Can Paris deal boost SDGs achievement?

An assessment of climate-sustainability co-benefits or side-effects

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Motivation

- 21th UNFCCC Conference Of Parties (COP 21) aims to reach a binding global climate agreement grounded on the Nationally Determined Contributions (NDCs)

- Sustainable Development Goals (SDGs) adopted in September 2015 by United Nations aim to shape the pathway towards an inclusive green growth

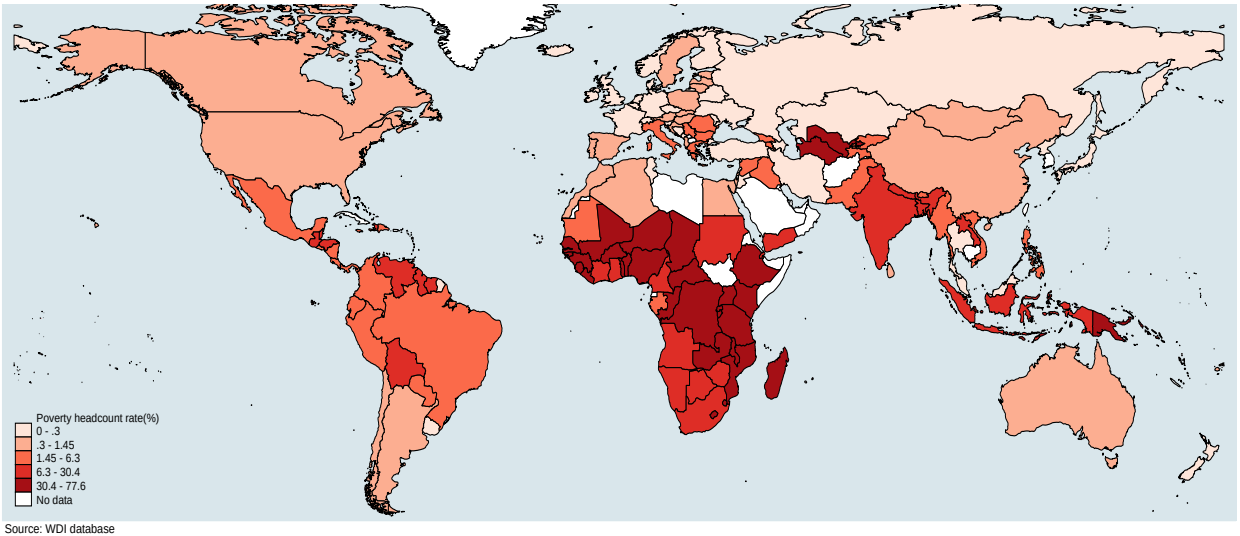
- How COP21 outcome will affect the path towards achieving SDGs?

- Focus on extreme poverty and inequality indicators which are the core of SDG1 and SDG10

- The chosen approach couples an empirical analysis with a CGE model

SDG 1 and SDG 10: current situation

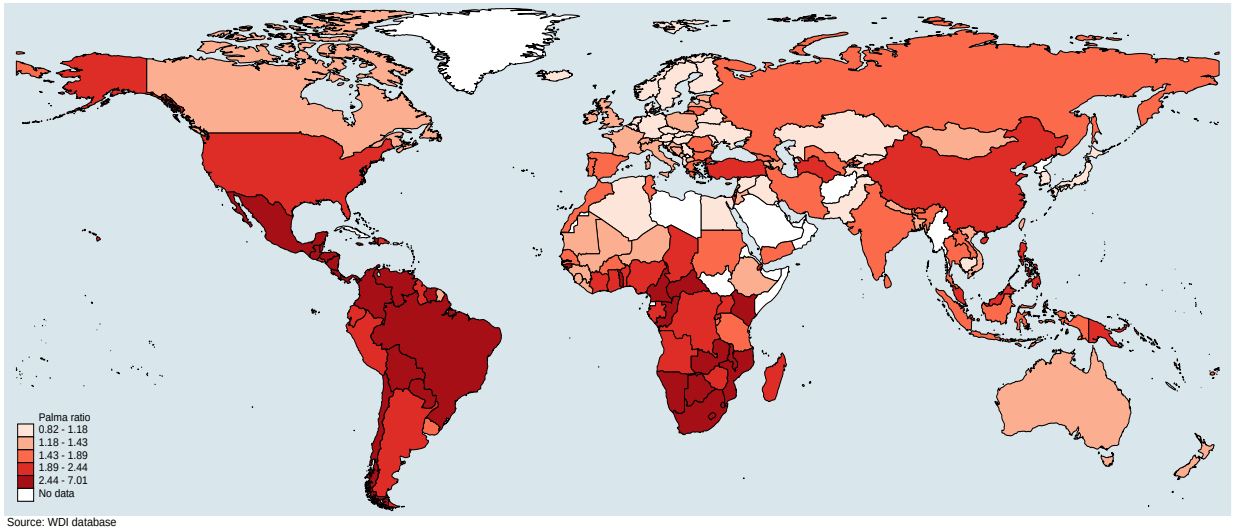
Poverty headcount rate at $1.25 a day (PPP) (%)



