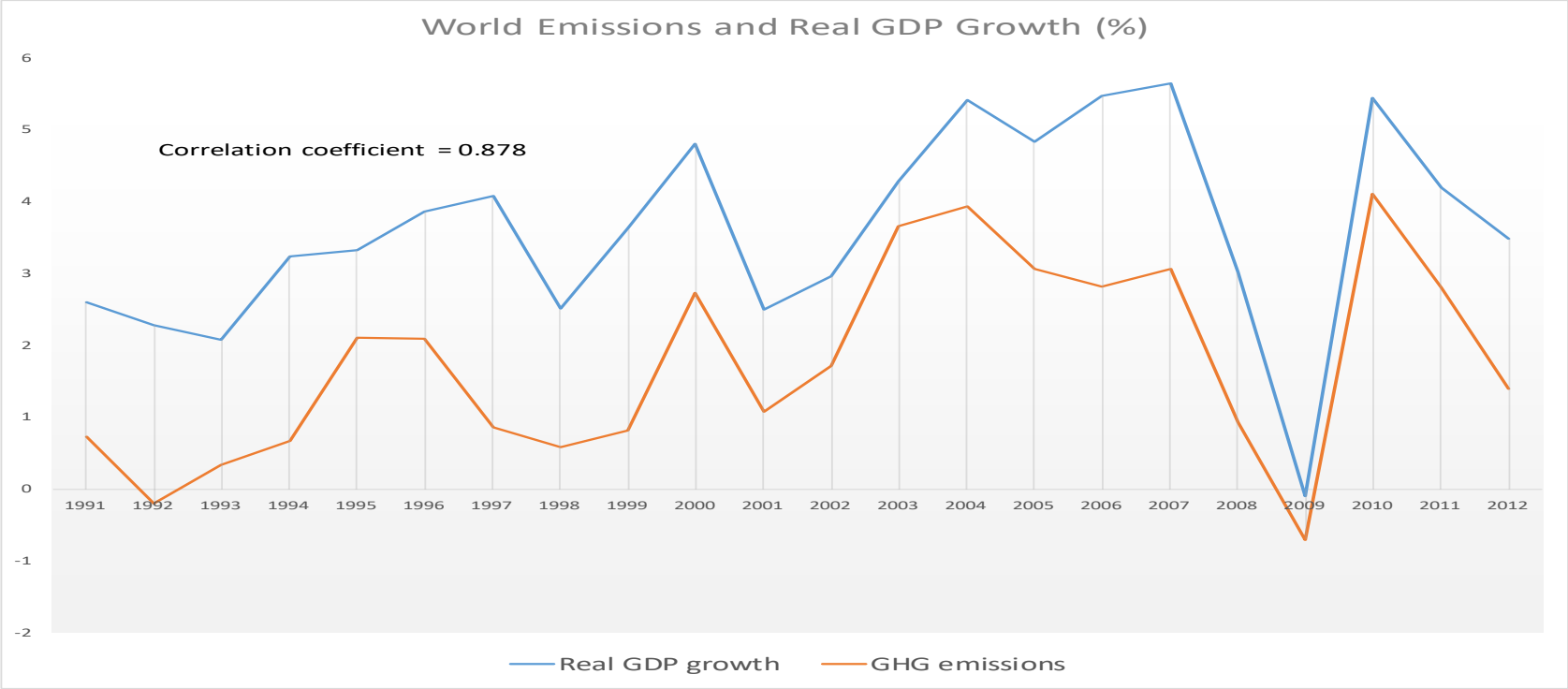
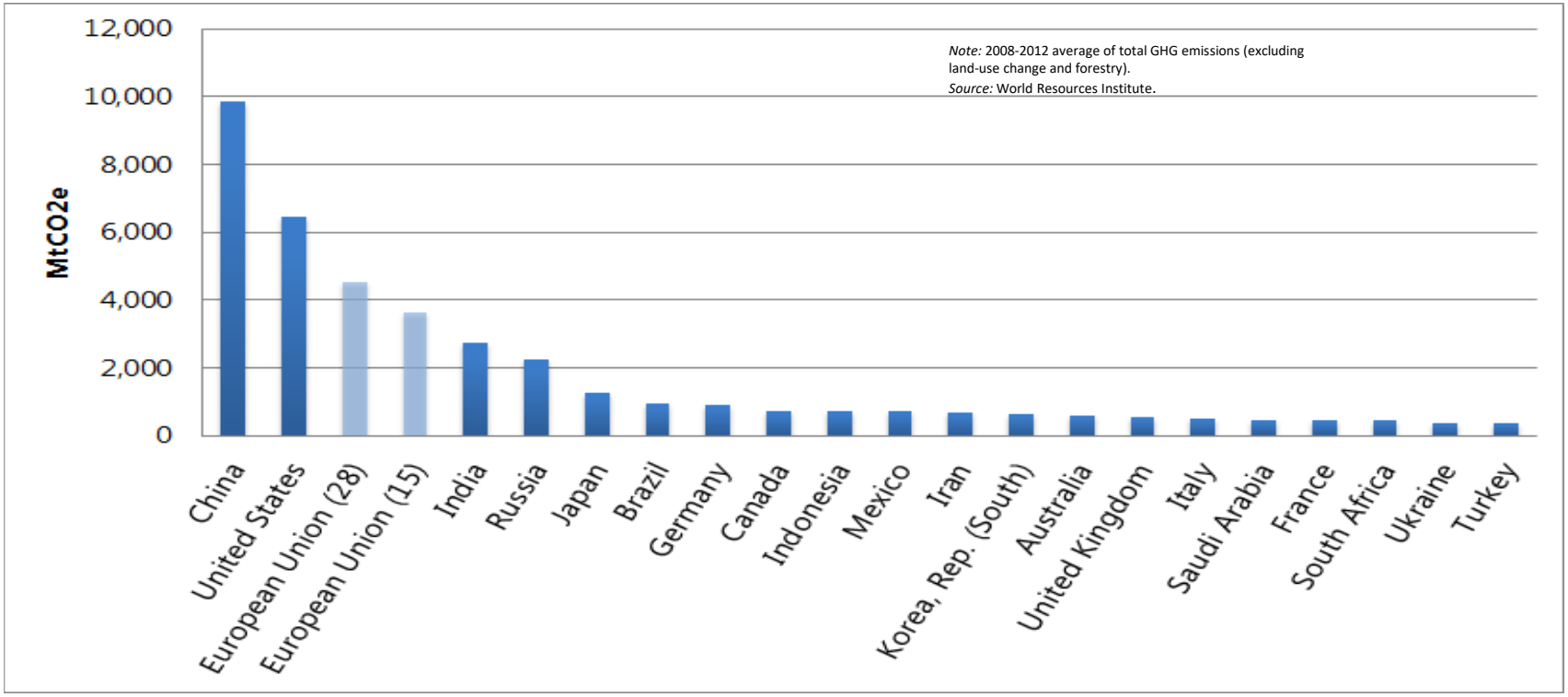
DECOUPLING OF EMISSIONS AND GROWTH

