate constrains emigration**

Methodology

We estimate the incidence and onset of civil conflicts world-wide:

$$C_{j,t} = \alpha + \theta ln Mig_{jt} + \boldsymbol{X}_{jt}{}'\beta + \boldsymbol{G}'_{j}\gamma + \phi_{rt} + \phi_t + \varepsilon_{jt}$$

$C_{j,t}$ = *battles with at least 25 deaths in a given year*

$X_{j,t}$ = *GDP per capita, population, natural resource abundance, whether a state was recently created, institutional quality, number of years of peace, agriculture productivity*

G_j = *ethnic fractionalization, non-contiguous state, mountainous terrain, absolute latitude, malaria incidence, yellow fever presence, % land area in geographical tropics, coastal population*

$Mig_{j,t}$ = *is the total flows of migrants or the immigration rates*

Methodology

Three problems:

I. Migration is multicausal, it is difficult to distinguish climate as its sole driver

II. Reasons for migrating are not generally collected in censuses (climate versus other drivers)

III. Potential reverse causality: migration causes conflict or vice-versa)

One solution:

- We employ a 2SLS (consistently estimates a LATE)
- To build an instrument, we estimate a bilateral equation for the flows of migrants using a small subset of (time-varying) **bilateral climatic** controls (Frankel and Romer, 1999; Rodriguez and Rodrik, 2001 and Feyrer (2009) for a panel context)

Data

Annual Temperature and precipitation: we use (terrestrial) monthly mean temperature and precipitation data at 0.5X0.5 degree resolution from weather stations, which are aggregated at country level using **pupulation weights**

Migration data are taken from Ozden et al. (2011)

- bilateral migrant stocks between all countries of the world in the last five available censuses (from 1960 to 2000)

