A problemática do *Catching Up*

Qual o passado… e o futuro do "crescimento económico"?

EIC, MEGCTI

Sumário

1. “Crescimento Económico Moderno”
2. Redução das desigualdades, convergência e *Catching Up*
3. A “restrição ambiental”

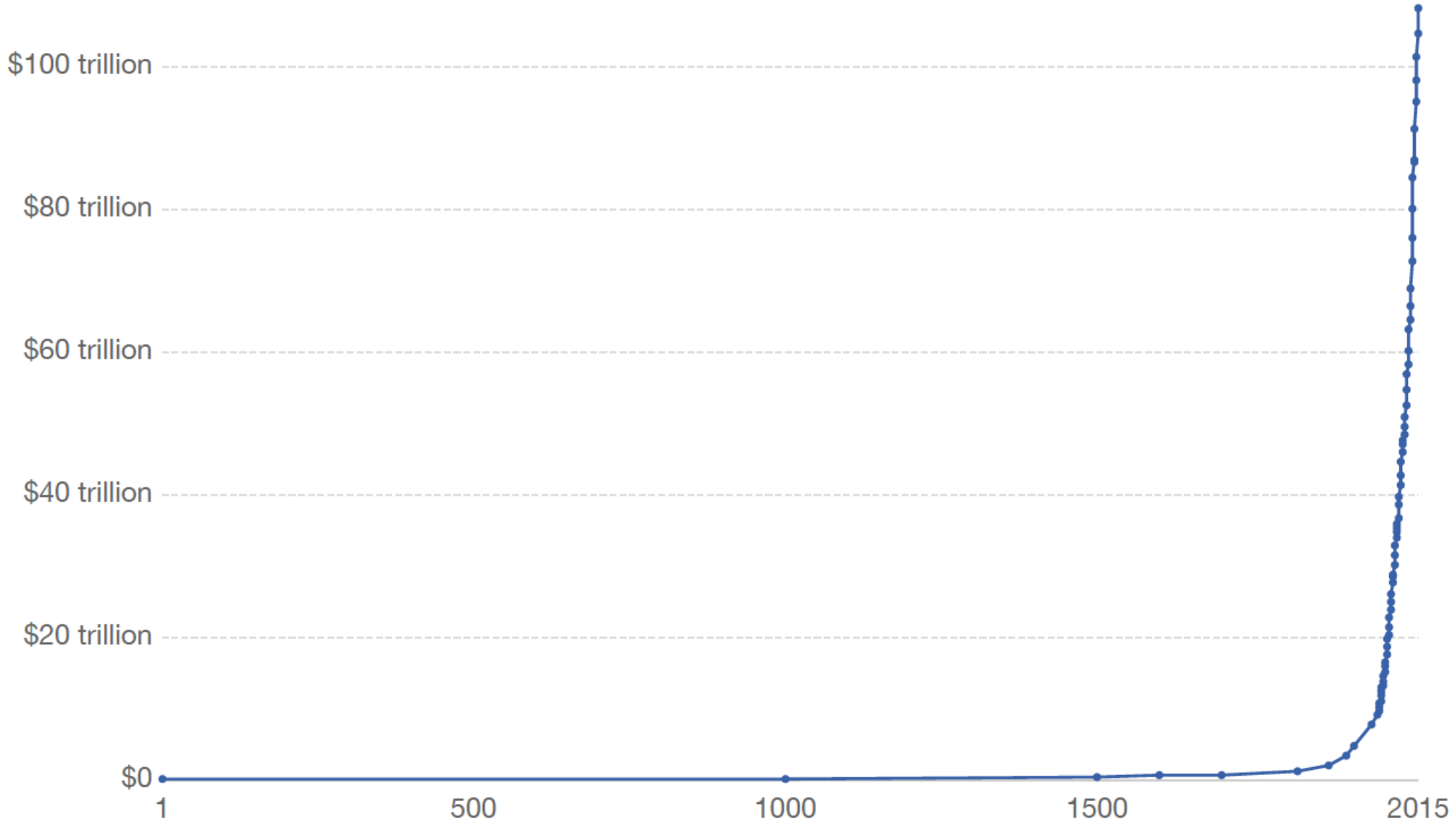
O “Crescimento económico moderno”

- Extraordinário crescimento da produção mundial
- Tanto em termos de PIB total como de PIB per capita
- Ponto de viragem: Revolução Industrial final Sec XVIII
- Reforço desta tendência: “Revolução Verde” (1950-1970)
- Século XX: Fixação no crescimento económico

World GDP over the last two millennia

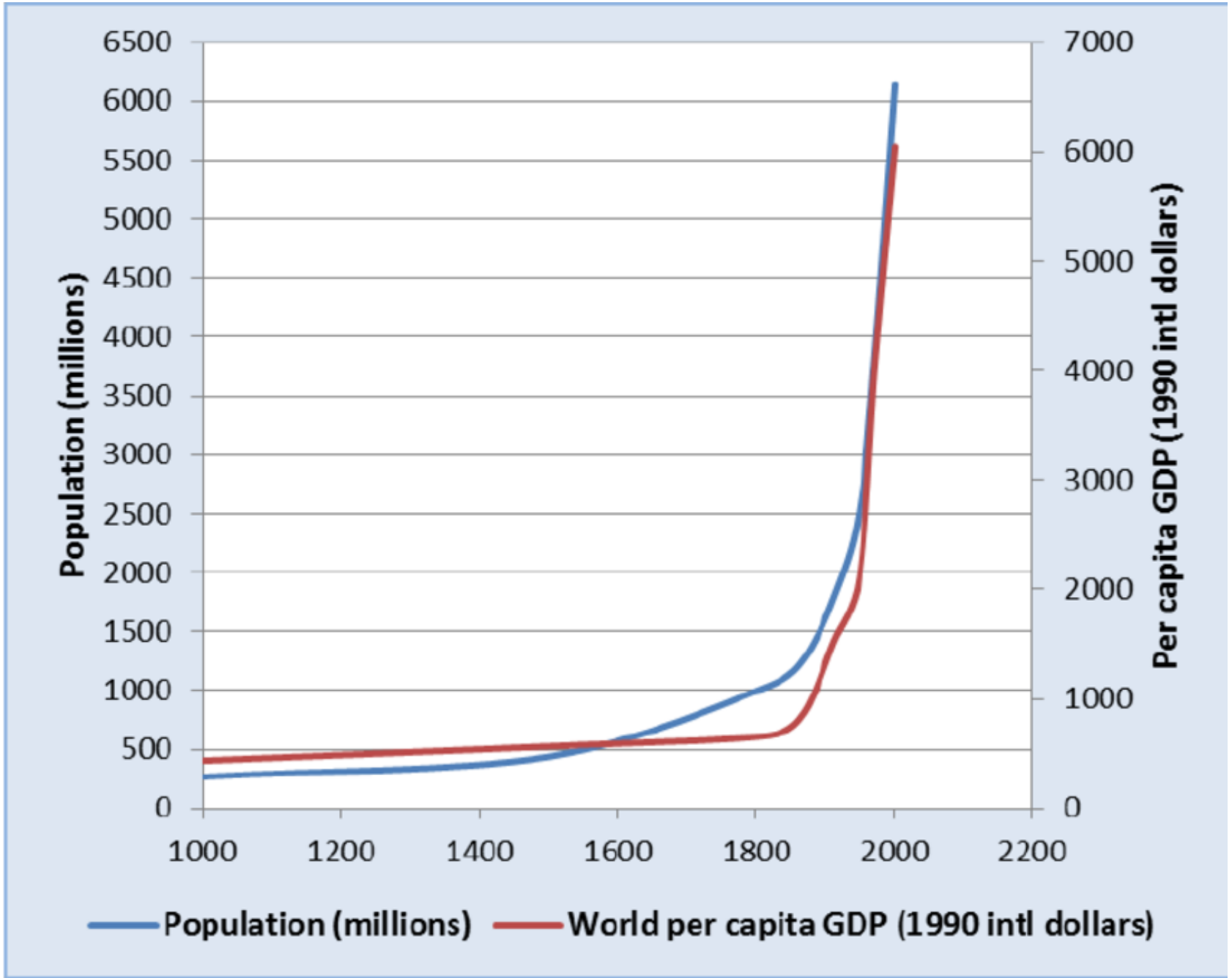
Total output of the world economy; adjusted for inflation and expressed in 2011 international dollars.

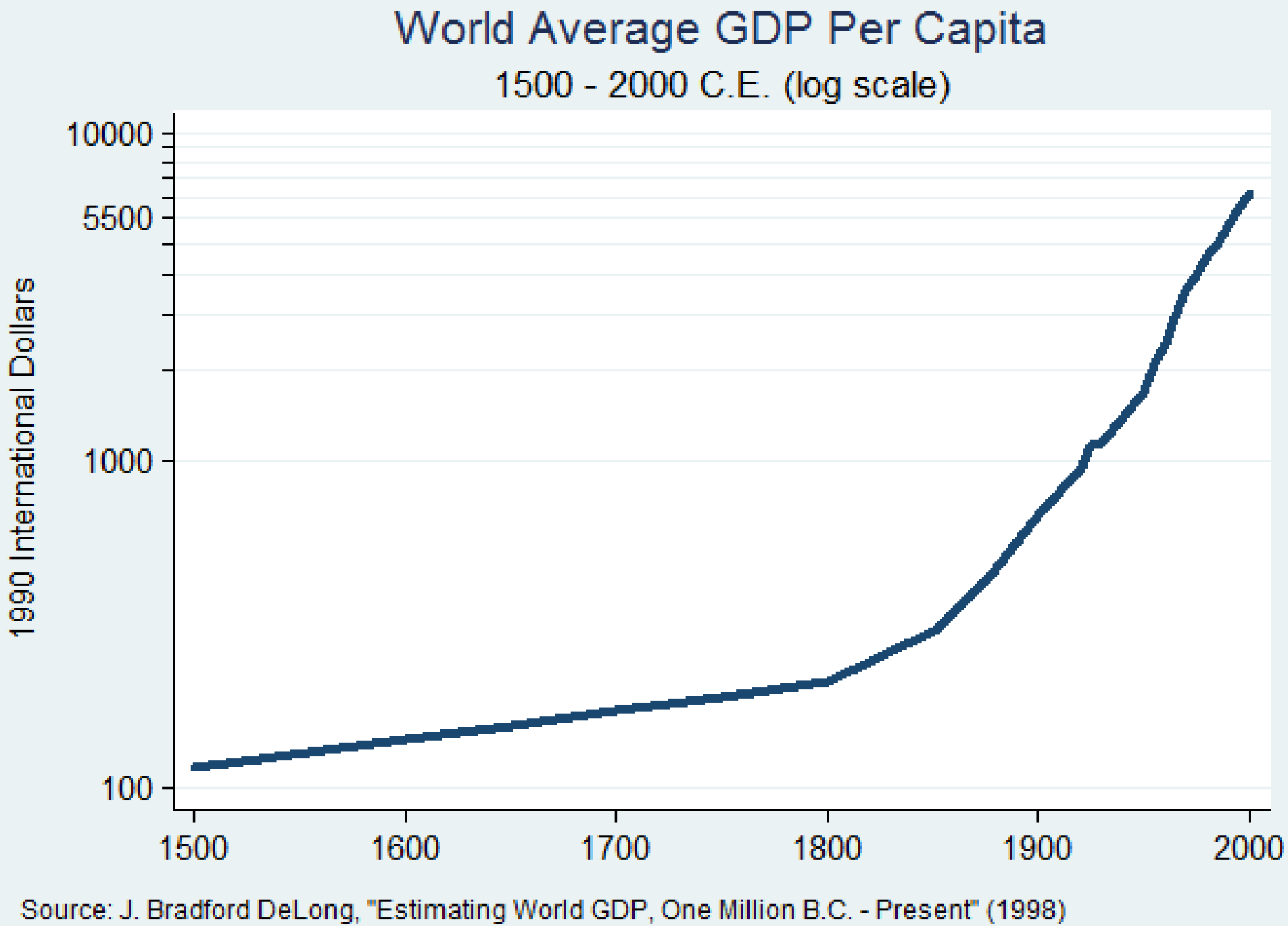
LINEAR



Source: World GDP - Our World In Data based on World Bank & Maddison (2017)