Source: WDI database

736 million people live with less than $1.90 a day (UN, 2018)

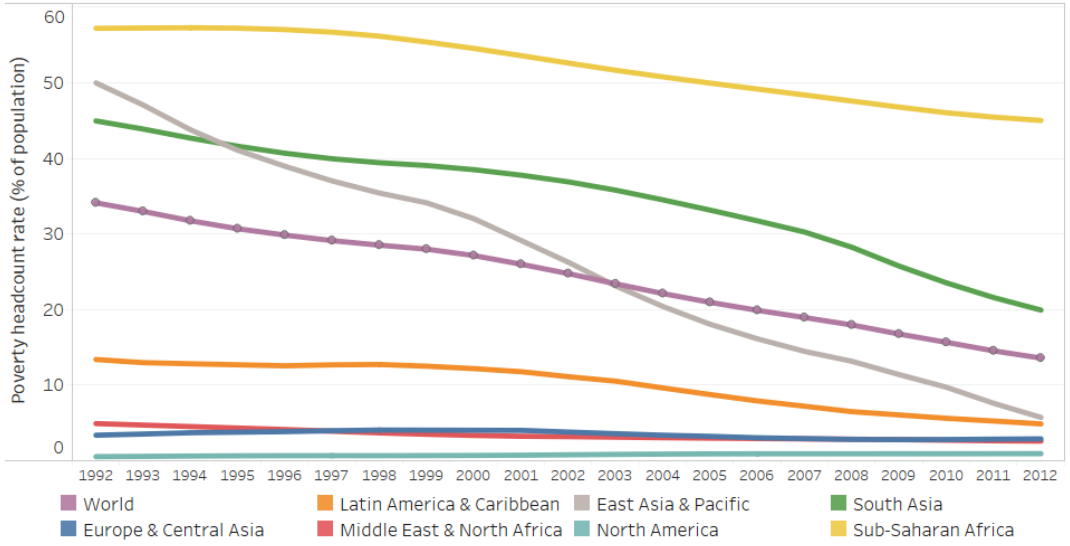
Palma ratio



Source: WDI database

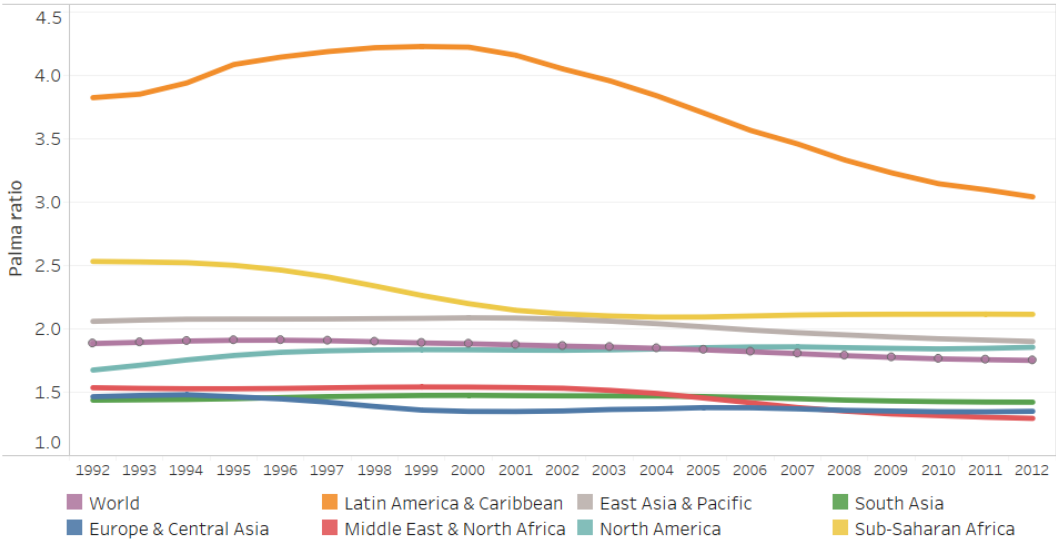
At world level, the income of richest 10% of population is 1.7 times that of poorest 40% of population

Past trend of poverty and inequality 1990-2014 (WDI, WB)



Between 1990 and 2014, around 960 million people moved outside of extreme poverty (-53%)

At global level, the Palma ratio average slightly decreases from 1.9 in 1990 to 1.7 in 2014



Evidences on poverty determinants

- **Empirical literature** from a cross-country perspective highlights as main drivers:
  - ✓ The growth of average income per capita (Ravallion and Chen, 1997)
  - ✓ The distributional change (Ravallion, 1997, 2001; Heltberg, 2002; Bourguignon, 2007)
  - ➢ Growth elasticity of poverty and inequality elasticity of poverty