Feb. 13, 2019

Where's the decoupling?

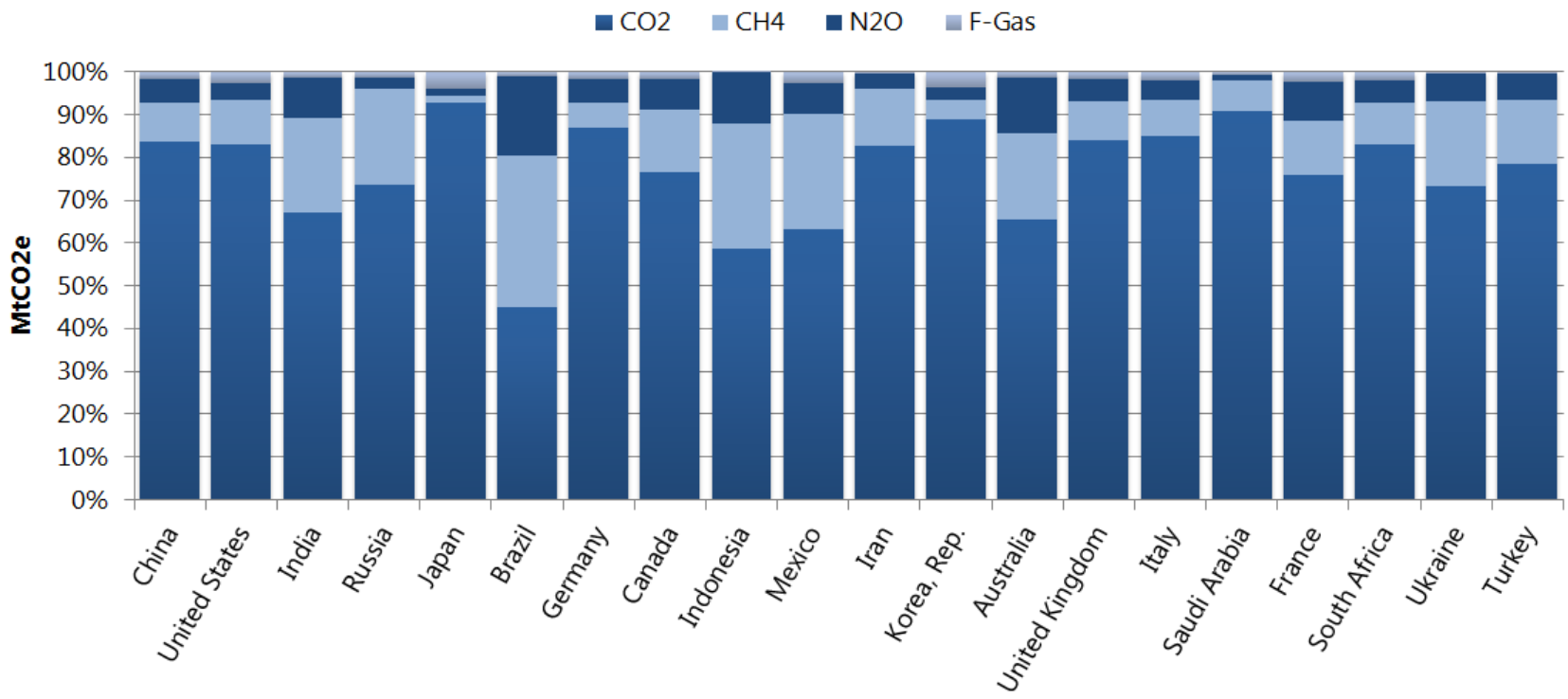


Top 20 world emitters



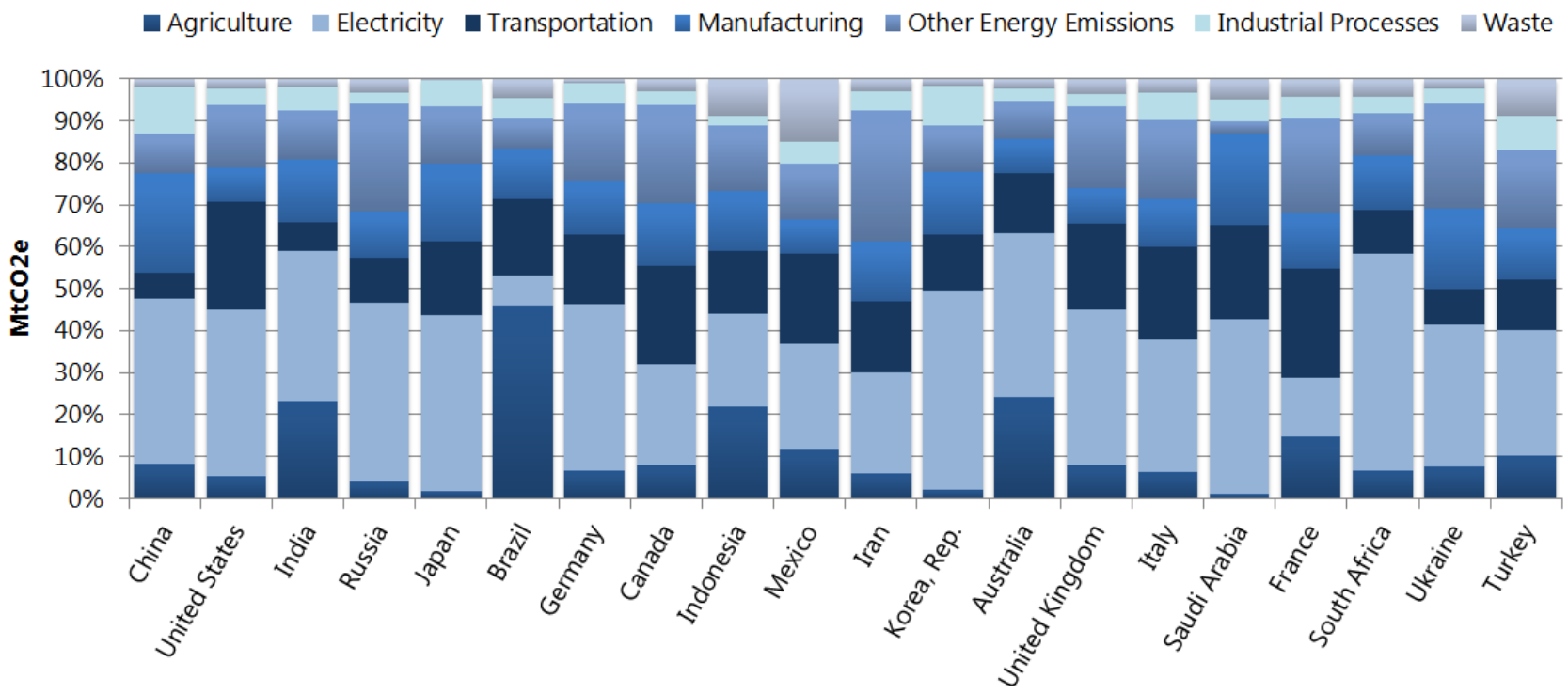
- The 20 largest GHG emitters contribute 74% of world emissions and account for 63% of the world's population and 77% of world's GDP.