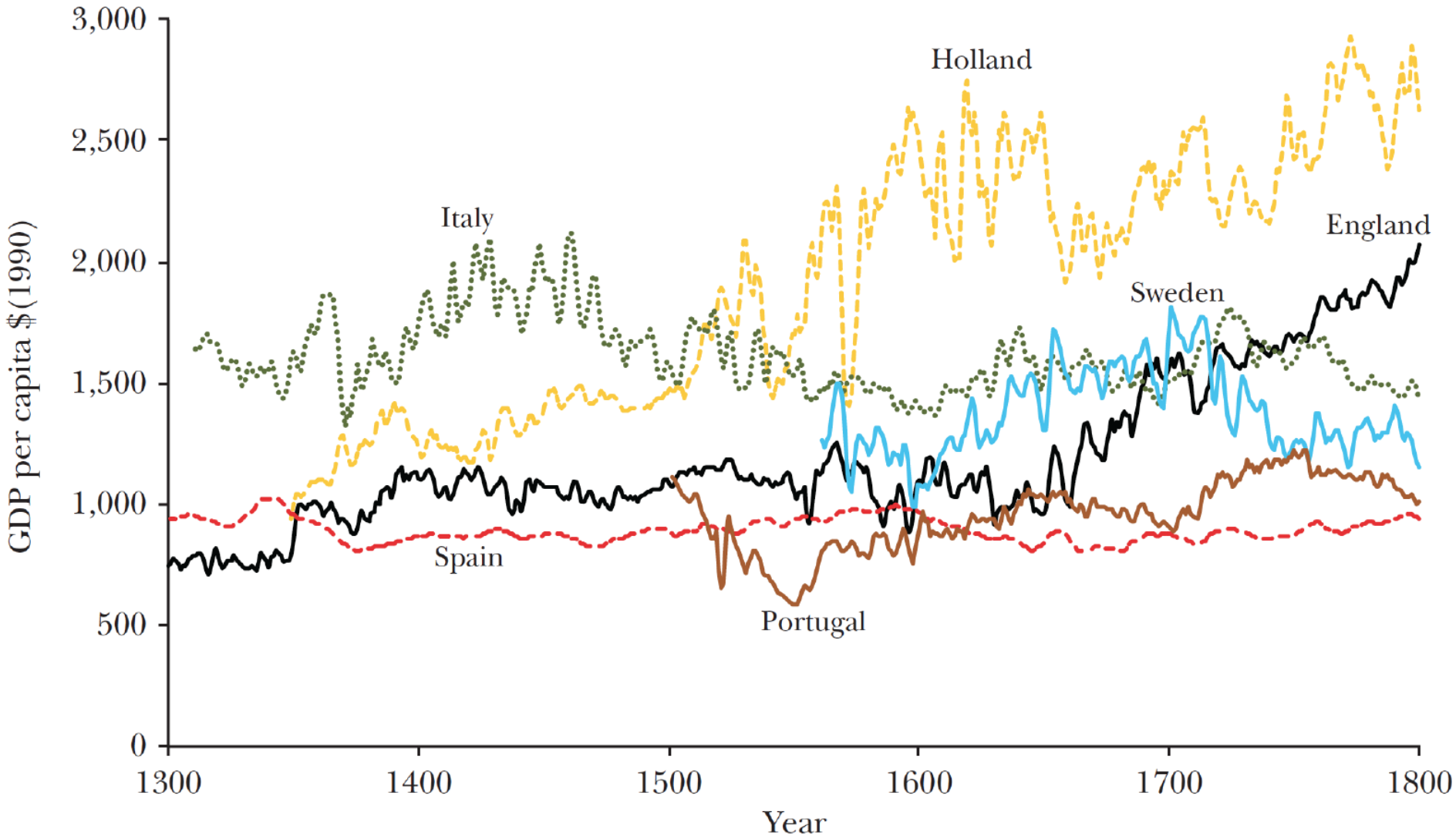
World Population and Per Capita GDP (PPP) 1000 AD to 2001. Data from Maddison (2011)




World Average GDP Per Capita
1500 - 2000 C.E. (log scale)
1990 International Dollars
10000
5500
1000
100
1500
1600
1700
1800
1900
2000
Source: J. Bradford DeLong, "Estimating World GDP, One Million B.C. - Present" (1998)

GDP per Capita in Selected European Economies, 1300–1800

(three-year average; Spain eleven-year average)



This figure is taken from Roger Fouquet and Stephen Broadberry – Seven Centuries of European Economic Growth and Decline. In Journal of Economic Perspectives, Vol. 29, No. 4, Fall 2015 (pp. 227-44). Online here: https://www.aeaweb.org/articles?id=10.1257/jep.29.4.227

2. Redução das desigualdades, convergência e *Catching Up*

…. tanto crecimento económico, …..e:

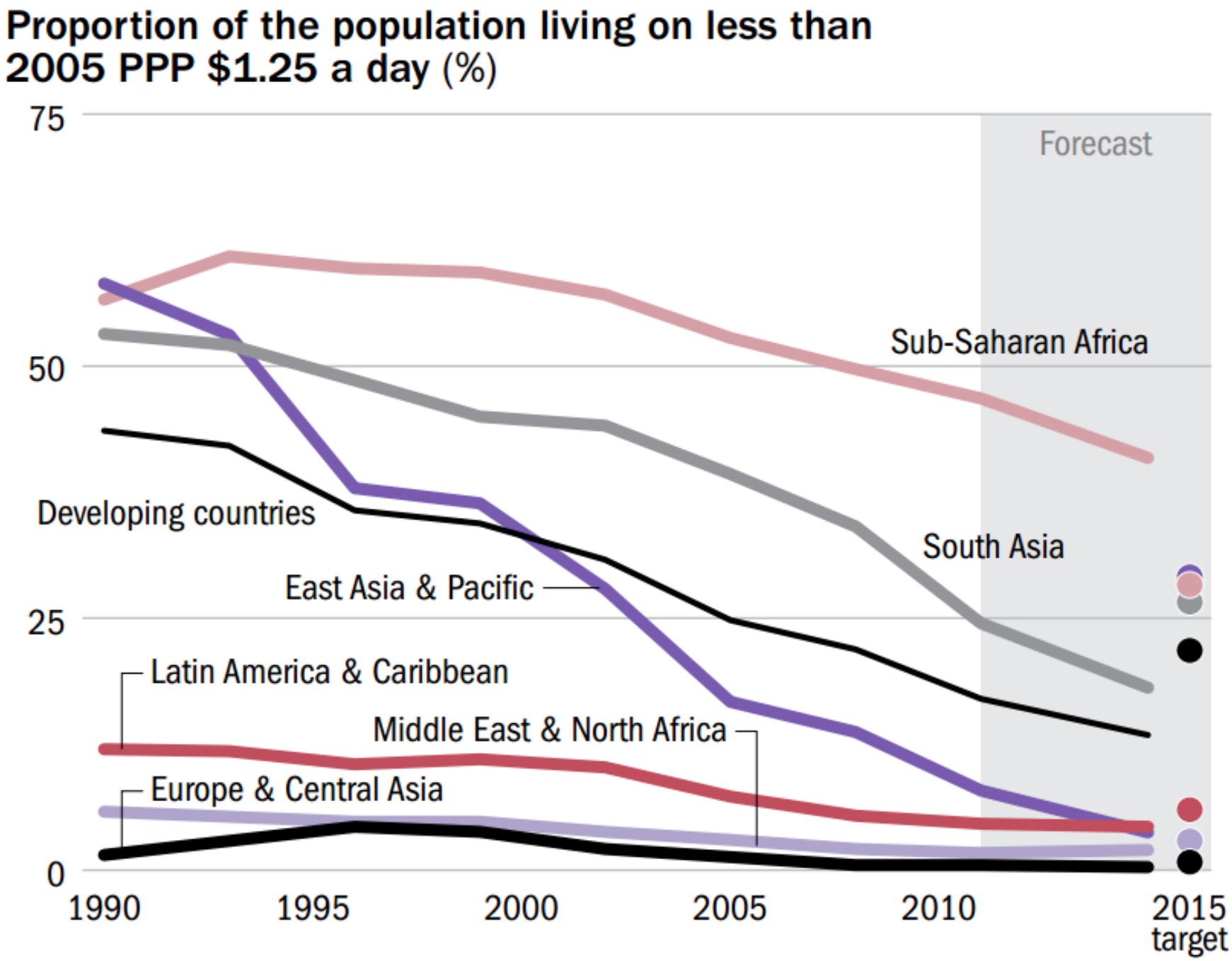
a) Estará a pobreza no mundo a diminuir?
b) Estarão as desiguladades a aumentar ou a diminuir?
c) Estará a haver convergência económica entre países?
d) *Catching* up: Causas e possibilidade de novos casos?

a) Estará a pobreza no mundo a diminuir?

Conceitos da pobreza absoluta e de pobreza relativa

Pobreza absoluta: Indivíduos abaixo de um determinado nível de rendimento
P.ex.: com menos de $1 por dia ou menos $1.25 por dia

Pobreza relativa: proporção de pessoas abaixo de uma determinada percentagem (10%; 20%... 40%) do valor do rendimento mediano.



Ver:

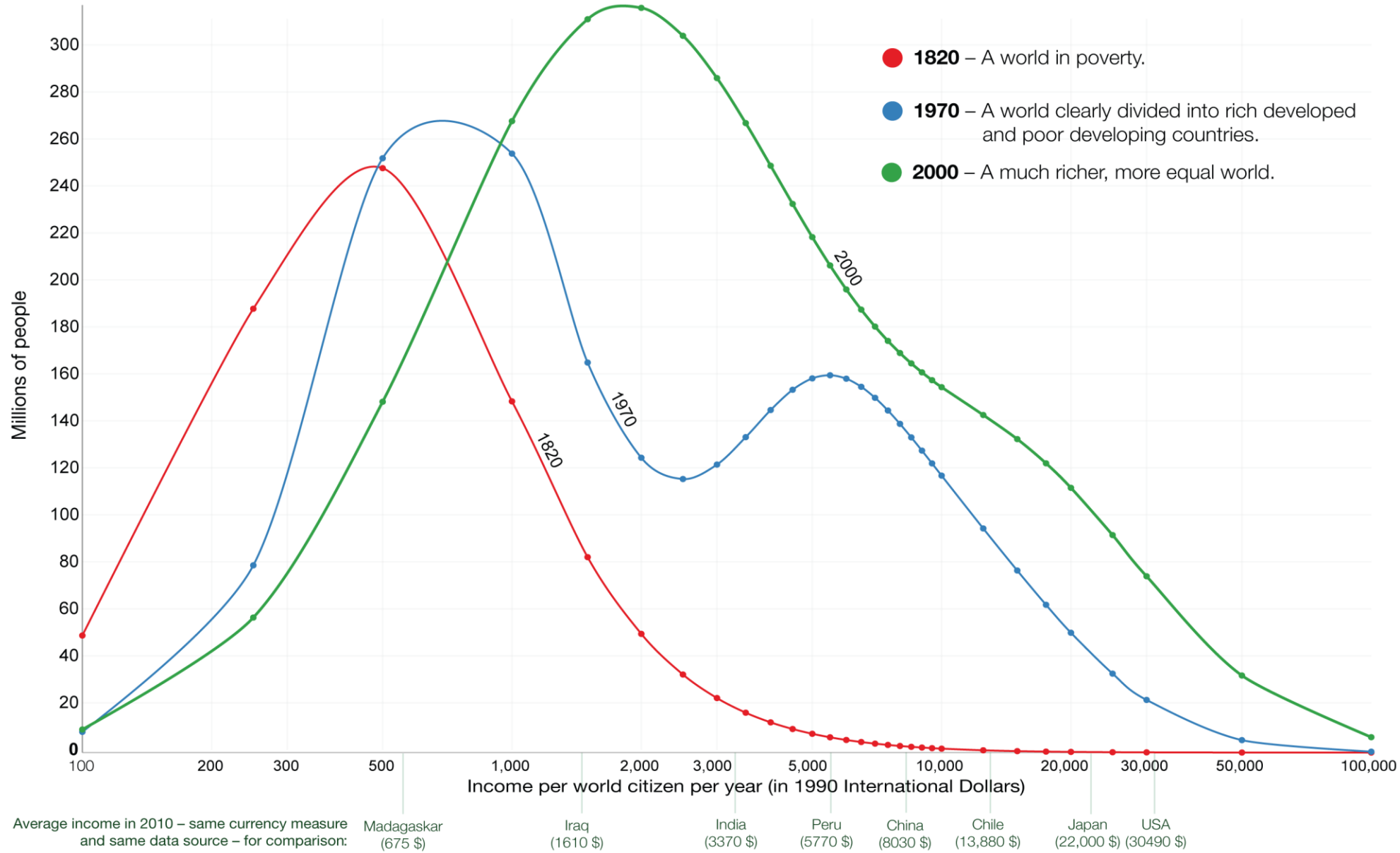
https://indicators.report/indicators/i-1/

b) Estão as desiguladades a aumentar ou a diminuir?