- **Country-specific empirical analyses** consider as drivers:
  - ✓ Sectoral growth patterns (Ferreira et al., 2007; Montalvo and Ravallion, 2010)

- **CGE modelling literature:**
  - ✓ Micro-simulation approach
  - ✓ Multi-household approach

Evidences on inequality determinants

- **Empirical cross-country studies**:
  - ✓ differential in labor productivity between agricultural and non-agricultural sectors (Bourguignon and Morrison, 1998)
  - ✓ sectoral wage differentials between skilled and un-skilled labor (Bourguignon et al., 2005)
  - ✓ globalization, education attainments and policy (Alvaredo and Gasparini, 2015)

- **CGE modelling perspective:**
  - Multi-Household approach
  - Usually assumed constant

Predicting inequality and poverty

- The considered period spans from 1990 to 2014 (WDI database, WB)
- 2 independent panel regressions using country fixed effect model with robust and panel-corrected standard errors

Inequality determinants

	$\mathrm{Ln}(Palma_{i,t})$
$\ln(PEduExp\_pc_{i,t-1})$	-0.1428***
	(0.004)
$\ln(AgriVA\_sh_{i,t-1})$	-0.1844***
	(0.001)
$\ln(hIndVA\_sh_{i,t-1})$	-0.0932**
	(0.024)
$Corrupt\_cntr_{i,t}$	-0.0914**
	(0.032)
$Unempl_{i,t-1}$	0.0062*
	(0.087)
$d\_c\_i_{i,t}$	0.0213
	(0.408)
t	0.0116***
	(0.000)
Constant	-21.5724***
	(0.000)
Observations	700
R-squared	0.308
Number of country	122

Robust p value in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Country and year fixed-effects omitted

Poverty determinants

	$\ln(\mathrm{POV}_{i,t})$
$\ln(GDPPPPpc_{i,t-1})$	-3.1371***
	(0.000)
$Palma_{i,t-1}$	0.1286**
	(0.014)
Constant	28.0526***
	(0.000)
Observations	975
Number of country	130
R^2	0.842