Most emissions are in the form of carbon dioxide (CO_2) and methane (CH_4)…



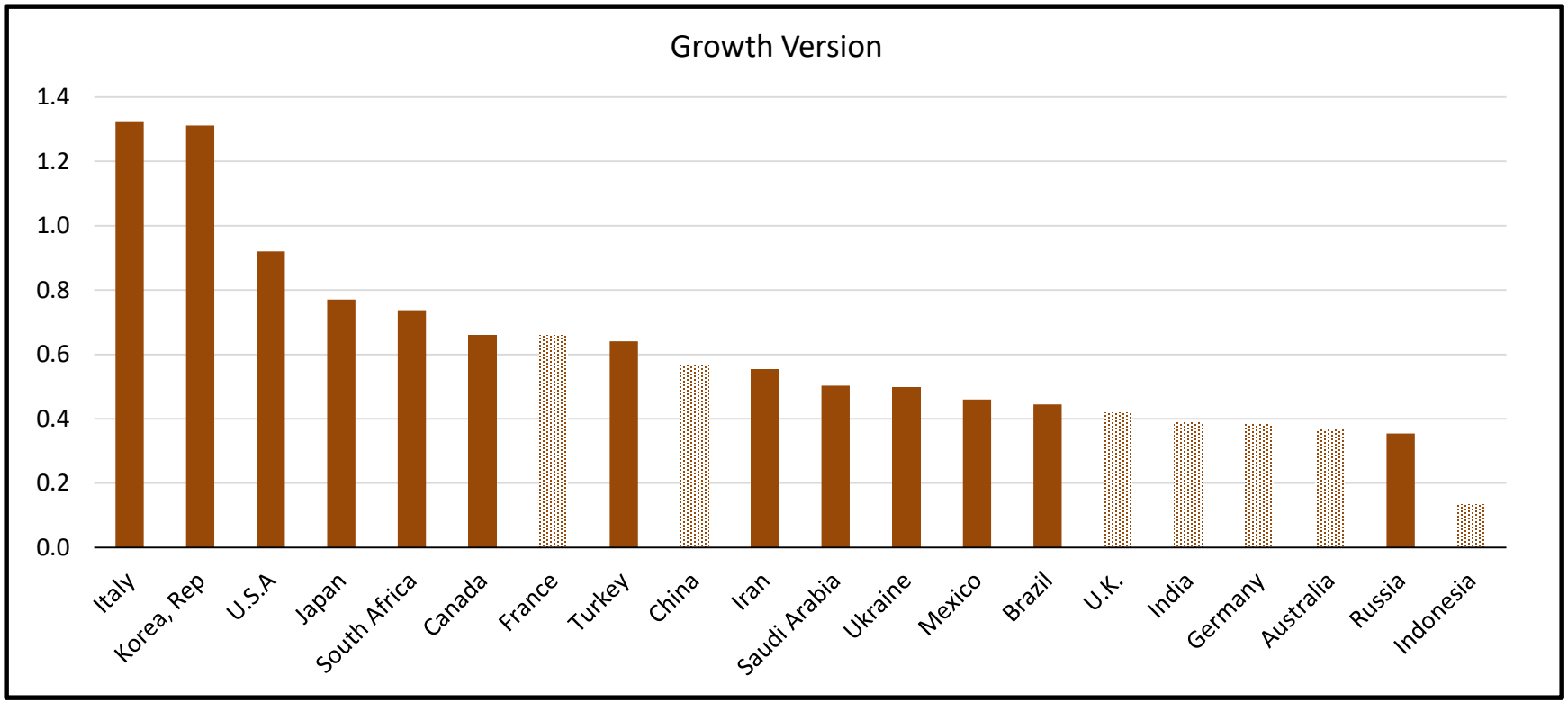
- Why look beyond CO2?
  - 26% of emissions do not derive from CO2.
  - CO2 underestimates economic activity in major agriculture producers (e.g. Australia, Brazil, Indonesia, Mexico).