Conflict data are taken from the UCDP/PRIO Armed Conflict Dataset

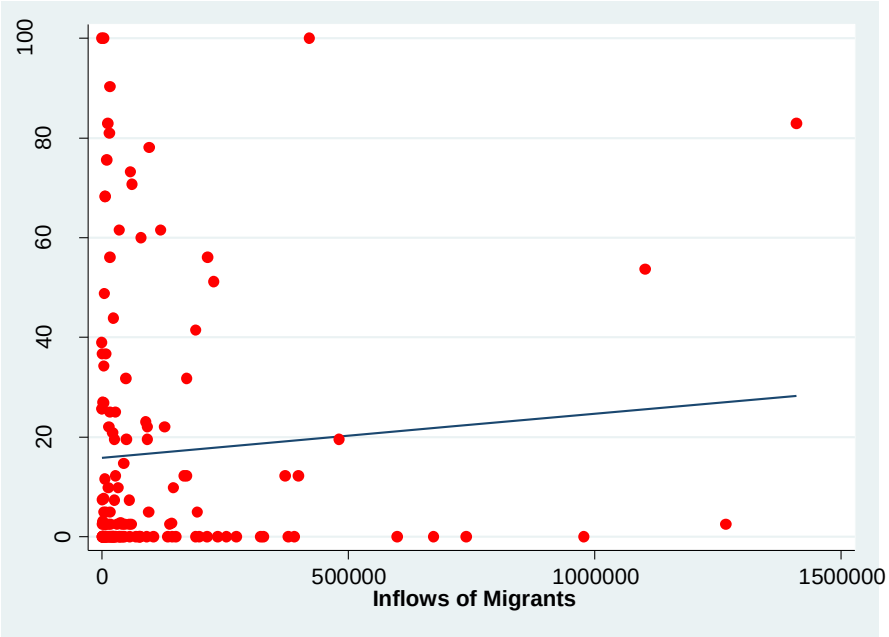
- Focus on civil conflicts only

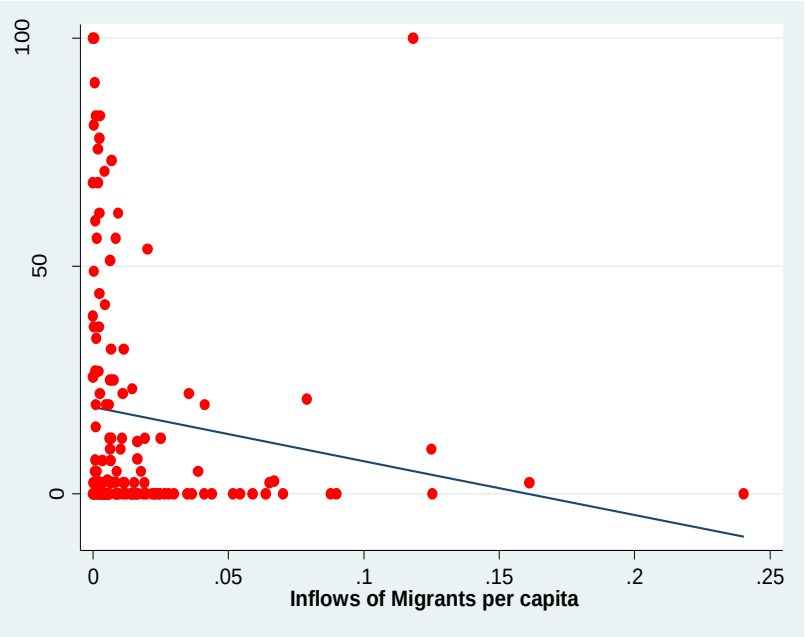
Geography data are taken from CEPII

Linguistic trees: Ethnologue project

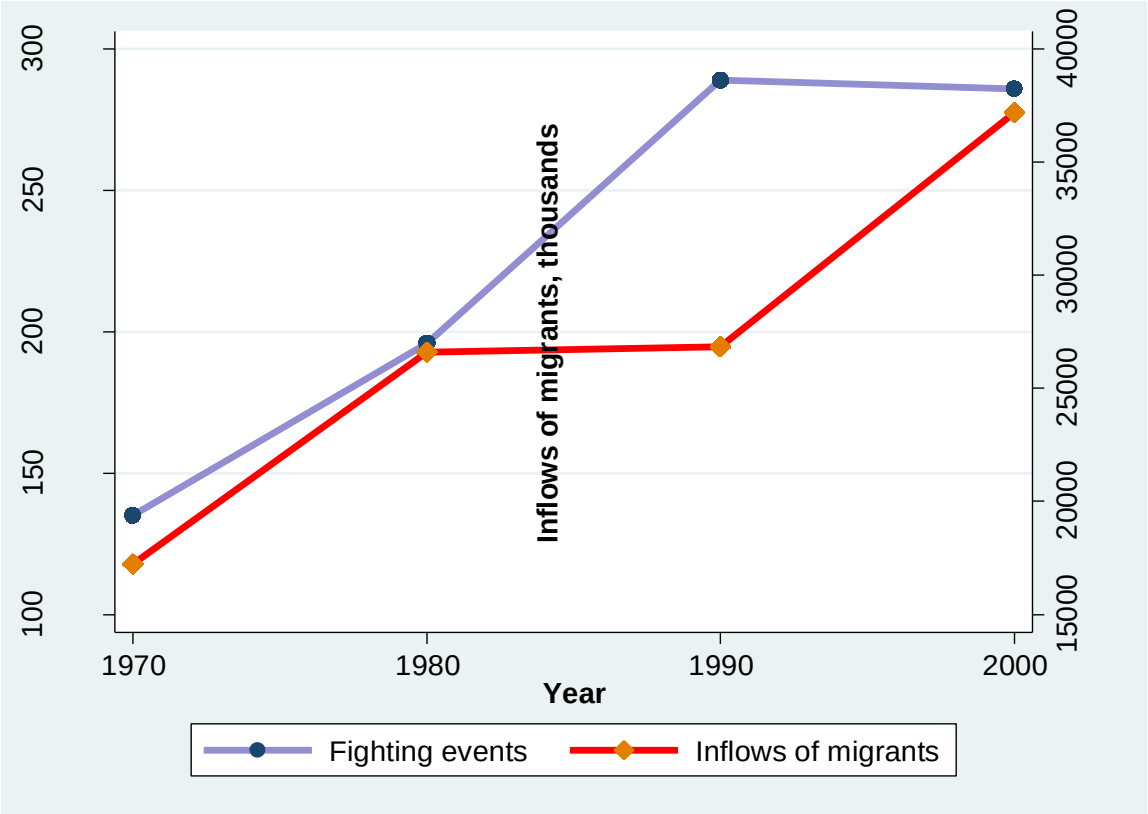
Part 1 Conflicts in Receiving Countries

Data


100
80
60
40
20
0
0
500000
1000000
1500000
Inflows of Migrants


100
50
0
0
.05
.1
.15
.2
.25
Inflows of Migrants per capita

Data


100
150
200
250
300
15000
20000
25000
30000
35000
40000
Inflows of migrants, thousands
1970
1980
1990
2000
Year
Fighting events
Inflows of migrants

Climate Induced Migration on Civil Conflicts in Receiving countries (Incidence)

	Incidence of civil conflicts			
	Total Migrants		Migrants per capita	
Ln(Inflows of Migrants)	0.068	-0.014	0.063	-0.011
	[0.045]	[0.055]	[0.041]	[0.056]
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Fixed effects	Yes	Yes	Yes	Yes
Country Fixed effects	No	Yes	No	Yes
Observations	390	389	390	389
Number of clusters	113	113	113	113
First Stage F-test	9.546	12.22	10.98	12.47

No evidence that climate-induced migration influences the incidence of civil conflicts in destination countries …

Climate Induced Migration on Civil Conflicts in Receiving countries (Onset)

	Onset of civil conflicts			
	Total Migrants		Migrants per capita	
Ln(Inflows of Migrants)	0.024	0.017	0.024	0.024
	[0.050]	[0.069]	[0.046]	[0.071]
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Fixed effects	Yes	Yes	Yes	Yes
Country Fixed effects	No	Yes	No	Yes
Observations	390	389	390	389
First Stage F-test	9.546	12.22	10.98	12.47

……nor the onset

Climate Induced Migration on Civil Conflicts in Receiving countries

Ethnic tension is a channel through which migration might cause conflicts

- We compute the Greenberg Index (1956) applied to the immigrant population and employ a measure of bilateral distance between each group of immigrants and the natives