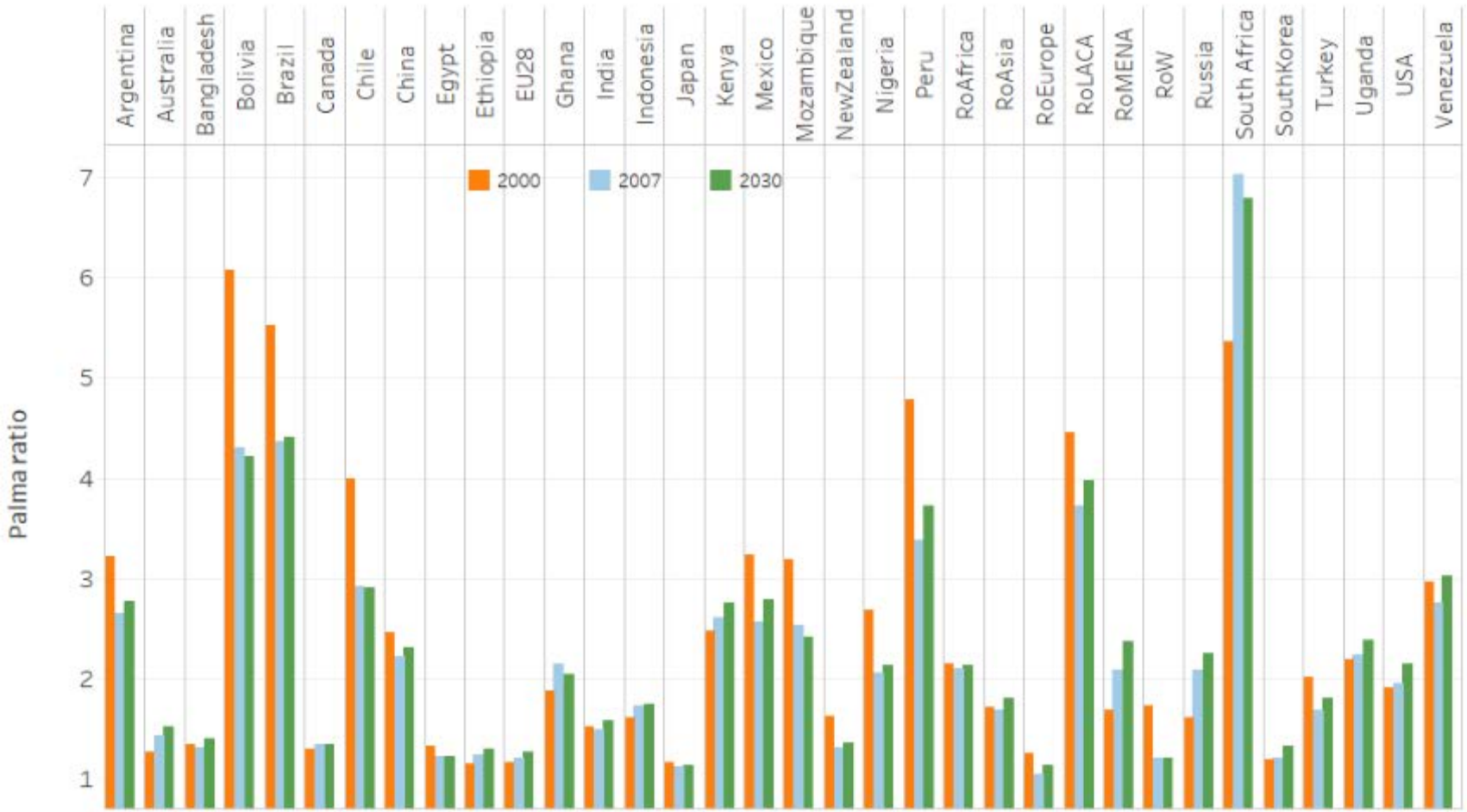
Robust p value in parentheses

*** p<0.01, ** p<0.05, * p<0.1

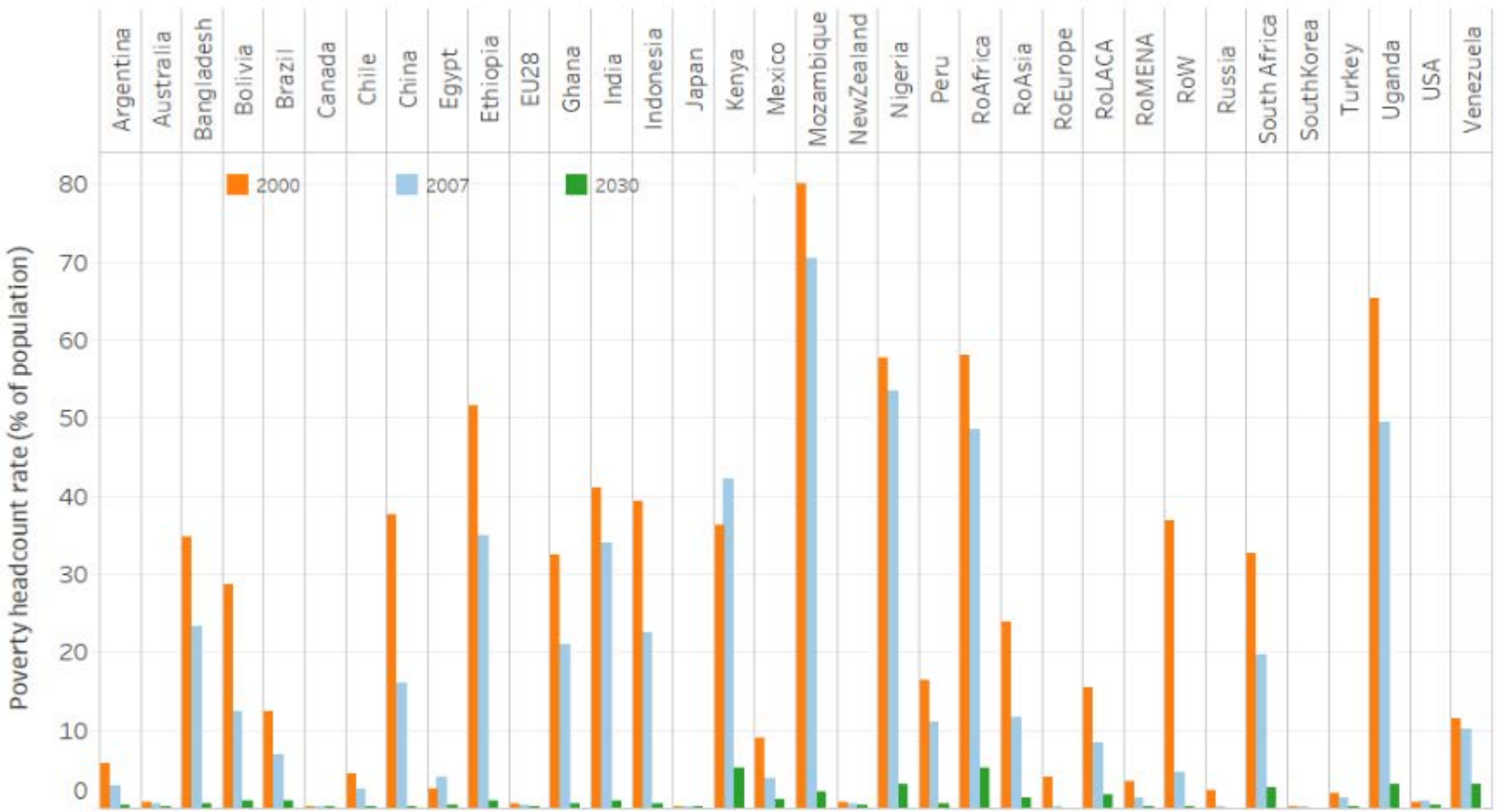
ICES model and baseline scenario

- The ICES model (Eboli *et al.*, 2010) is a recursive-dynamic General Equilibrium model, relying upon the GTAP-E structure (Burniaux and Troung, 2002)
- Medium term analysis: 2007-2030
- Scenario SSP2: medium population growth and medium GDP growth
- 45 countries and 22 sectors considered
- Poverty and inequality assessment stems from out of sample estimations using coefficient previously computed and changes of endogenous variables of ICES model