- Como tem evoluído a “distribuição do rendimento” a nível mundial?

The World Income Distribution in 1820, 1970 and 2000 – by Max Roser

The yearly income of all world citizens is measured in International Dollars. This is a currency that would buy a comparable amount of goods and services a U.S. dollar would buy in the United States in 1990. Therefore incomes are comparable across countries and across time.

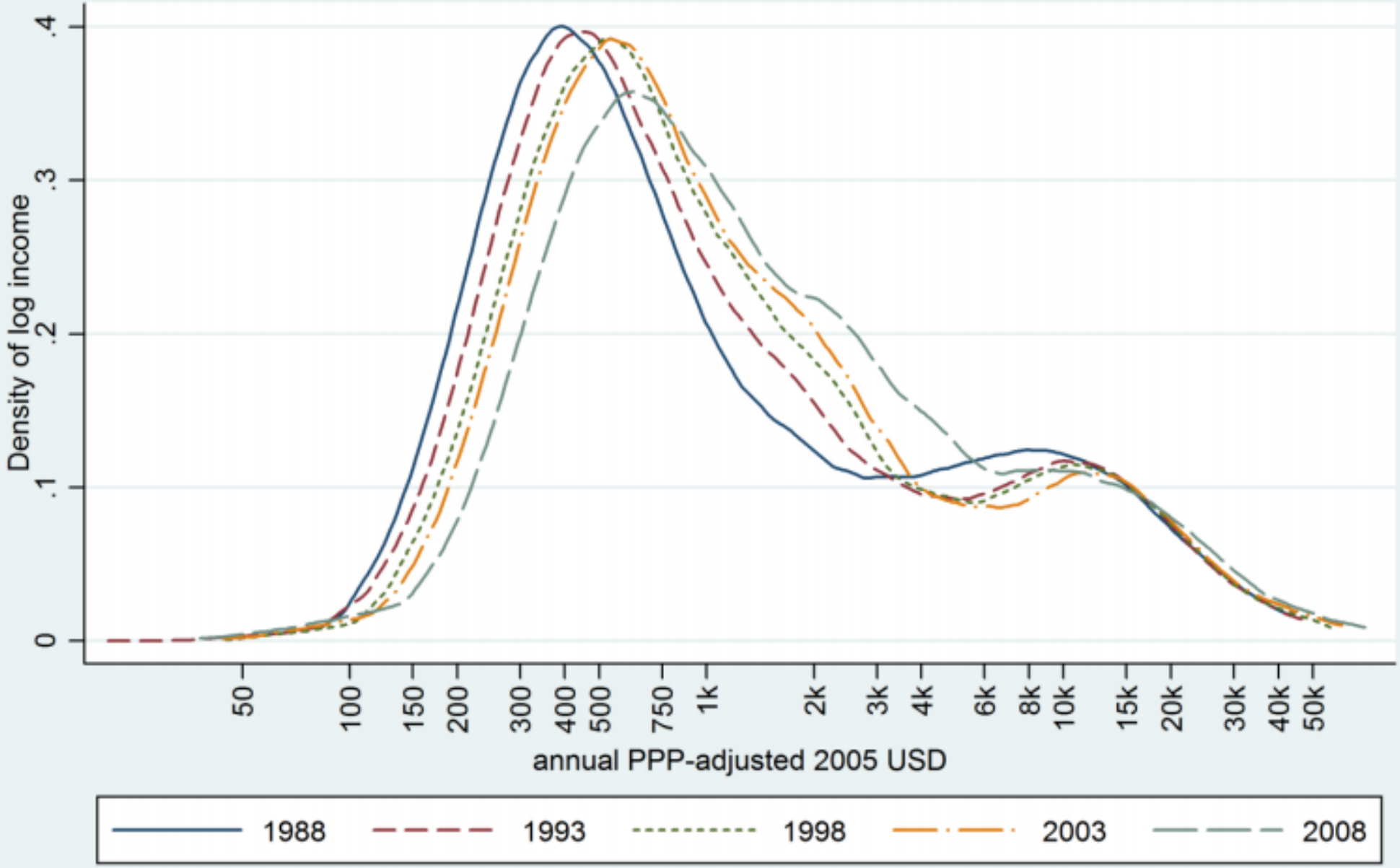


Data source: www.Clio-Infra.eu via van Zanden et al. (2014) – *How Was Life?*, OECD.

The interactive data visualisation is available at OurWorldinData.org. There you find the raw data and more visualisations on this topic.

Figure 2: The global distribution of income over time

logarithmic scale, population-weighted

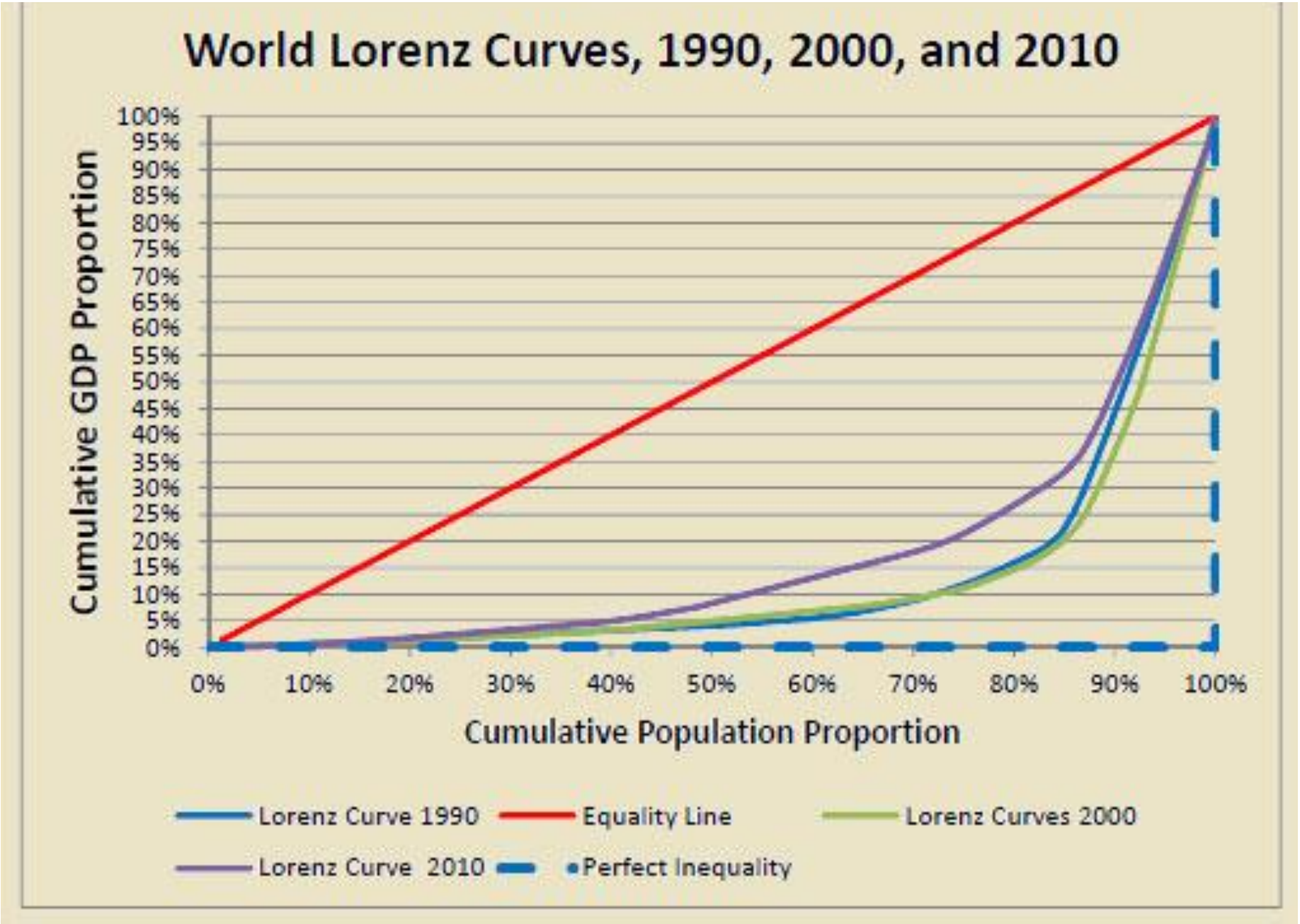


Replication of the 'elephant curve'

Growth in average per capita household income, 1988-2008 (%)

Source: Resolution Foundation

Lorenz curves for global income distributions in 1990, 2000 and 2010



VER https://teachernas.wordpress.com/disparities-in-wealth-and-development/

Lorenz curves for global income distributions in 1988 and 2008

Nota 1: The Lorenz curve shows on the horizontal axis, the cumulative percentage of population, ranked from the poorest to the richest percentile, and on the vertical axis, the cumulative percentage of total income received by such population percentiles. If, for a given value of x, y is greater, it means that the bottom x percent of population receives a greater share of total income.

Nota 2: O Coeficiente de Gini é uma medida de desigualdade. Pode ser usado para qualquer distribuição, embora seja normalmente utilizado para medir a desigualdade de distribuição de rendimentos. O Coeficiente de Gini consiste num número entre 0 e 1, onde 0 corresponde à completa igualdade (significaria que todos os indivíduos da população obteriam exactamente o mesmo rendimento) e 1 corresponde à completa desigualdade (onde uma pessoa recebe todo o rendimento e as demais nada recebem). O índice de Gini é calculado como uma razão das áreas no diagrama da curva de Lorenz. Se a área entre a linha de perfeita igualdade e a curva de Lorenz é A, e a área abaixo da curva de Lorenz é B, então o coeficiente de Gini é igual a A/(A+B). Esta razão expressa-se como percentagem ou como equivalente numérico dessa percentagem, que é sempre um número entre 0 e 1.

Fonte: Branko Milanovic (2012), Global Income Inequality by the Numbers: in History and Now: An Overview. The World Bank, Policy Research Working Paper 6259.