…and from the energy and agricultural sectors



- Why look beyond CO2?
  - 26% of emissions do not derive from CO_2.
  - CO_2 underestimates economic activity in major agriculture producers (e.g. Australia, Brazil, Indonesia, Mexico).
- Major source of emissions: Energy sector followed by agriculture.

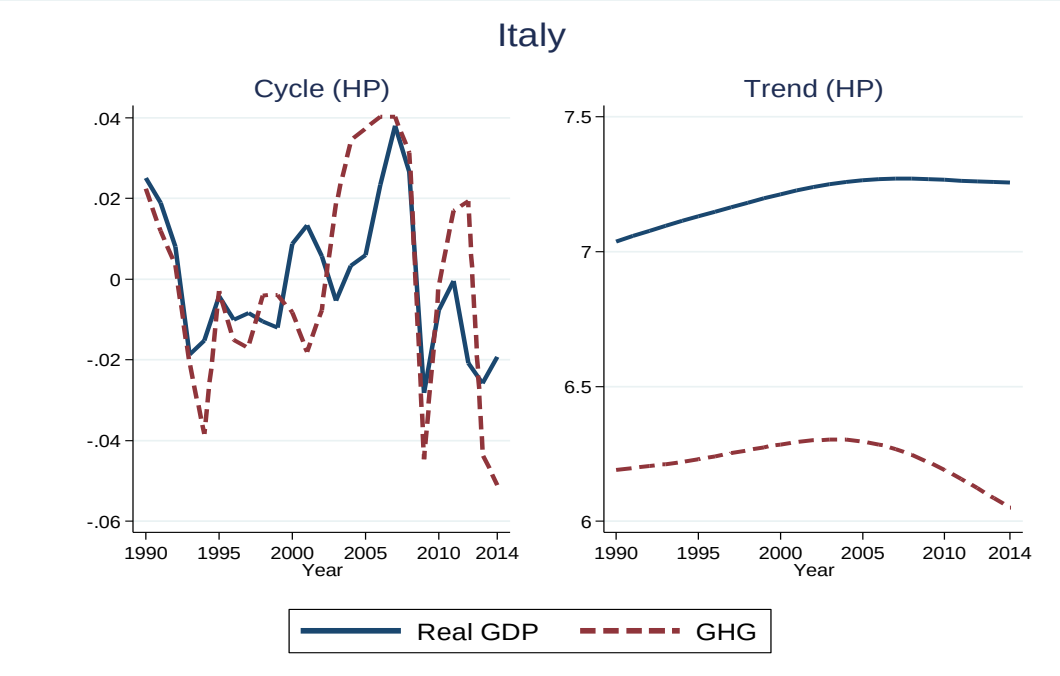
Relationship between emissions growth and output growth



- Bars show the emissions elaticity wrt GDP based on this regression:

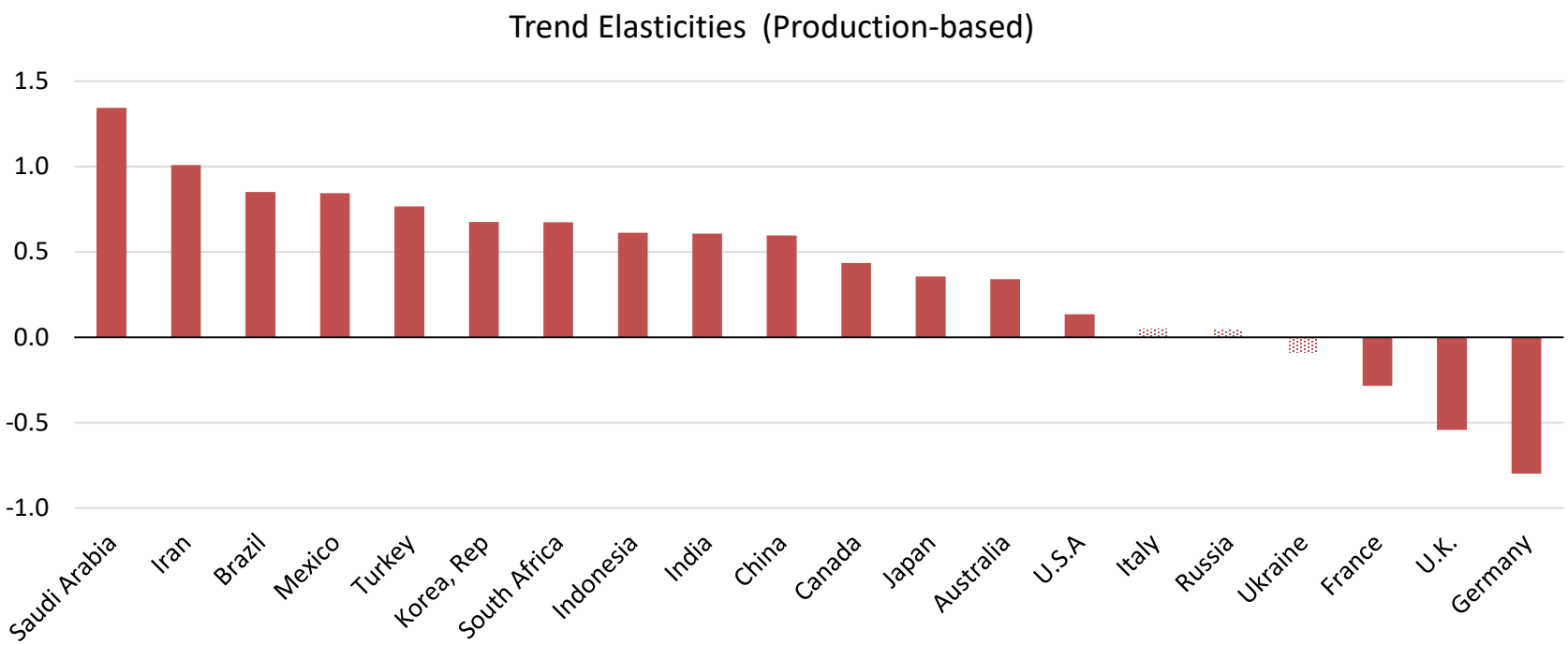
$$\Delta e_t = \alpha + \omega \Delta y_t + u_t$$

Cycles can obscure trend movements



- Cyclical and trend components extracted with the Hodrick-Prescott (HP) filter, with smoothing parameter = 100.
- Results are robust to alternative filtering methods, in particular with Hamilton's detrending method (2016).