Inequality change in the baseline scenario (2000, 2007, 2030)



Poverty change in the baseline scenario (2000, 2007, 2030)



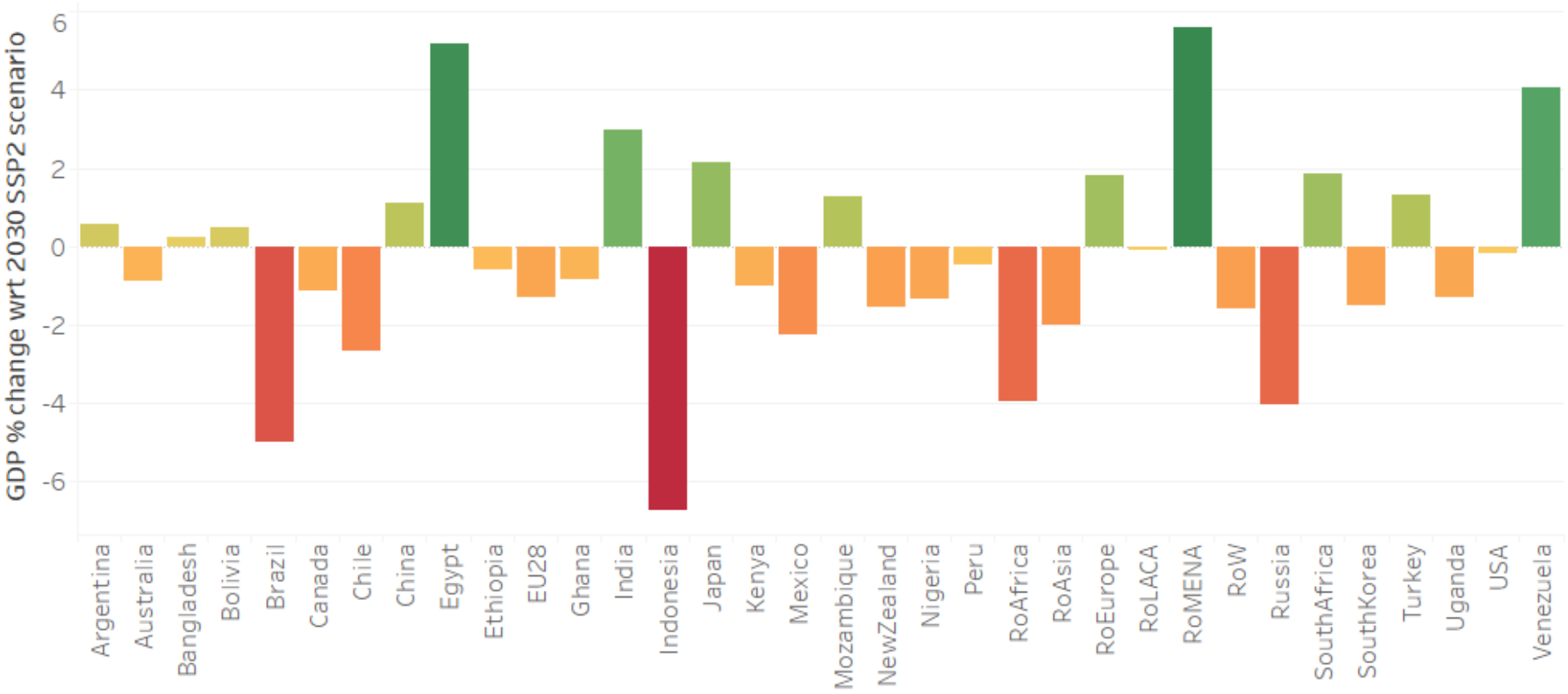
- 30% reduction of poverty prevalence between 2000 and 2007
- 1 bl people get out extreme poverty in 2030 compared to 2007

Climate policy scenarios

- **MPOLICY scenario**: considering the **NDCs** as binding targets:
  - EU28 achieves its target through an Emission Trading Scheme (EU-ETS)
  - The other countries impose a carbon tax
  - Internal recycling of the revenues