- We use linguistic as the metric of distance
- We run a weighted regression, and use this index as weight

Considering Ethnic Distance: Climate Induced Migration on Civil Conflicts in Receiving countries (Incidence)

	Incidence of civil conflicts			
	Total Migrants		Migrants per capita	
Ln(Inflows of Migrants)	0.152**	0.107	0.131**	0.095
	[0.062]	[0.085]	[0.053]	[0.082]
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Fixed effects	Yes	Yes	Yes	Yes
Country Fixed effects	No	Yes	No	Yes
Observations	390	389	390	389
R-squared	0.561	0.190	0.578	0.194
First Stage F-test	9.254	7.179	11.32	7.570

Mild evidence in destination countries where the migration population has a larger linguistic distance with respect to natives

Civil Conflict Onset: weighted regression. 2SLS

	Onset of civil conflicts			
	Total Migrants		Migrants per capita	
Ln(Inflows of Migrants)	0.127*	0.089	0.111*	0.095
	[0.066]	[0.091]	[0.059]	[0.090]
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Fixed effects	Yes	Yes	Yes	Yes
Country Fixed effects	No	Yes	No	Yes
Observations	390	389	390	389
R-squared	0.351	0.205	0.364	0.205
First Stage F-test	9.254	7.179	11.32	7.570

Part 2 Conflicts in (not) Sending Countries

Gravity model. PPML

	Migration flows from origin c to destination j	
Temperature*middle income dummy	1.087***	0.786***
	(0.381)	(0.172)
Precipitation*middle income dummy	-0.012	-0.062
	(0.040)	(0.038)
Temperature*low income dummy	-0.034	0.424
	(0.533)	(0.380)
Precipitation*low income dummy	-0.116	0.033
	(0.086)	(0.050)
Temperature*OECD dummy	-1.126	0.463
	(0.724)	(0.955)
Precipitation*OECD dummy	0.368	-0.400*
	(0.229)	(0.238)
Geography bilateral controls	Yes	Yes
Decade fixed effects	Yes	Yes
Country of origin fixed effect	Yes	Yes
Country of destination*time fixed effect	Yes	Yes
Country of origin*time trend	Yes	No
Country of origin*time trend squared	Yes	No
Country of destination fixed effect	No	Yes