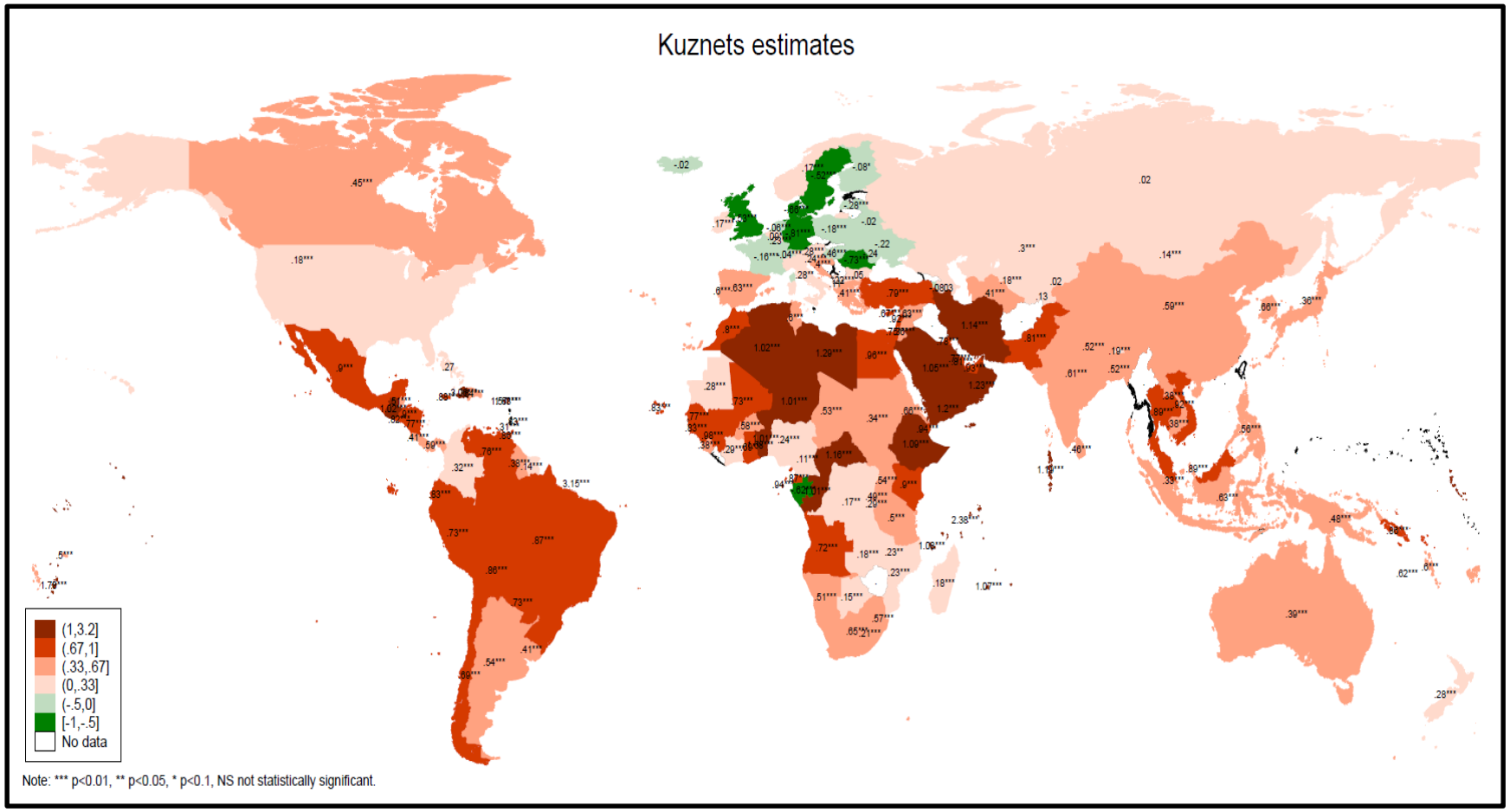
Trend elasticities



- Trend relationship between emissions and GDP

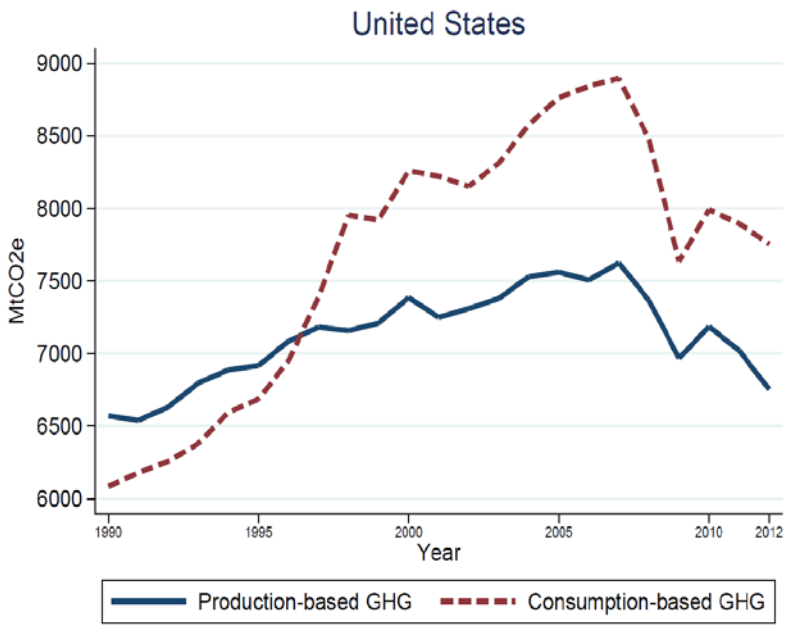
$$e_t^{\tau} = \gamma \quad + \beta^{\text{kuznets}} \; y_t^{\tau} + \varepsilon_t^{\tau}$$