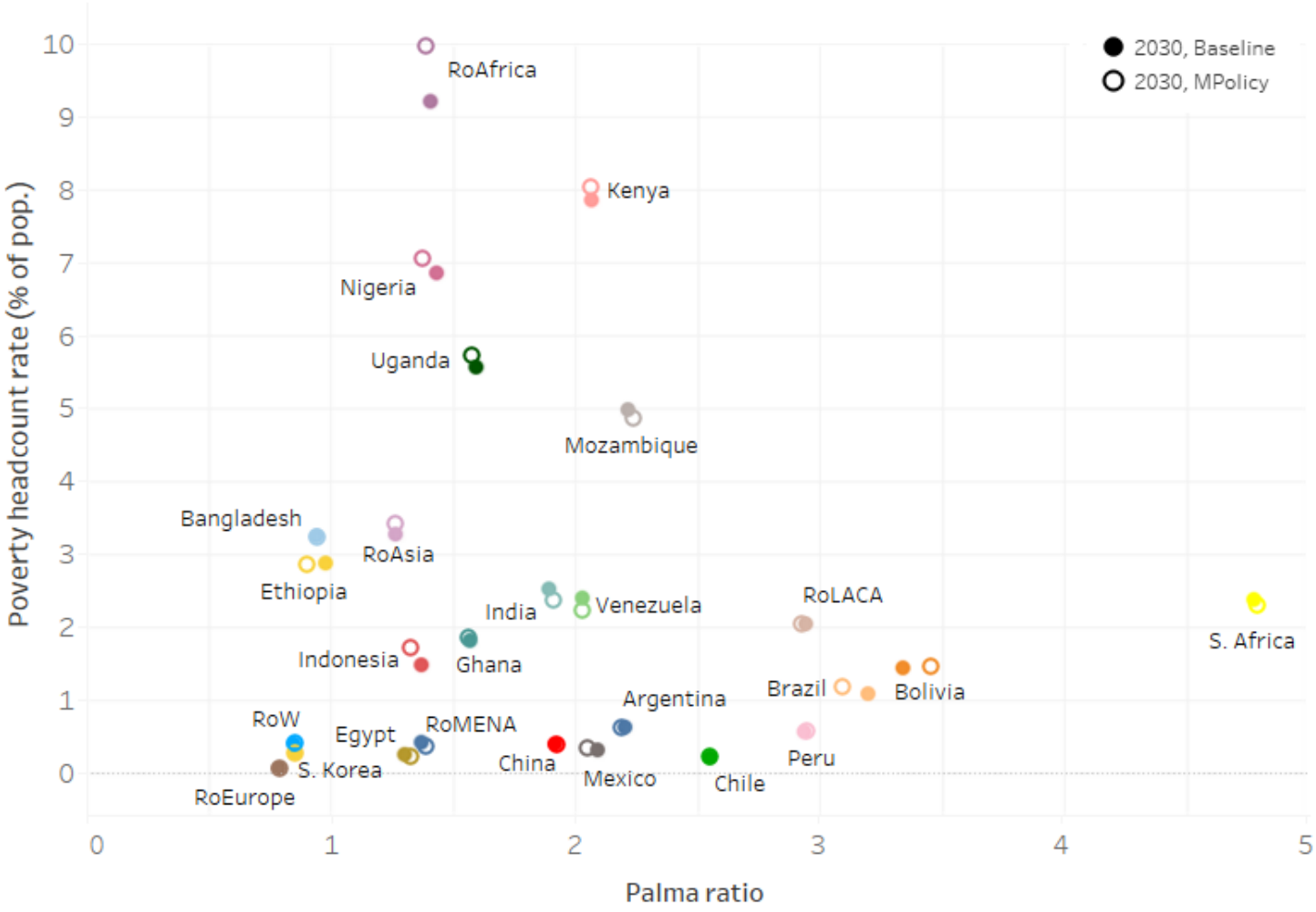
- **MPOLICY+CGF scenario:**
  - Carbon revenues flow to an International Green Climate Fund (GCF) that reaches 50 billion in 2020 and then remains constant
  - Money are transferred to developing countries in Asia, Latina America, Middle East and Africa proportionally to their population share
  - The transfer from the Fund is used to subsidise Clean Electricity and Research&Development (R&D)

Mitigation policy costs in 2030



- GHG emissions reduce of 13% with respect to the 2030 baseline scenario
- Some countries experience GDP gains as a consequence of absent or loose NDC mitigation targets

