The Role of Global Climate Change in Structural Transformation of Sub-Saharan Africa

Case Study of Senegal

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Main takeaways

Problem:

- non-conventional structural transformation of Sub-Saharan African (SSA) countries (rural-urban migration without industrialization)

Question:

- the role of Global Climate Change (GCC) in deagrarianization and structural transformation of SSA (based on the case study of Senegal)

Methods:

- a combination of *biophysical* and *economic* models

Key results:

- GCC can affect Senegal's economic structure and increase existing regional imbalances
- the most developed and least affected capital Dakar will attract a deagrarianized labor force from all provinces
- although 'Dakarization' allows alleviating GCC negative consequences, the non-controlled rural-urban migration might have long-term negative repercussions
- problem: services' partaking in the absorption of the former agricultural labor force ('premature deindustrialization' argument by Rodrik, 2015);

Policy recommendation:

- consider measures to canalize the deagrarianized labor force away from services towards industrial sectors

Main data: 2015 regionalized Social Accounting Matrix of Senegal

Figure: 14 administrative regions

SAM Region	Total	of which				
		crops	oagr	agpr	manu	serv
r1 (Dakar)	55.3	0.7	0.4	8.7	12.4	63.9
r2 (Thies_Diourbel)	17.2	5.5	5.1	10.2	11.1	54.0
r3 (Northern)	10.1	21.0	18.6	16.6	4.9	23.1
r4 (Central)	9.1	38.5	20.5	5.3	2.9	26.1
r5 (Southern)	8.3	27.8	16.2	8.2	2.8	35.9

Table: GDP, % (Randriamamonjy and Thurlow 2019)

r3 (Northern): Saint-Louis & Matam;
r4 (Central): Louga, Kaolack, Fatick & Kaffrine;
r5 (Southern): others

The biophysical model (Calzadilla et al. 2013; Robinson et al. 2015) provides **GCC scenarios**

Table: Senegal IMPACT GCC scenarios (total % change over 2015-50)

Scenario	Agricultural productivity					Prices (world)	
	Dakar	Thi_Dio	Center	North	South	crops	oagr
No GCC	0.00	0.00	0.00	0.00	0.00	17.66	11.29
GFDL	-15.01	-15.01	-11.59	-4.56	-4.84	28.31	11.94
IPSI	-23.60	-23.60	-28.37	-14.41	-17.32	30.03	12.42
HADGEM	-31.15	-31.15	-34.64	-15.81	-10.71	31.28	12.39

Note: No GCC = no-global-climate-change scenario
Earth System Models:
GFDL = Geophysical Fluid Dynamics Laboratory Climate Model;
IPSL = Institut Pierre Simon Laplace Earth System Model;
HADGEM = Hadley Centre Global Environment Model.

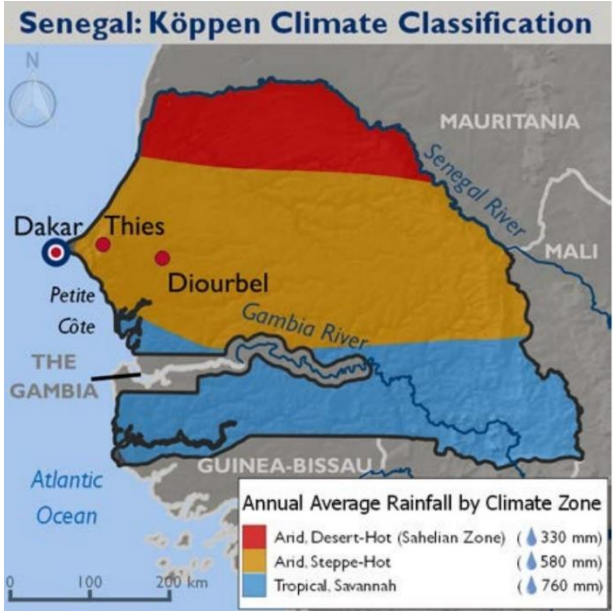
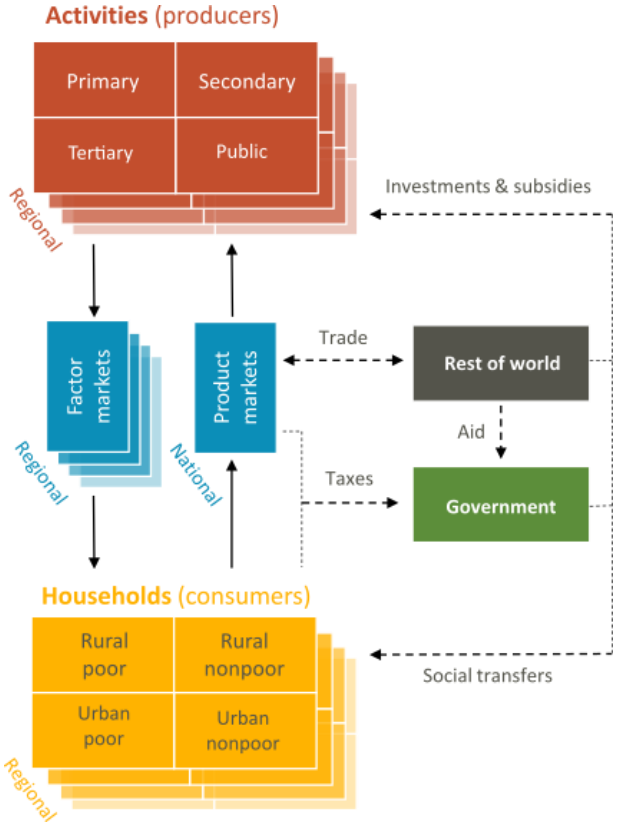


Figure: Climate zones (USAID 2017)

Country-level CGE (Löfgren et al. 2002; Diao and Thurlow 2012) uses GCC scenarios as inputs

- Economic linkages
  - between sectors/activities, households, (regions), government & rest of world
- Resource competition
  - factor markets (land, labor, capital);
  - product markets (supply, demand)
- Macro consistency
  - Government (revenues, spending);
  - Savings-investment;
  - Current account (foreign exchange);



Simulation results

- although having an overall moderate impact, GCC can significantly affect a country's economic structure and increase existing regional imbalances
  - the most developed and least affected Dakar will attract a deagrarianized labor force from the provinces
- although 'Dakarization' of the country allows alleviating negative consequences of GGC, the non-controlled policy might have long-term negative repercussions
  - problem: services' partaking in the absorption of the former agricultural labor force ('premature deindustrialization' argument by Rodrik, 2015)
- measures that reduce services' demand for unskilled labor can be considered a potential solution to canalize the deagrarianized labor force towards industrial sectors.

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