Trend elasticities around the world

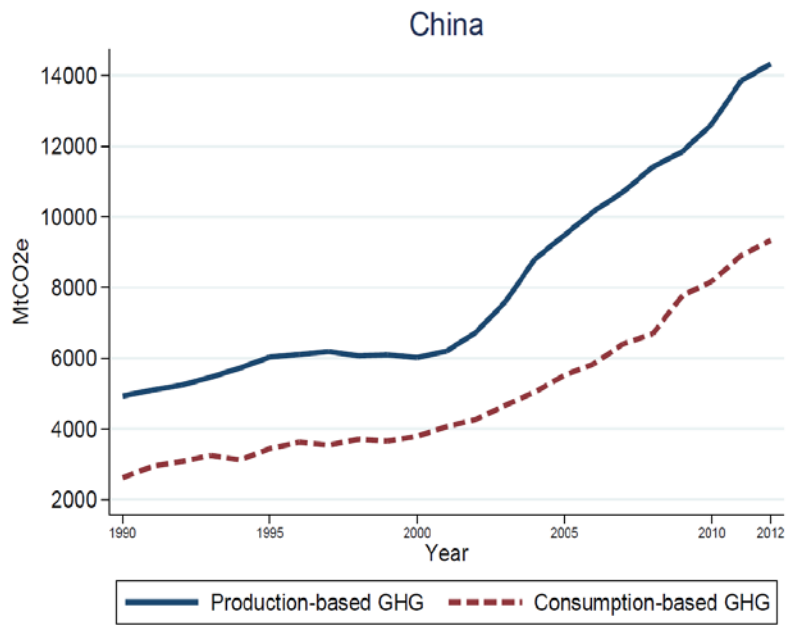


Production vs. consumption-based emissions

Higher consumption-based emissions

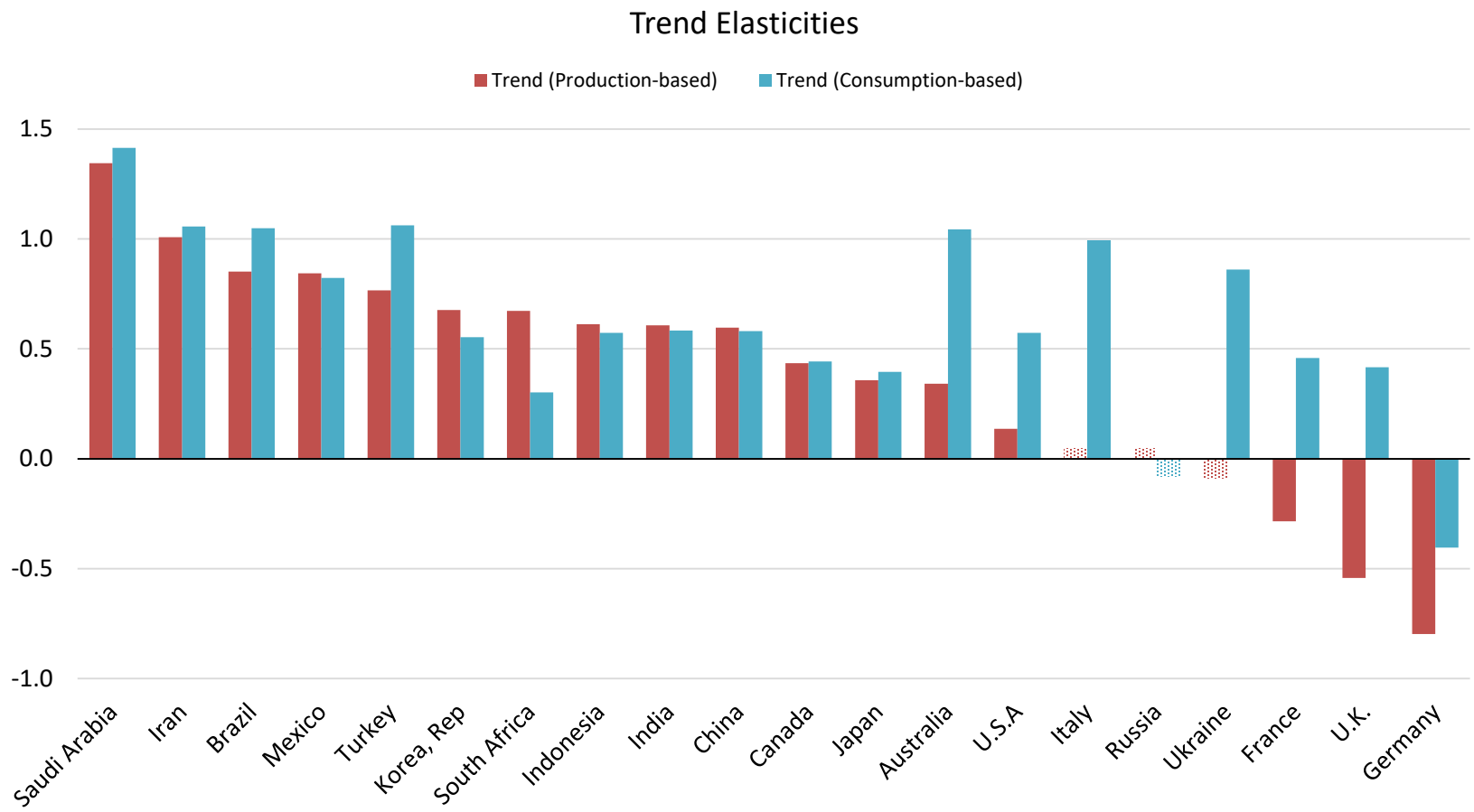


Higher production-based emissions



Revisiting trend elasticities

(Consumption-based vs. production-based estimates)