World Gini Coefficient

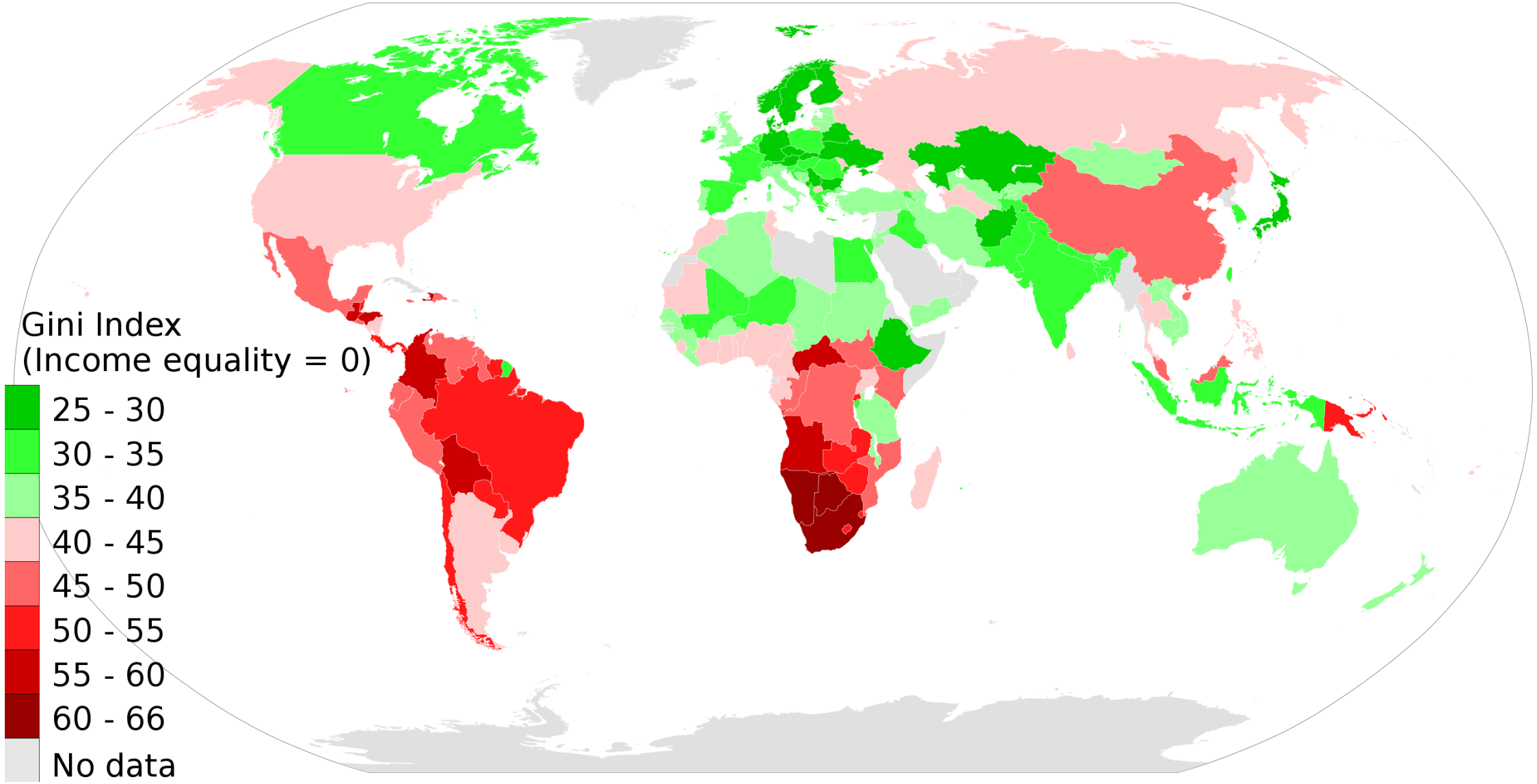
Two centuries of global income inequality

(recalculated using the new Maddison project data)

Fonte: Branko Milanovic

Countries' income inequality (2014) according to their Gini coefficients measured in percent

red = higher than average, green = lower than average inequality

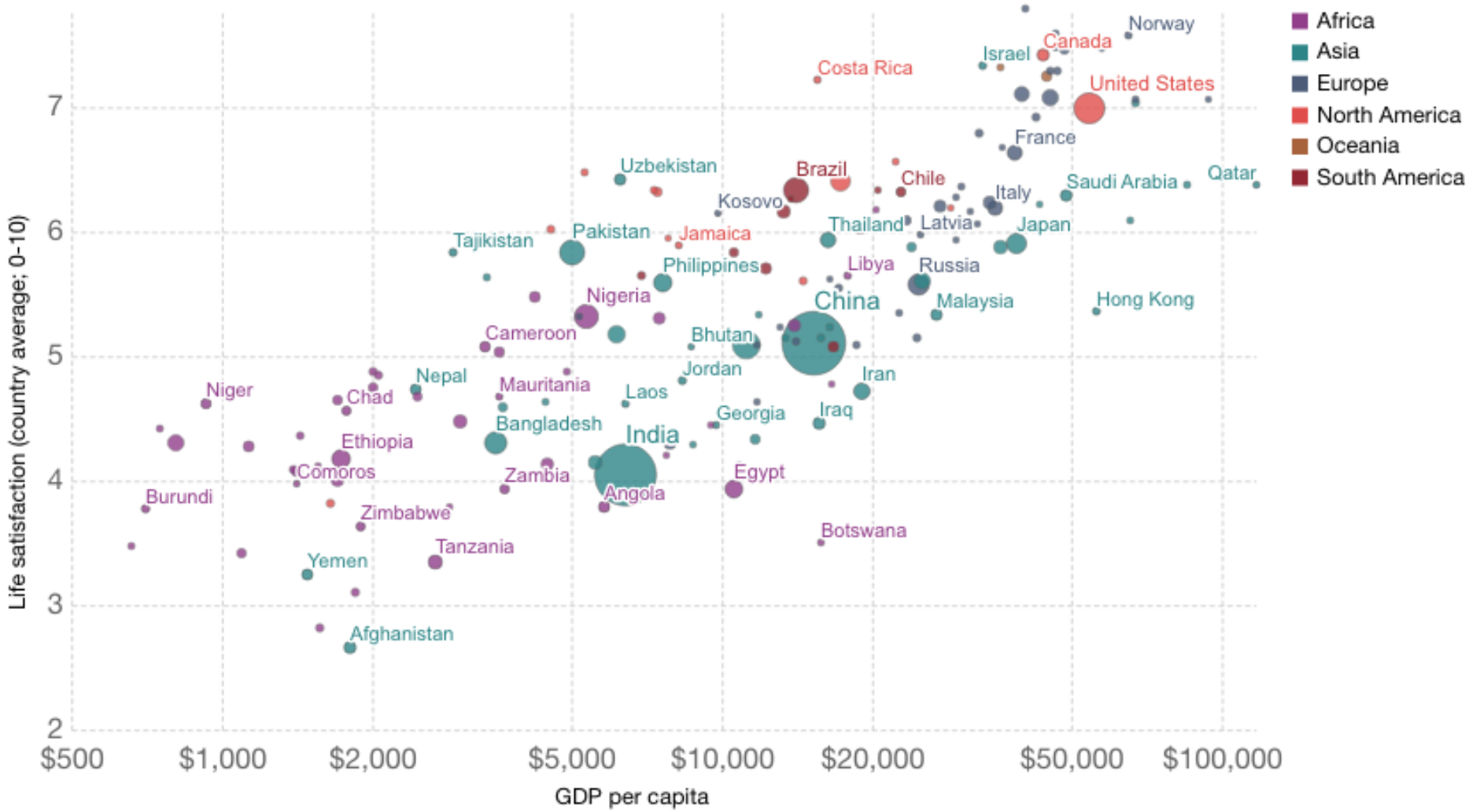


https://en.wikipedia.org/wiki/List_of_countries_by_income_equality#/media/File:2014_Gini_Index_World_Map,_income_inequality_distribution_by_country_per_World_Bank.svg

Self-reported Life Satisfaction vs GDP per capita, 2017

The vertical axis shows the national average of the self-reported life satisfaction on a scale ranging from 0-10, where 10 is the highest possible life satisfaction.
The horizontal axis shows GDP per capita adjusted for inflation and cross-country price differences.

Our World in Data

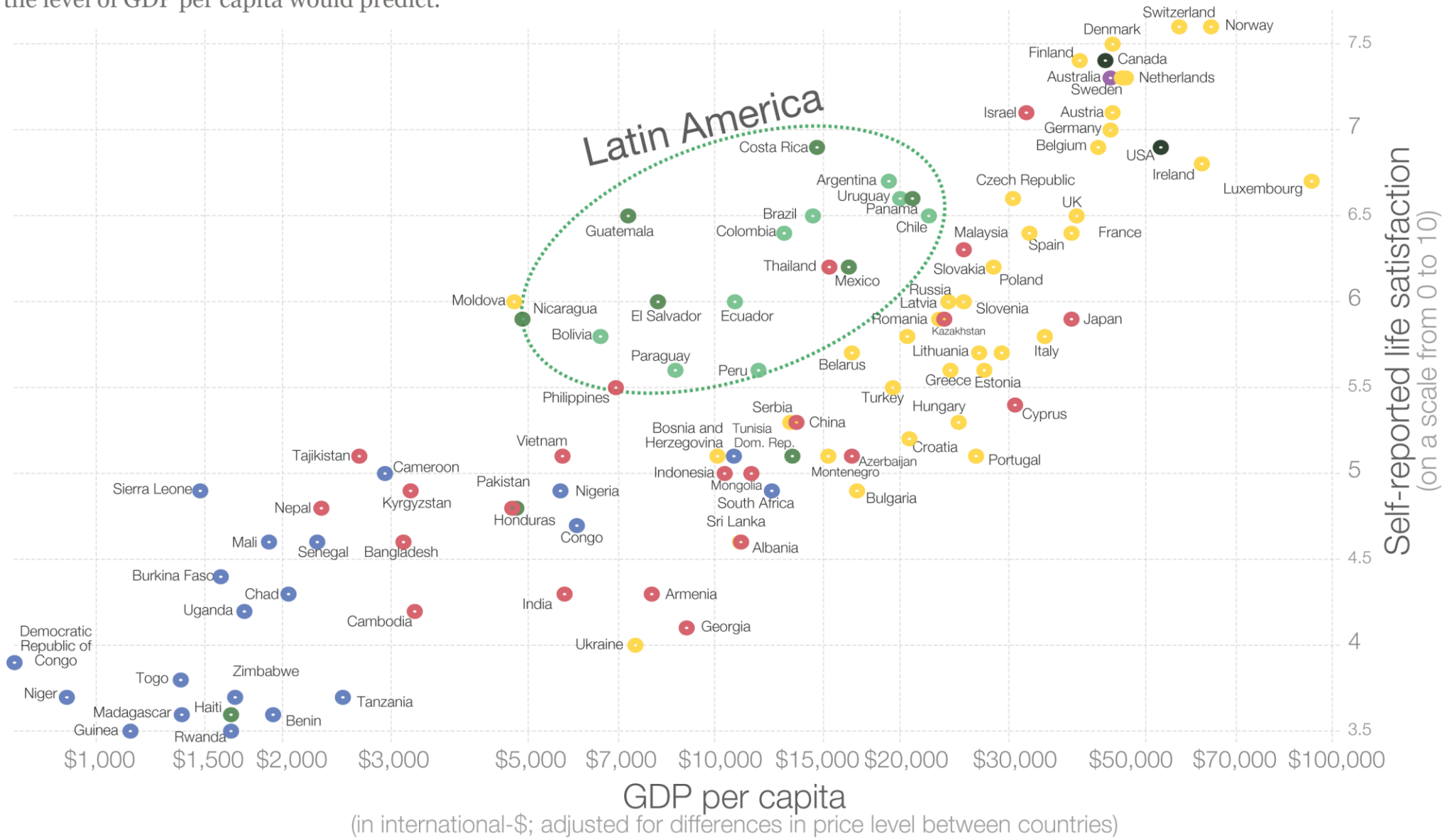


Source: World Happiness Report (2019), World Bank

Self-reported life satisfaction vs GDP per capita, in 2015

The color represents the continent of the country. People in many Latin American countries report higher life-satisfaction than the level of GDP per capita would predict.