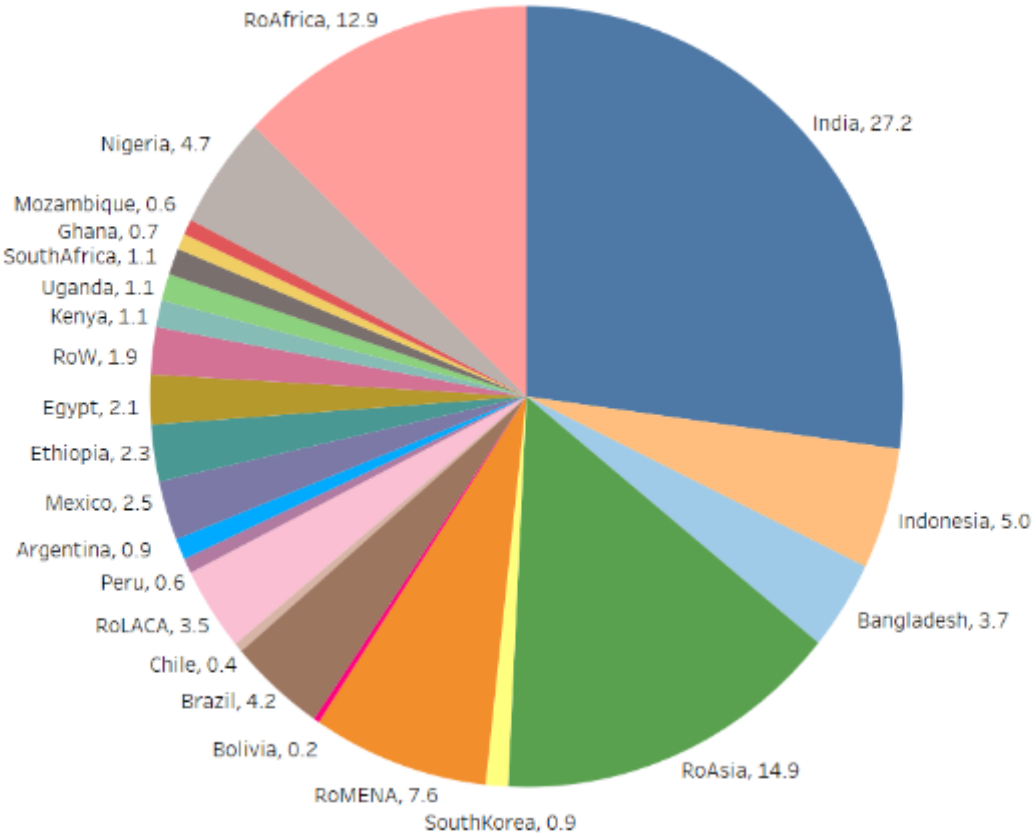
Effect of mitigation scenario on poverty and inequality



- Countries with stringent mitigation contributions show a small reduction of inequality, but overall poverty prevalence increases (4.3%)

Green Climate Fund (GCF)

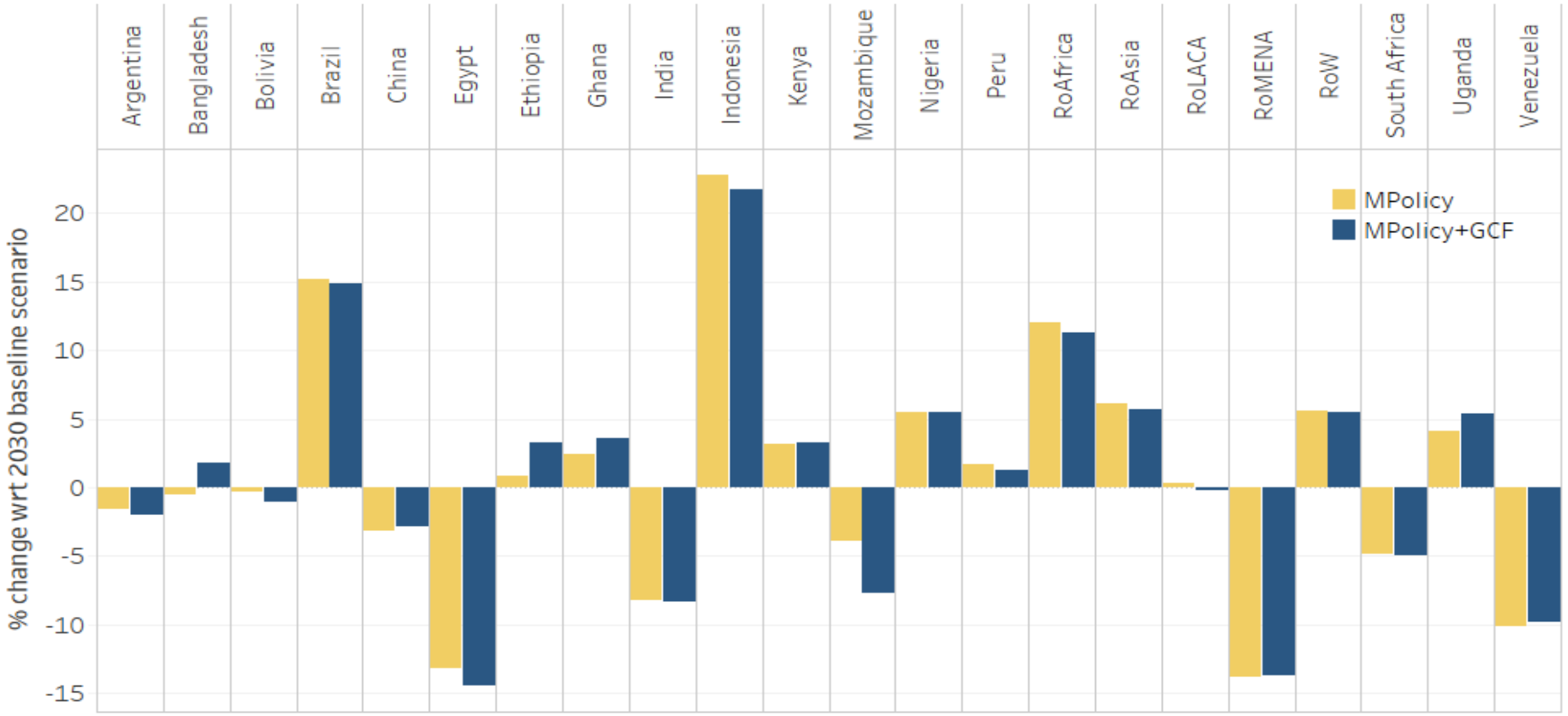
- The Green Climate Fund reaches 50 bln$ in 2020 and then remain constant
- EU28 revenues account for 41% of the total amount, and United States for 28%.