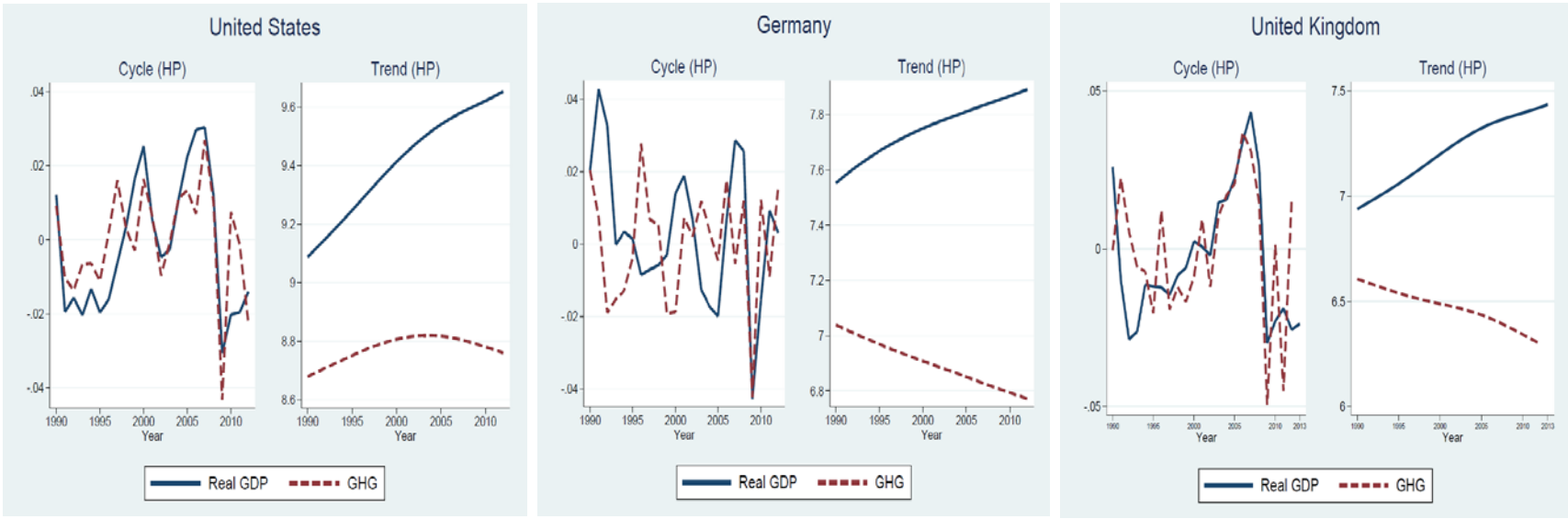
Declining trend elasticities

(Production-based estimates)

	Post-WWII period (1946-1982)	Great Moderation (post-1983)
Trend Elasticity (average, 20 countries)	1.11	0.66

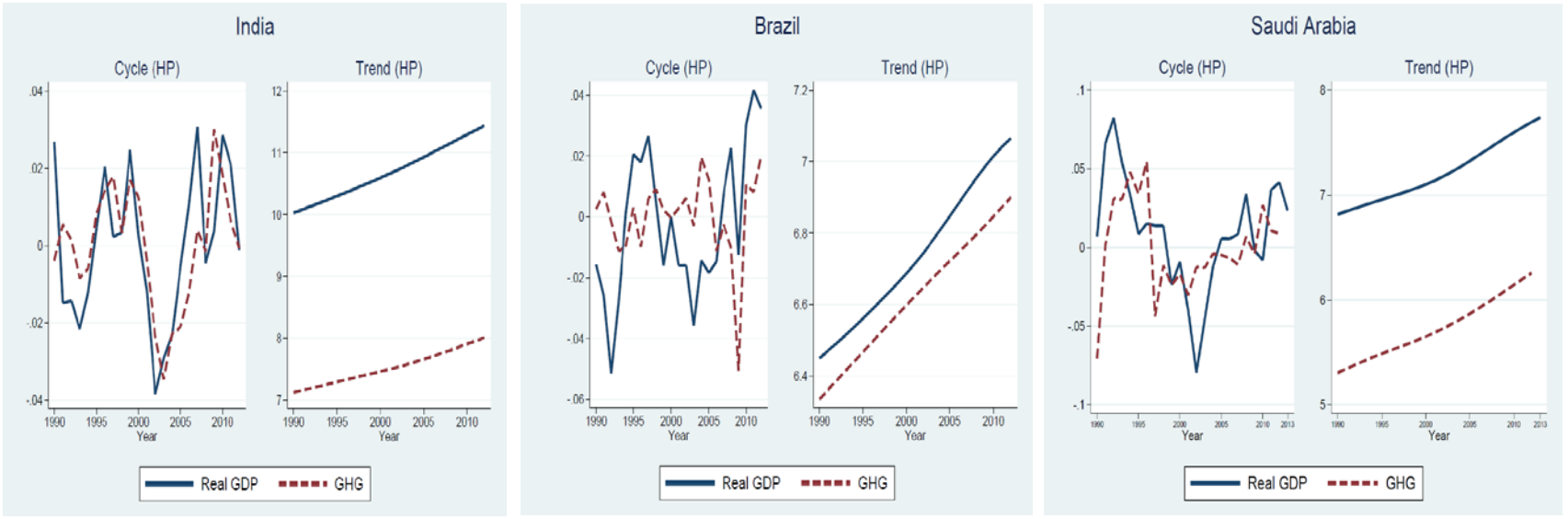
Average (all countries)		1.1	0.6
Advanced		1.0	0.3
Emerging		1.3	0.9

Cycles can obscure trend movements: some advanced countries



- Cyclical and trend components extracted with the Hodrick-Prescott (HP) filter, with smoothing parameter = 100.
- Results are robust to alternative filtering methods, in particular with Hamilton's detrending method (2016).