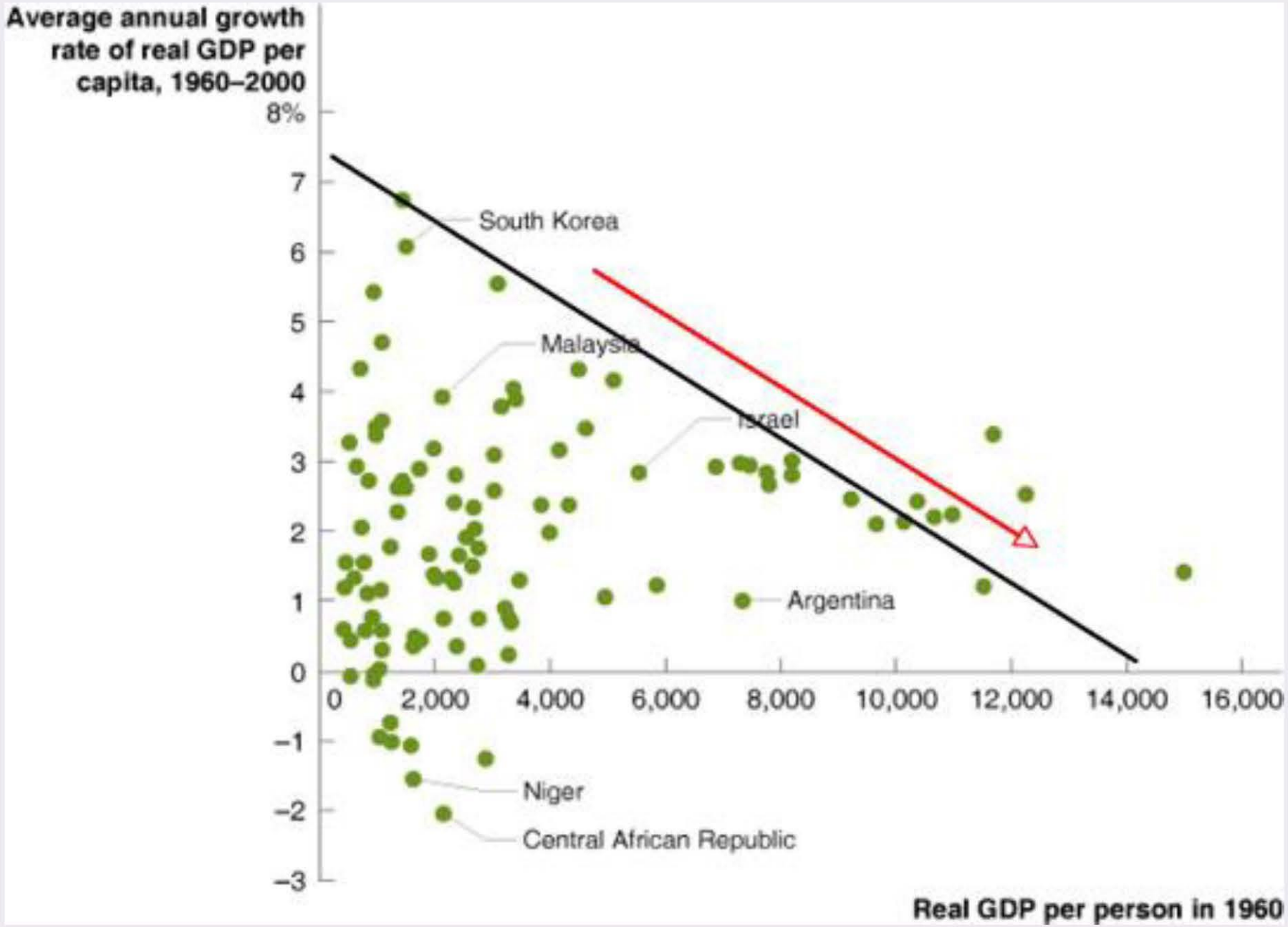
Our World in Data



Data sources: ***World Bank*** for GDP per capita; ***Gallup World Poll*** for self-reported life satisfaction.
The data visualization is available at OurWorldinData.org. There you find the research and more visualizations on this topic.

c) Está a haver convergência económica entre países?

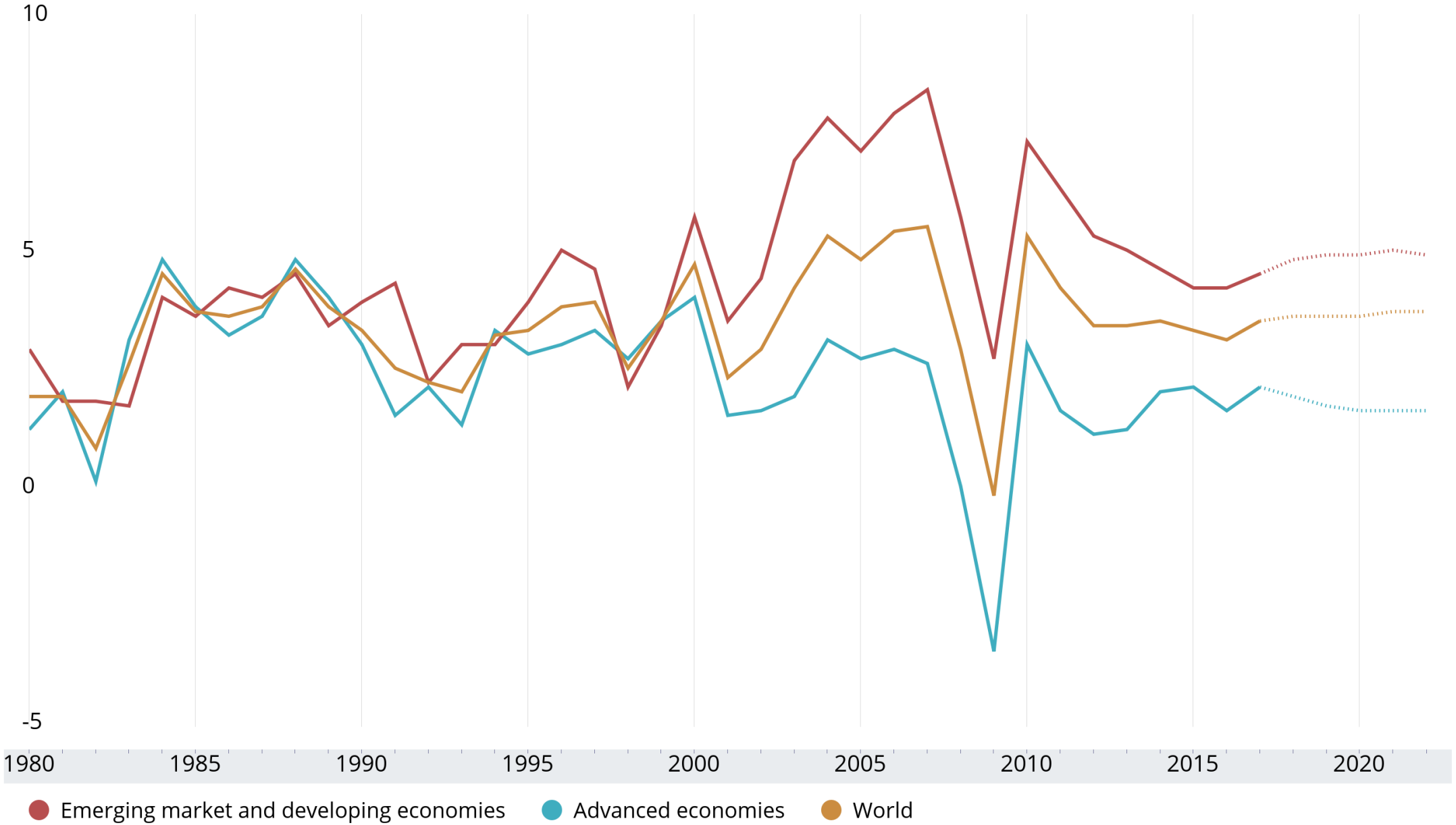
- De acordo com W. Baumol verifica-se convergência económica sempre que o coeficiente da linha estimada a partir dos pontos do gráfico seguinte tem sinal negativo (“BETA convergence”)
- Estimação: A T.M.C.A. do PIB per capita num dado período é regredida relativamente ao PIB per capita do ano inicial desse período
- Expectativa seria obter uma equação que gerasse a linha negra do gráfico seguinte…


Average annual growth rate of real GDP per capita, 1960–2000
8%
7
6
5
4
3
2
1
0
−1
−2
−3
South Korea
Malaysia
Israel
Argentina
Niger
Central African Republic
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
Real GDP per person in 1960

- Gráfico anterior não sugere “convergência”
- Porém gráfico seguinte, sugere que a partir de ≈ 2000 poderá estar a ocorrer “convergência”

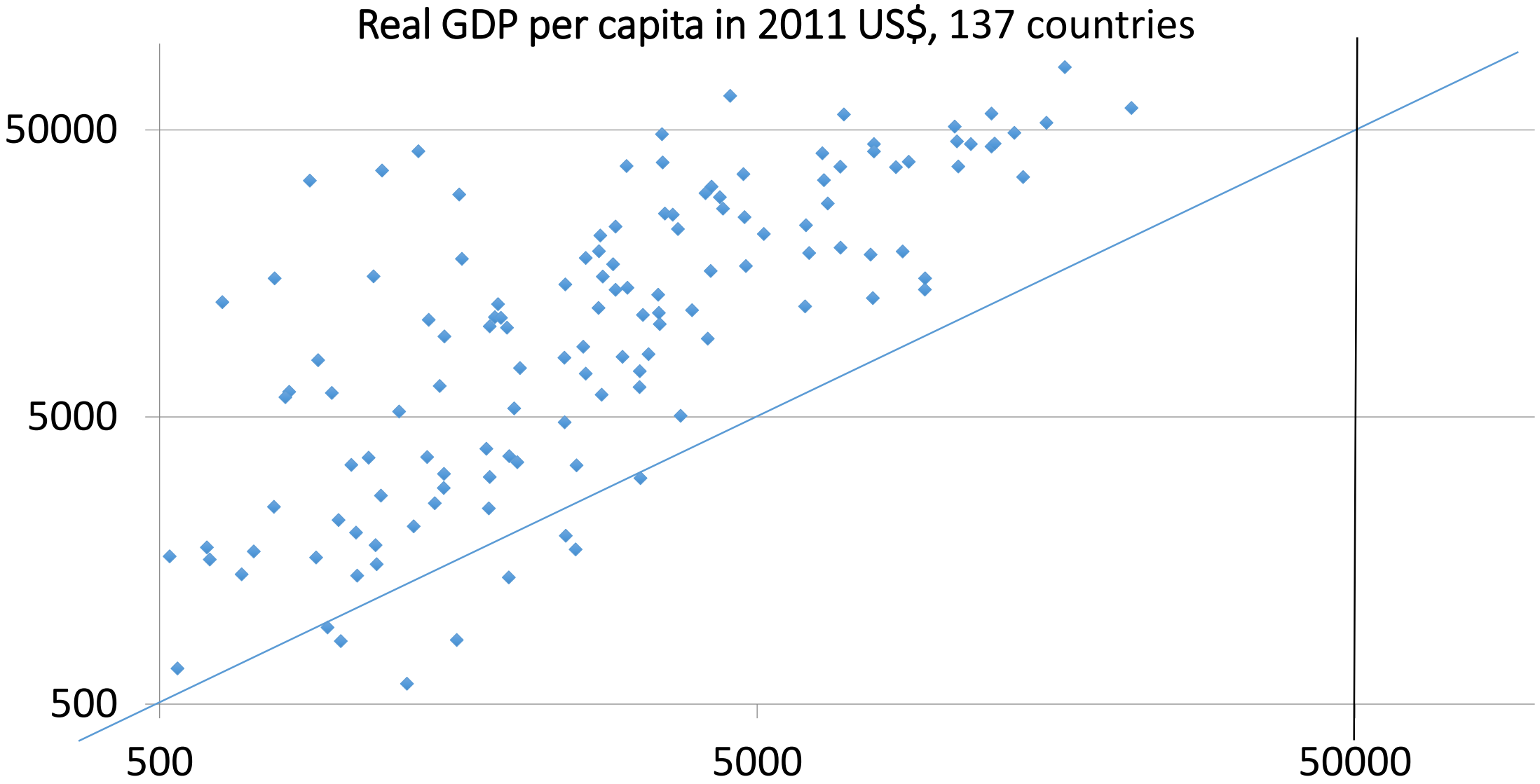
IMF DataMapper

Real GDP growth (Annual percent change)



https://www.rug.nl/ggdc/historicaldevelopment/maddison/data/mpd2018.xlsx

GDP per capita in 1950 (X Axis) and in 2016 (Y axis)