Effect of GCF on inequality

- Transfers from Green Climate Fund determine a small drop of inequality with respect to MPOLICY scenario
- The results are heterogeneous and unrelated to the share of funds received, but to the magnitude of the funds with respect to the country's economy.

Effect of GCF on poverty prevalence



- With the Green Climate Fund poverty slightly reduces (-197 thousand poor people) compared to the MPOLICY scenario
- Benefits of mitigation policies (reduction of climate change impacts) are not considered

Conclusions

- Linking empirically SDGs indicators to a CGE model allows assessing future trend of these indicators under different scenarios and policy interventions
- Considering the INDCs as binding targets, COP21 agreement will determine:
  - ✓ a positive effect on inequality reduction the more ambitious is the climate mitigation commitment (synergies between climate policy and inequality)
  - ✓ a slight increase of extreme poverty prevalence in the LDCs
- Recycling carbon revenues with the creation of a Green Climate Fund slightly reduces poverty prevalence compared to the mitigation scenario, but poverty remains always above baseline level
  - ✓ we are only considering the costs of mitigation policy and not the benefits (lower climate change impacts)
  - ✓ The Green Climate Fund has to be coupled and can not replace a Development Fund aiming to achieve SDGs by 2030

Thanks

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Climate policy: INDCs

Country	Target (%)	Target type	Country	Target (%)	Target type
Australia	-27	Emission reduction wrt 2005	**Venezuela**	-20	Emission reduction wrt 2030 BAU scenario
New Zealand	-30	Emission reduction wrt 2005	**Rest of Latin America (RoLACA)**	-20	Average mission reduction wrt 2030 BAU scenario
Japan	-26	Emission reduction wrt 2013	**EU28**	-40	Emission reduction wrt 1990
South Korea	-37	Emission reduction wrt 2030 BAU scenario	**Rest of Europe (RoEurope)**	-17	Average mission reduction wrt 2030 BAU scenario
Bangladesh	-15	Emission reduction wrt 2030 BAU scenario	**Russia**	-27.5	Emission reduction wrt 1990
China	-62.5	Emission intensity reduction wrt 2005	**Turkey**	-21	Emission reduction wrt 2030 BAU scenario
India	-34	Emission intensity reduction wrt 2005	**Rest of MENA (RoMENA)**	-9	Average mission reduction wrt 2030 BAU scenario
Indonesia	-41	Emission reduction wrt 2030 BAU scenario	**Ethiopia**	-64	Emission reduction wrt 2030 BAU scenario
Rest of Asia (RoAsia)	-25	Average mission reduction wrt 2030 BAU scenario	**Ghana**	-45	Emission reduction wrt 2030 BAU scenario
Canada	-30	Emission reduction wrt 2005	**Kenya**	-30	Emission reduction wrt 2030 BAU scenario
USA	-27	Emission reduction wrt 2005	**Mozambique**	-8	Emission reduction computed from target emission levels in 2030
Mexico	-36	Emission reduction wrt 2030 BAU scenario	**Nigeria**	-45	Emission reduction wrt 2030 BAU scenario
Argentina	-30	Emission reduction wrt 2030 BAU scenario	**Uganda**	-22	Emission reduction wrt 2030 BAU scenario
Brazil	-37	Emission reduction wrt 2005	**South Africa**	-22	Emission level target in 2030 is in the range 398 and 614 Mt CO2–eq
Chile	-40	Emission intensity reduction wrt 2007	**Rest of Africa (RoAfrica)**	-33	Average mission reduction wrt 2030 BAU scenario
Peru	-30	Emission reduction wrt 2030 BAU scenario	**Rest of the World (RoW)**	-36	Average mission reduction wrt 2030 BAU scenario

Stringency of the mitigation targets