Cycles can obscure trend movements: some emerging economies



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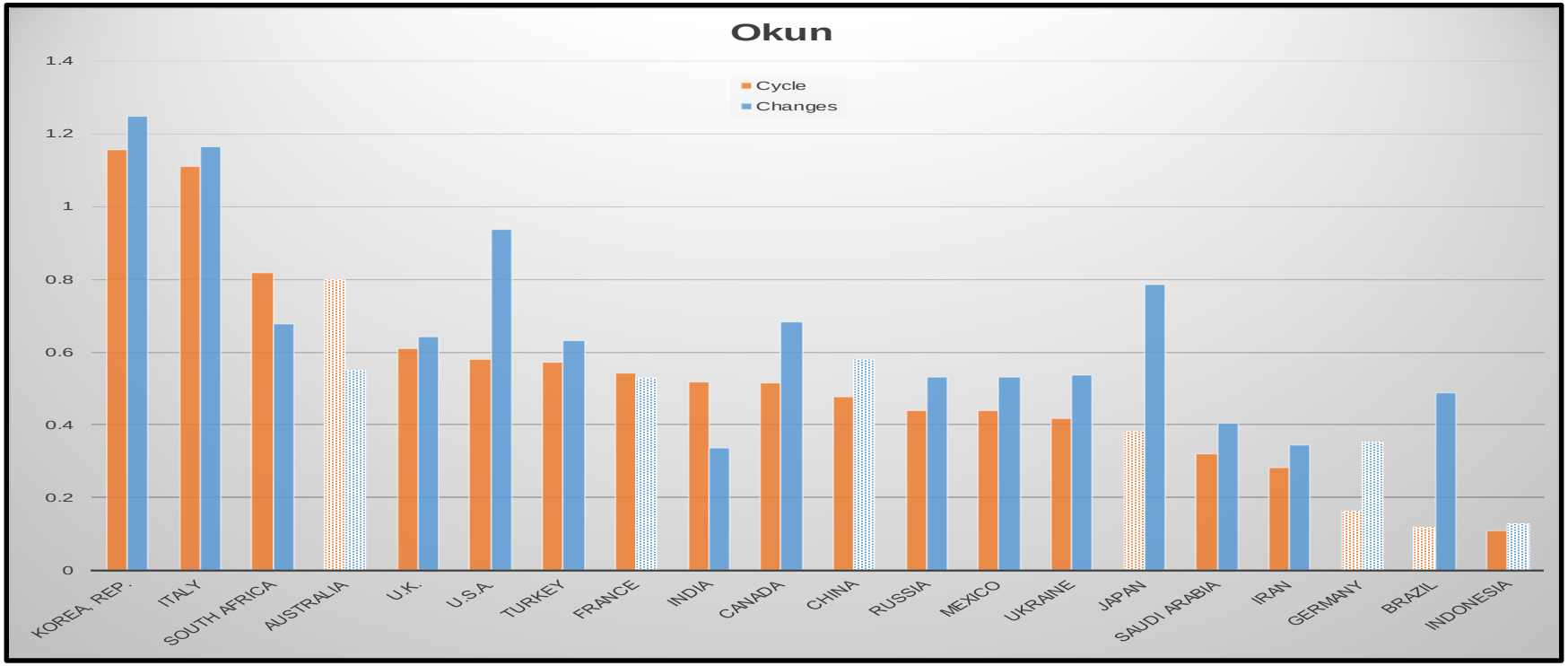
Environmental Okun's Law: Estimates of the Okun Elasticities



- Short-term elasticities

$$e_t^c = \beta^{\text{okun}}\, y_t^c + \varepsilon_t^c$$

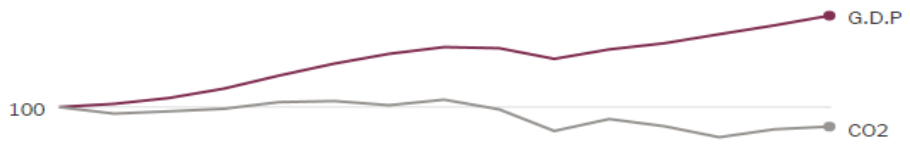
- Estimation methods

Decoupling of domestic production and emissions

The Decoupling: The United States

While America's G.D.P has grown 28 percent since 2000, its carbon emissions have decreased 6 percent.

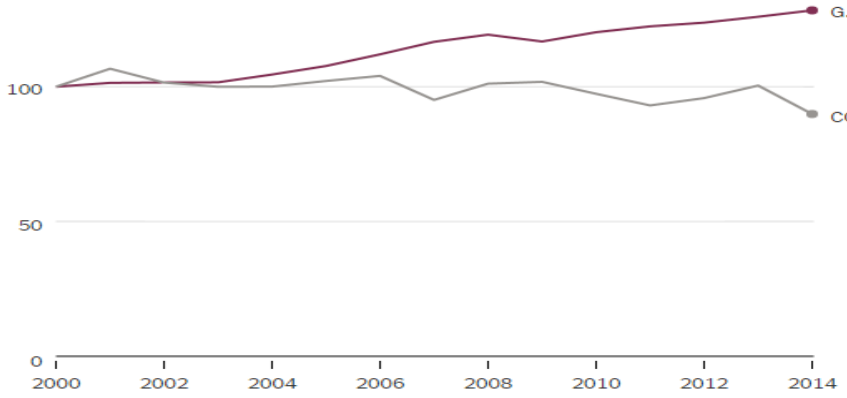
Indexed to 100 in 2000



The Decoupling: Switzerland

Of the 21 countries that have managed to lower their carbon emissions and continue to expand their economies, Switzerland has done the best.

Indexed to 100 in 2000



Since 2000, More Than 20 Countries Have Reduced Annual GHG Emissions While Growing Their Economies

COUNTRY	CHANGE IN CO_2 (2000–2014)	CHANGE IN GDP (2000–2014)
Austria	-3%	21%
Belgium	-12%	21%
Bulgaria	-5%	62%
Czech Republic	-14%	40%
Denmark	-30%	8%
Finland	-18%	18%
France	-19%	16%
Germany	-12%	16%
Hungary	-24%	29%
Ireland	-16%	47%
Netherlands	-8%	15%
Portugal	-23%	1%
Romania	-22%	65%
Slovakia	-22%	75%
Spain	-14%	20%
Sweden	-8%	31%
Switzerland	-10%	28%
Ukraine	-29%	49%
United Kingdom	-20%	27%
United States	-6%	28%
Uzbekistan	-2%	28%

Sources: BP Statistical Review of World Energy 2015; World Bank World Development Indicators

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