Norway	NOR	16360	82814
Singapore	SGP	4504	65729
Switzerland	CHE	21147	59662
Luxembourg	LUX	12333	57006
Ireland	IRL	6983	56597
United States	USA	15241	53015
Saudi Arabia	SAU	10703	51397
Australia	AUS	13466	48845
China, Hong Kong SAR	HKG	3466	48330
Netherlands	NLD	10790	45600
Denmark	DNK	12475	44836
Germany	DEU	7840	44689
Sweden	SWE	11385	44659
Canada	CAN	12333	43745
Taiwan, Province of China	TWN	1355	42165
Iceland	ISL	7841	42085
Austria	AUT	6426	41445
Belgium	BEL	8960	38766
Oman	OMN	3473	38515
Japan	JPN	3023	37465
United Kingdom	GBR	10846	37334
Finland	FIN	6886	37239
France	FRA	8531	37124
Republic of Korea	KOR	1178	36103
Puerto Rico	PRI	4742	35082
New Zealand	NZL	13924	34295
Italy	ITA	6465	33419
Equatorial Guinea	GNQ	892	33317
Israel	ISR	4192	31701
Spain	ESP	4098	30110
Malta	MLT	1587	29817
Trinidad and Tobago	TTO	4329	29178
Czechoslovakia	CSK	6563	27738
Seychelles	SYC	4381	26624
Cyprus	CYP	3504	25577
Portugal	PRT	3610	25346
Poland	POL	4760	24838
Hungary	HUN	6034	23279
Malaysia	MYS	2896	23053
Greece	GRC	3684	22574
Chile	CHL	5128	21696
Panama	PAN	2731	21449
Uruguay	URY	6894	19468
Mauritius	MUS	2718	18918
Argentina	ARG	8759	18875
Former USSR	SUN	6108	18635
Gabon	GAB	7739	18413
Turkey	TUR	2583	17906
Romania	ROU	1603	17782
Bulgaria	BGR	2869	17037
Iran (Islamic Republic of)	IRN	4788	16783
Mexico	MEX	4179	16133
Thailand	THA	1140	15454
Former Yugoslavia	YUG	2759	15416
Venezuela (Bolivarian Republic of)	VEN	9546	15219
Botswana	BWA	779	15198
Dominican Republic	DOM	2387	14489
Costa Rica	CRI	3034	14098
Iraq	IRQ	9542	13898
Brazil	BRA	2898	13873
Colombia	COL	3414	13326
Lebanon	LBN	7807	12972
China	CHN	637	12569
Mongolia	MNG	1843	12360
South Africa	ZAF	6015	12139
Barbados	BRB	2712	12003
Peru	PER	3889	11776
Jordan	JOR	3422	11529
Egypt	EGY	3219	11351
Sri Lanka	LKA	1820	11149
Tunisia	TUN	1863	11073
Indonesia	IDN	1410	10911
Ecuador	ECU	3434	10527
Albania	ALB	1784	10342
Saint Lucia	LCA	1907	10233
Dominica	DMA	1498	9550
Namibia	NAM	4131	9376
Paraguay	PRY	2558	8786
El Salvador	SLV	3289	8280
Libya	LBY	2976	8096
Morocco	MAR	2380	8039
Swaziland	SWZ	921	7881
Philippines	PHL	2005	7410
Guatemala	GTM	3182	7221
Jamaica	JAM	2582	7084
Cabo Verde	CPV	1471	6418
Bolivia (Plurinational State of)	BOL	3178	6355
India	IND	824	6125
Viet Nam	VNM	971	6062
Congo	COG	2746	5974
Lao People's DR	LAO	812	5859
Nigeria	NGA	1961	5360
Myanmar	MMR	466	5284
Pakistan	PAK	1258	5223
Nicaragua	NIC	3721	5045
Honduras	HND	2381	4796
Ghana	GHA	1762	3878
Sudan (Former)	SDN	1924	3651
Sao Tome and Principe	STP	1402	3624
Bangladesh	BGD	1119	3604
Zambia	ZMB	1985	3479
Mauritania	MRT	1047	3407
Côte d'Ivoire	CIV	2492	3395
Cambodia	KHM	472	3251
Kenya	KEN	1496	3169
Syrian Arab Republic	SYR	1784	3091
Djibouti	DJI	3189	3064
Cameroon	CMR	1495	2828
Lesotho	LSO	389	2767
U.R. of Tanzania: Mainland	TZA	1173	2660
Yemen	YEM	1444	2506
Nepal	NPL	777	2435
Senegal	SEN	1778	2403
Chad	TCD	997	2189
Benin	BEN	1331	2080
Uganda	UGA	1066	1980
Afghanistan	AFG	2392	1929
Gambia	GMB	1149	1788
Rwanda	RWA	600	1758
Haiti	HTI	2485	1728
Comoros	COM	719	1702
Ethiopia	ETH	520	1635
Sierra Leone	SLE	914	1619
Mali	MLI	607	1594
Zimbabwe	ZWE	1154	1534
Burkina Faso	BFA	497	1483
Guinea-Bissau	GNB	497	1436
Guinea	GIN	686	1417
Togo	TGO	1071	1400
Madagascar	MDG	1921	1381
Mozambique	MOZ	345	1113
Malawi	MWI	473	1112
Niger	NER	955	925
D.R. of the Congo	COD	1571	836
Liberia	LBR	1005	829
Burundi	BDI	536	665
Central African Republic	CAF	1297	589

		1950	2016
Norway	NOR	16360	82814
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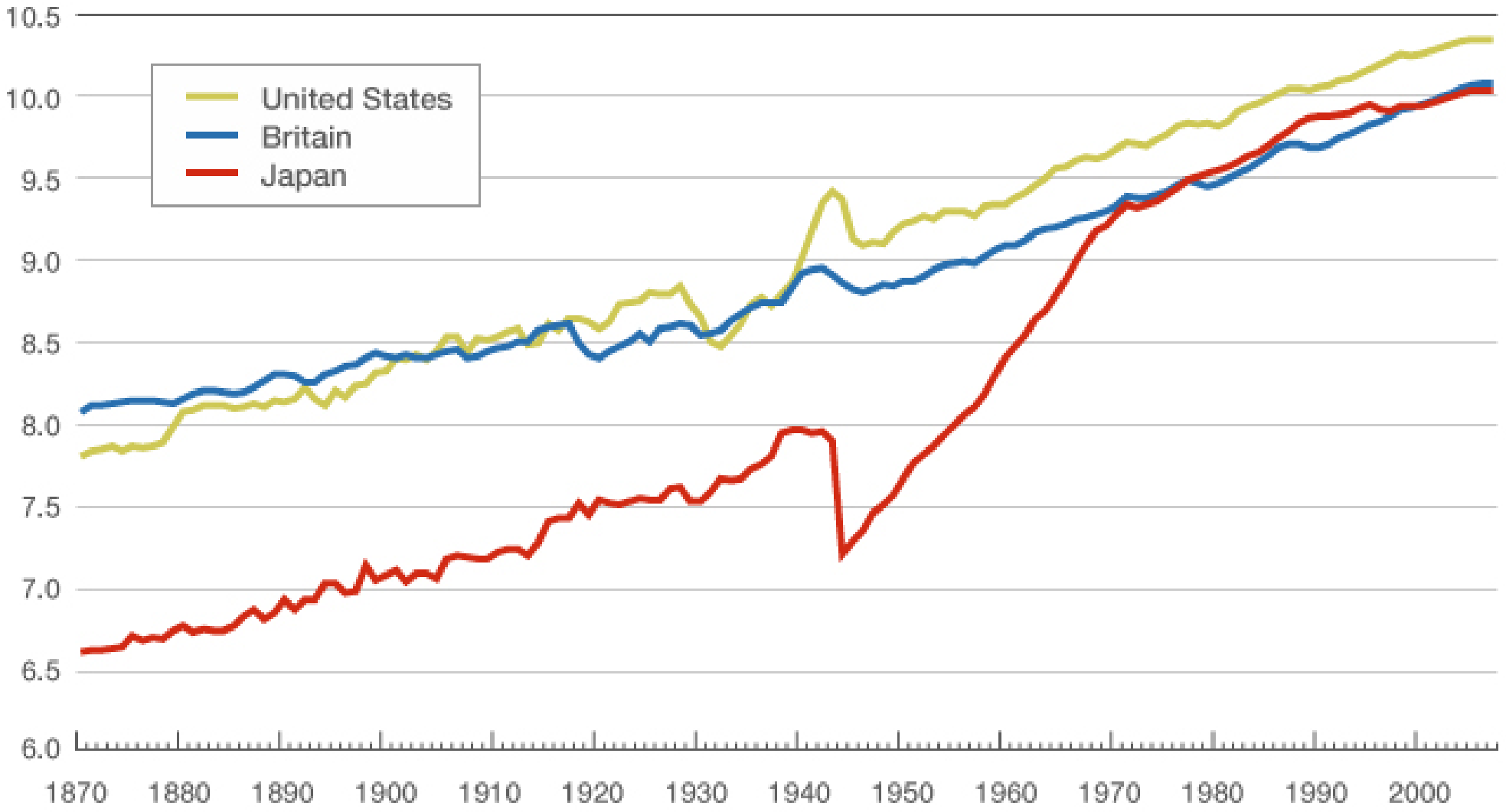
d) *Catching* up: Causas e possibilidade de novos casos?