Climate-induced lack of emigration

What if we compute the missed flows of migrants in low income countries that are due to climate change as the difference between the actual measured emigration rates and what would be predicted if we used the middle income country model?

predicted

$$\Psi_{cjt} = \begin{cases} \beta_1 T_{ct}^R + & \delta_1 R_{ct}^R \\ \beta_2 T_{ct}^M + & \delta_2 R_{ct}^M \\ \beta_3 T_{ct}^P + & \delta_3 R_{ct}^P \end{cases}$$

counterfactual

$$\tilde{\Psi}_{cjt}^P = \beta_2 T_{ct}^P + \delta_2 R_{ct}^P$$

“Missed emigration flows” on incidence of civil conflict in low-income countries

	Incidence of Civil Conflict			
	Total Missed		Missed per capita	
Ln(Missed Migrants)	1.873	0.831	1.256**	1.742*
	[1.569]	[8.344]	[0.570]	[1.000]
Country Fixed effects	No	Yes	No	Yes
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Dummies	Yes	Yes	Yes	Yes
Observations	102	102	102	102
R-squared	0.568	0.337	0.571	0.377

“Missed flows” on onset of civil conflict: poor origin countries

	Onset of Civil Conflict			
	Total Missed		Missed per capita	
Ln(Missed Migrants)	0.674	2.367	1.076	2.080
	[1.790]	[9.729]	[0.920]	[1.423]
Decade X Region Fixed effects	yes	yes	yes	yes
Country Fixed effects	yes	yes	yes	yes
Decade Dummies	yes	yes	yes	yes
Observations	102	102	102	102
R-squared	0.353	0.238	0.369	0.283

Placebo test: Incidence in middle income countri

	Incidence of Civil Conflict			
	Climate Migrants		Climate Migrants per capita	
Ln(Climate Migrants)	-0.039	-0.420	-0.050	-1.127*
	[0.221]	[2.414]	[0.169]	[0.580]
Country Fixed effects	No	Yes	No	Yes
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Dummies	Yes	Yes	Yes	Yes
Observations	248	255	248	255
R-squared	0.500	0.129	0.500	0.144

Placebo test: Onset in middle income countries

	Incidence of Civil Conflict			
	Climate Migrants		Climate Migrants per capita	
Ln(Climate Migrants)	0.138	-1.879	0.149	-0.406
	[0.154]	[2.547]	[0.161]	[0.648]
Country Fixed effects	No	Yes	No	Yes
Decade X Region Fixed effects	Yes	Yes	Yes	Yes
Decade Dummies	Yes	Yes	Yes	Yes
Observations	248	255	248	255
R-squared	0.315	0.138	0.316	0.137

Conclusions and Future research

- Emigration represents an important opportunity to increase economic well-being and facilitate adaptation to the detrimental consequence of climate change
- Emigration should be facilitated through the removal of barriers that hinder this investment rather than constrain it
- We may draw different conclusions if:
  - consider migration induced by fast-onset events rather than by gradual changes in temperature and precipitation
  - consider inter-state conflicts between origin and destination of migration flows rather than civil conflicts in destination countries
  - Immigration flows are ethnically very diverse from receiving countries

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Summary Statistics

Variable	Obs	Mean	Std. Dev.
Incidence of conflict	398	0.33	0.47
Onset of conflict	398	0.25	0.43
Inflows of migrants	398	257’492.2	872108.6
Immigration rate	398	0.030	0.154
GDP per capita	398	7890.66	9009.127
Population	398	36’800’000	123’000’000
Number of years of peace	398	13.194	11.073
Democratic country dummy	398	0.477	0.500
Oil Exporter dummy	398	0.168	0.375
New State dummy	398	0.141	0.348
Non-contiguity dummy	398	0.198	0.399
Missed flows	102	5980.484	835.7849
Missed flows per capita	102	0.002	0.003