Growth in Real Per Capita GDP in Japan, Britain, and the US, 1870–2008 (Natural log of per capita GDP in 1990 international Geary-Khamis dollars)

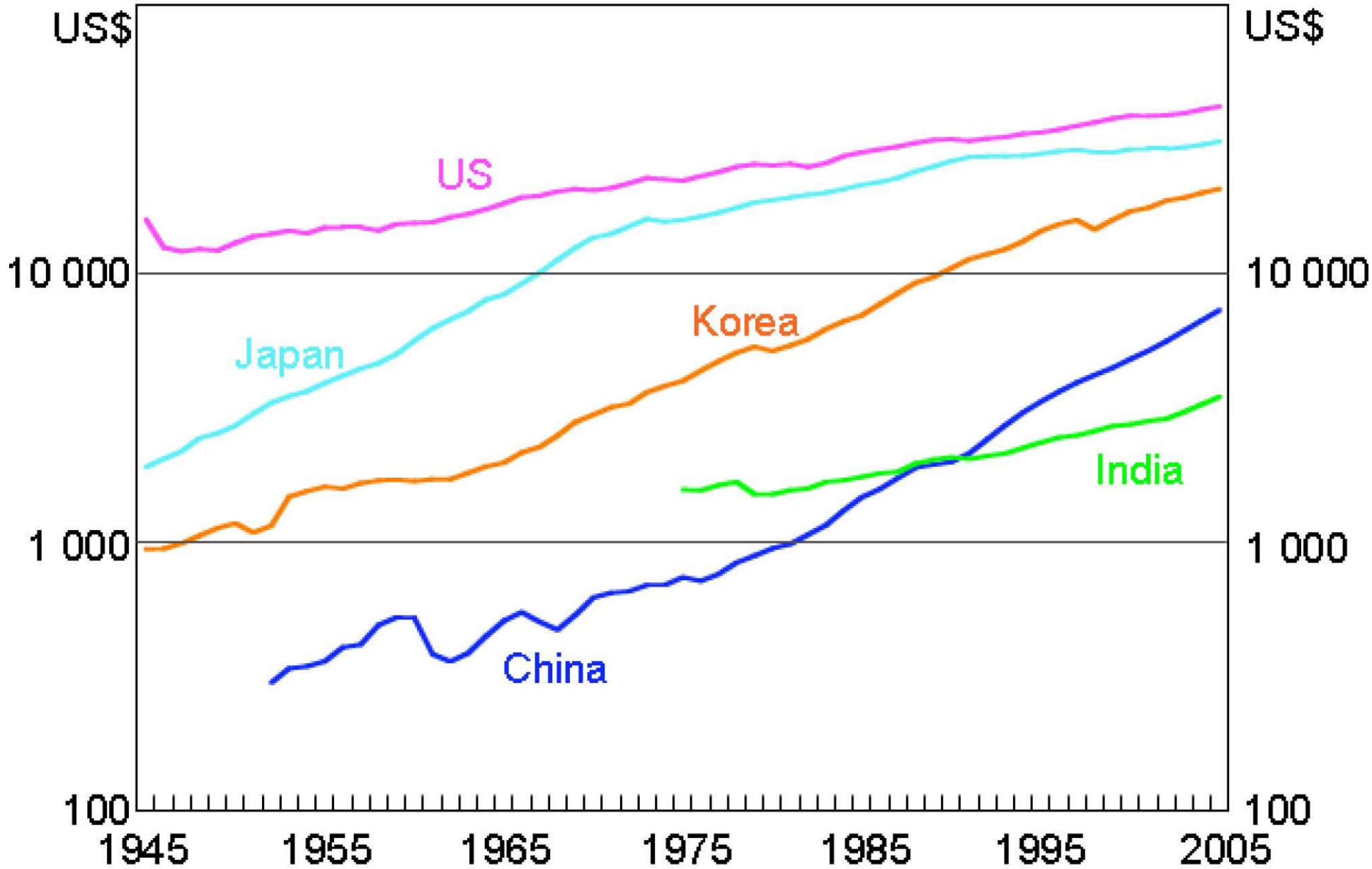


Source: The Maddison-Project
(http://www.ggdc.net/maddison/maddison-project/home.htm, 2013 version).

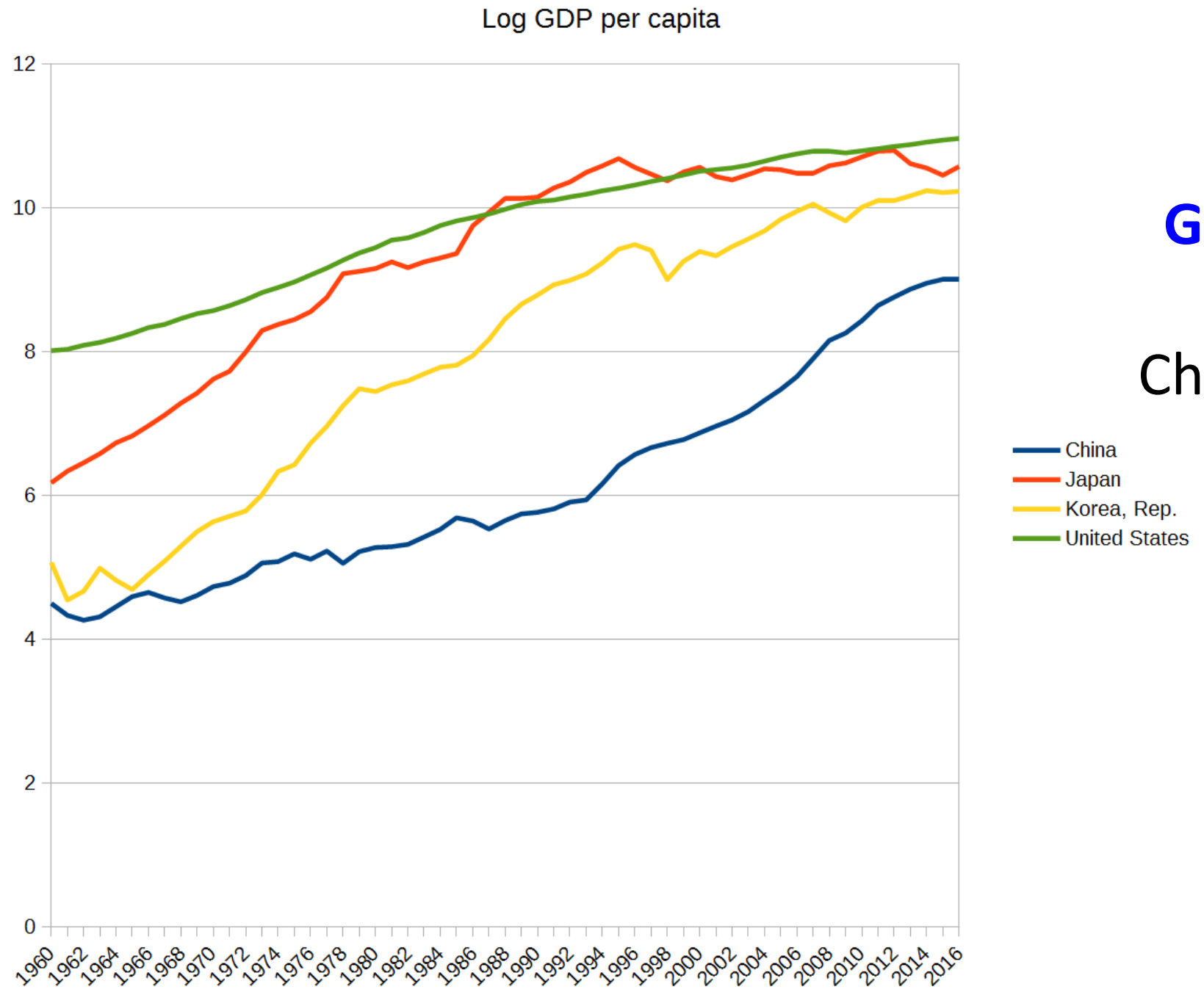
nippon.com

GDP Per Capita

2005 prices and PPP exchange rates



Sources: GGDC; IMF WEO; Maddison; Thomson Financial; World Bank



GDP per capita 1960-2016

Chart (on a log scale) of GDP per capita

US, Japan, China, Korea

from World Bank data since 1960.

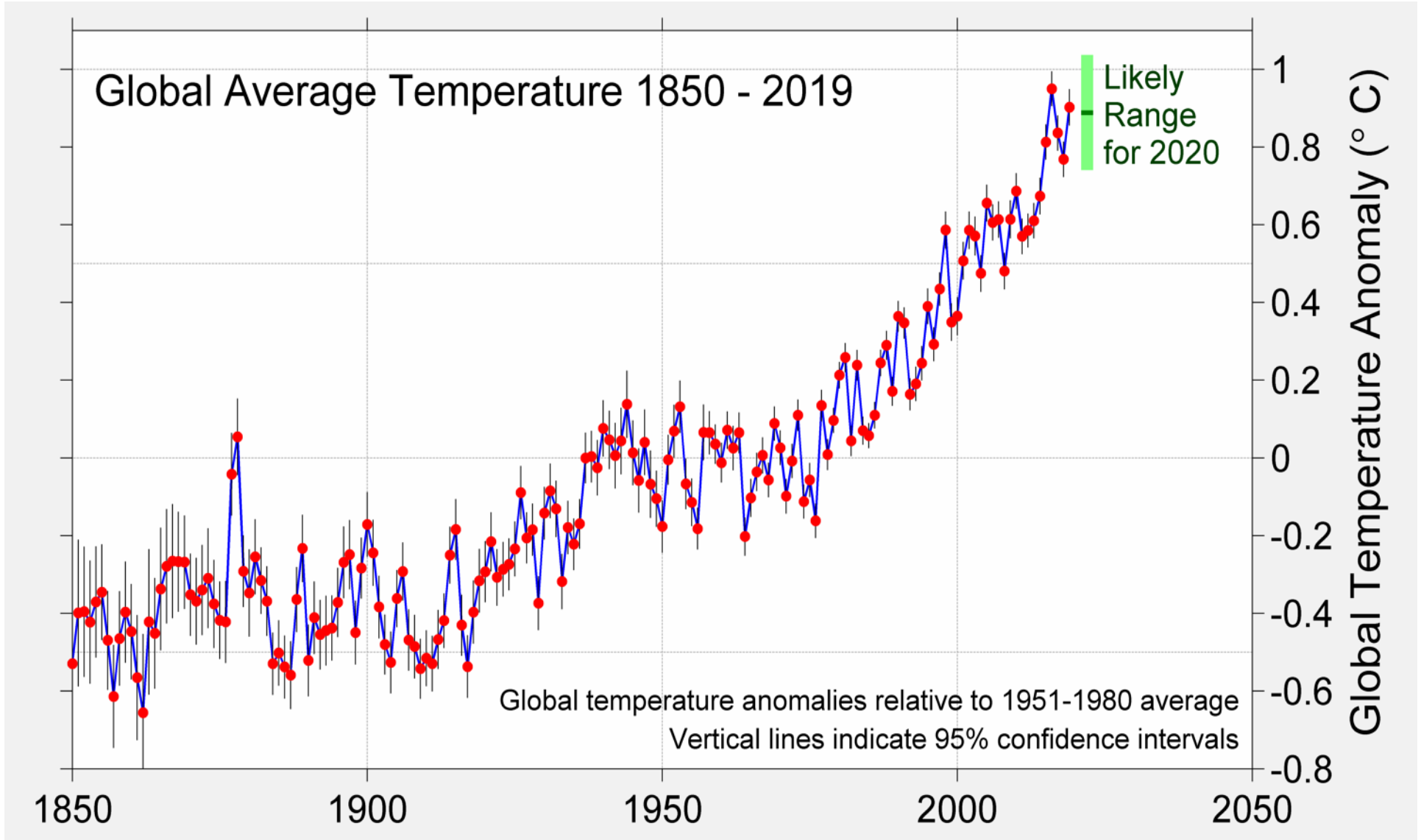
Causas?

- **Acumulação (tangível, intangível)** (ver slides em anexo sobre "educação")
- **Mudança estrutural** (ver aula sobre "dinâmicas industriais") (ponto 7)
- **Mudança institucional** (ver ponto 5)

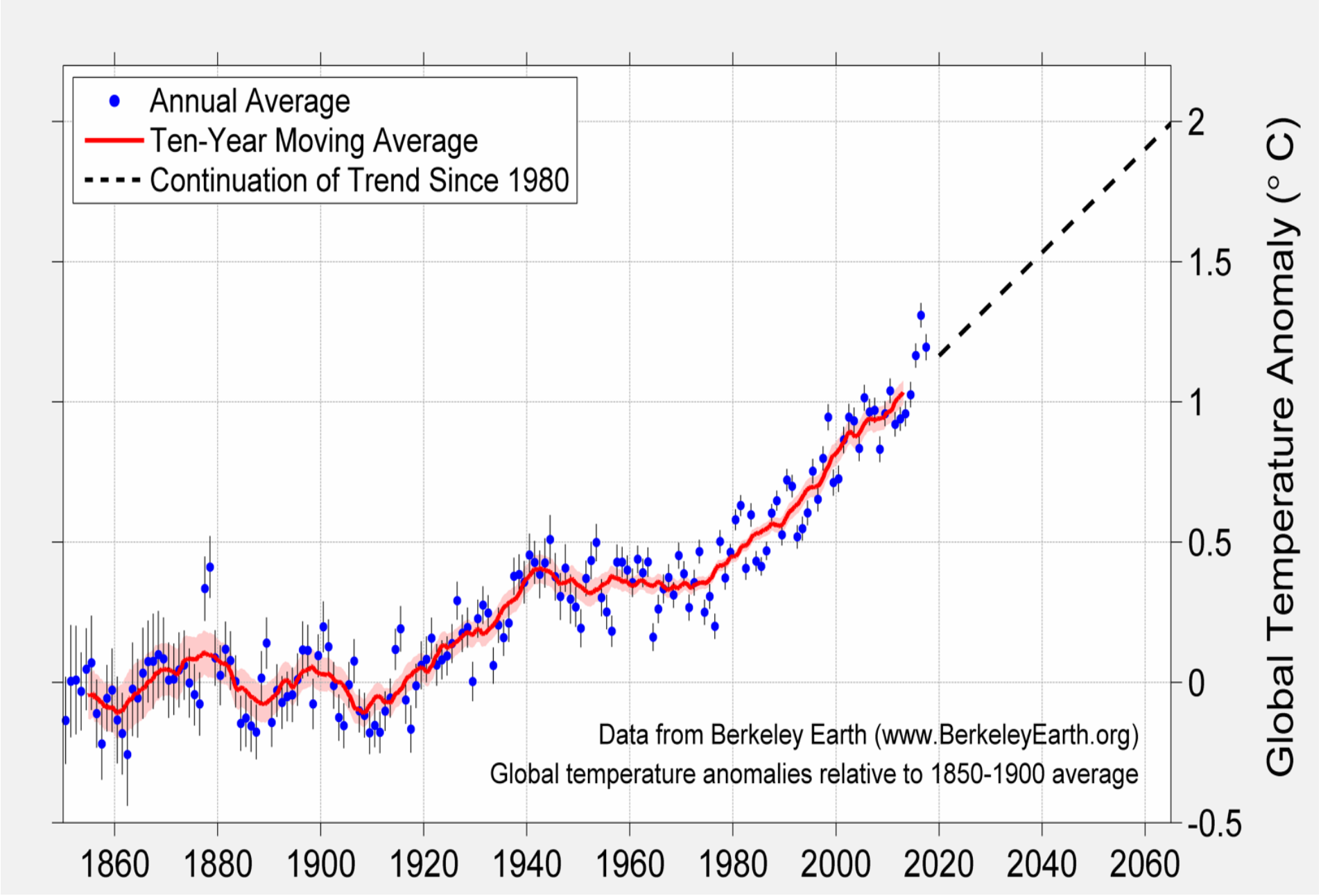
- **…. possibilidade de novos casos**?

3. A restrição ambiental

- 3 slides seguintes: http://berkeleyearth.org/global-temperatures-2017/



Source: http://berkeleyearth.org/archive/2019-temperatures/



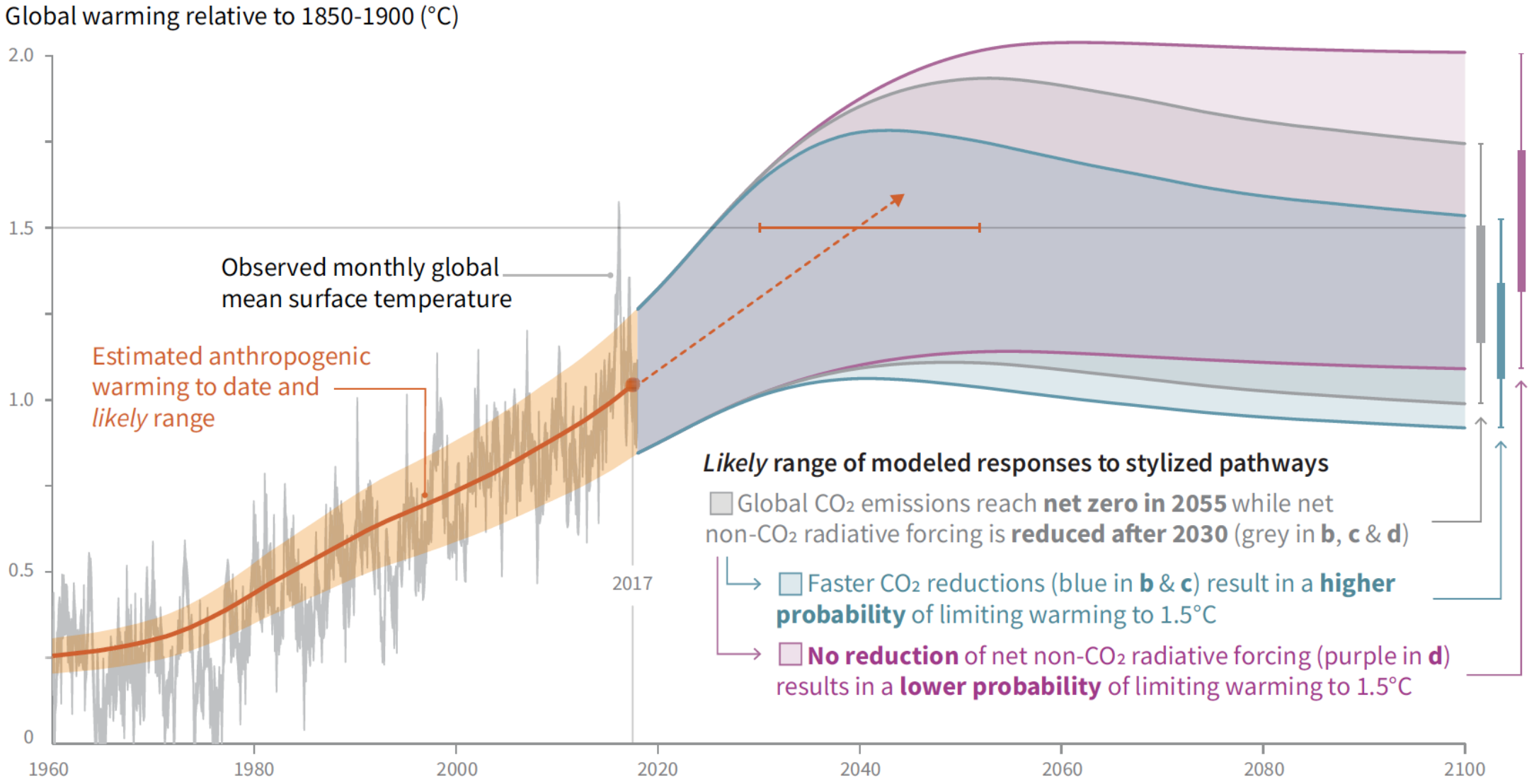
Source: http://berkeleyearth.org/archive/global-temperatures-2017/

IPCC Outubro 2018

Global warming of 1.5°C

An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty

Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways



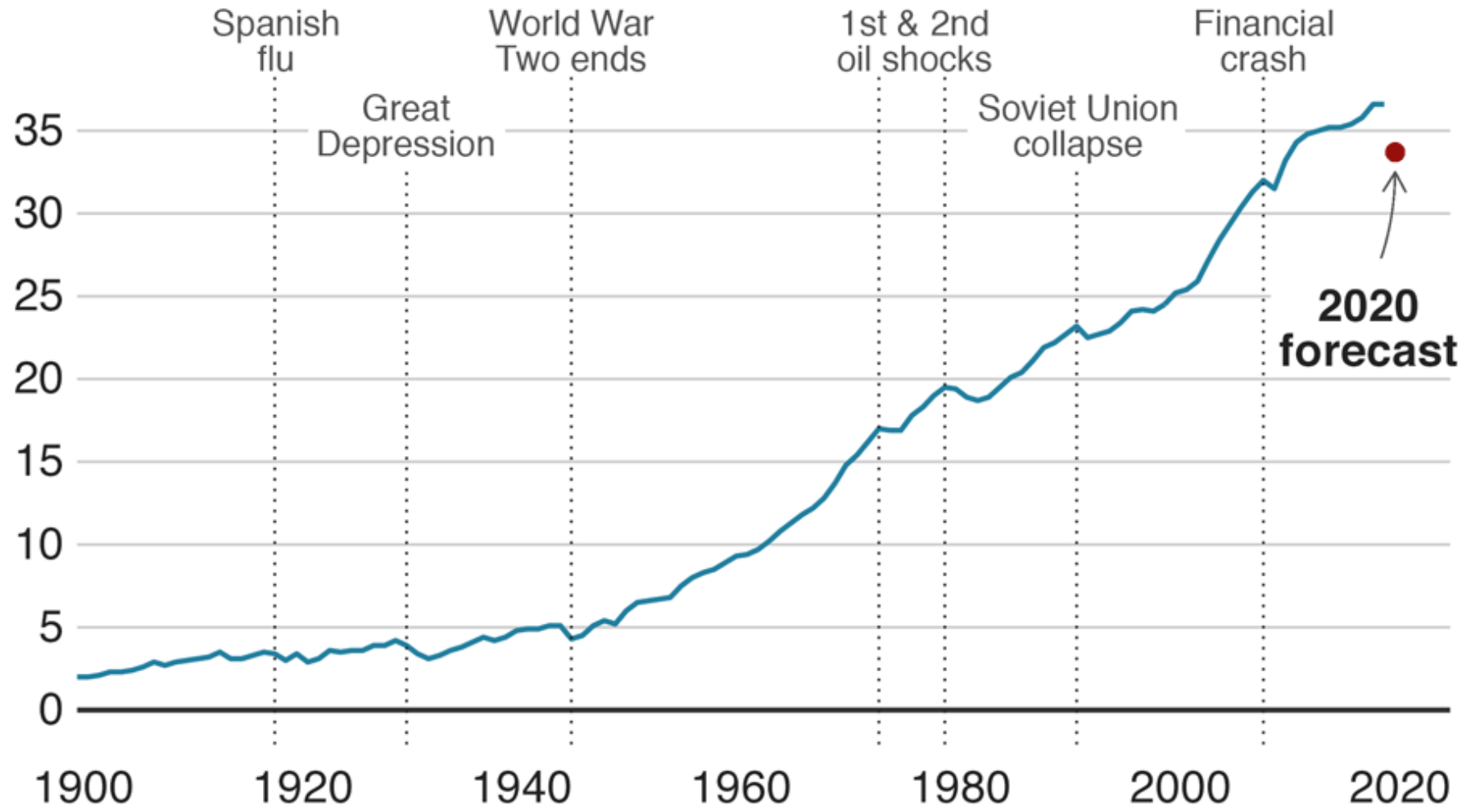
BBC News, 8 December 2018

Climate change: COP24 fails to adopt key scientific report (UN climate change conference 2018, Katowice)

- Attempts to incorporate a key scientific study into global climate talks in Poland have failed.
- The IPCC report on the impacts of a temperature rise of 1.5C, had a significant impact when it was launched last October.
- Scientists and many delegates in Poland were shocked as the US, Saudi Arabia, Russia and Kuwait objected to this meeting "welcoming" the report.
- The report said that the world is now completely off track, heading more towards 3C this century rather than 1.5C.
- Keeping to the preferred target would need "rapid, far-reaching and unprecedented changes in all aspects of society". If warming was to be kept to 1.5C this century, then emissions of carbon dioxide would have to be reduced by 45% by 2030.

Global CO2 emissions, 1900-present

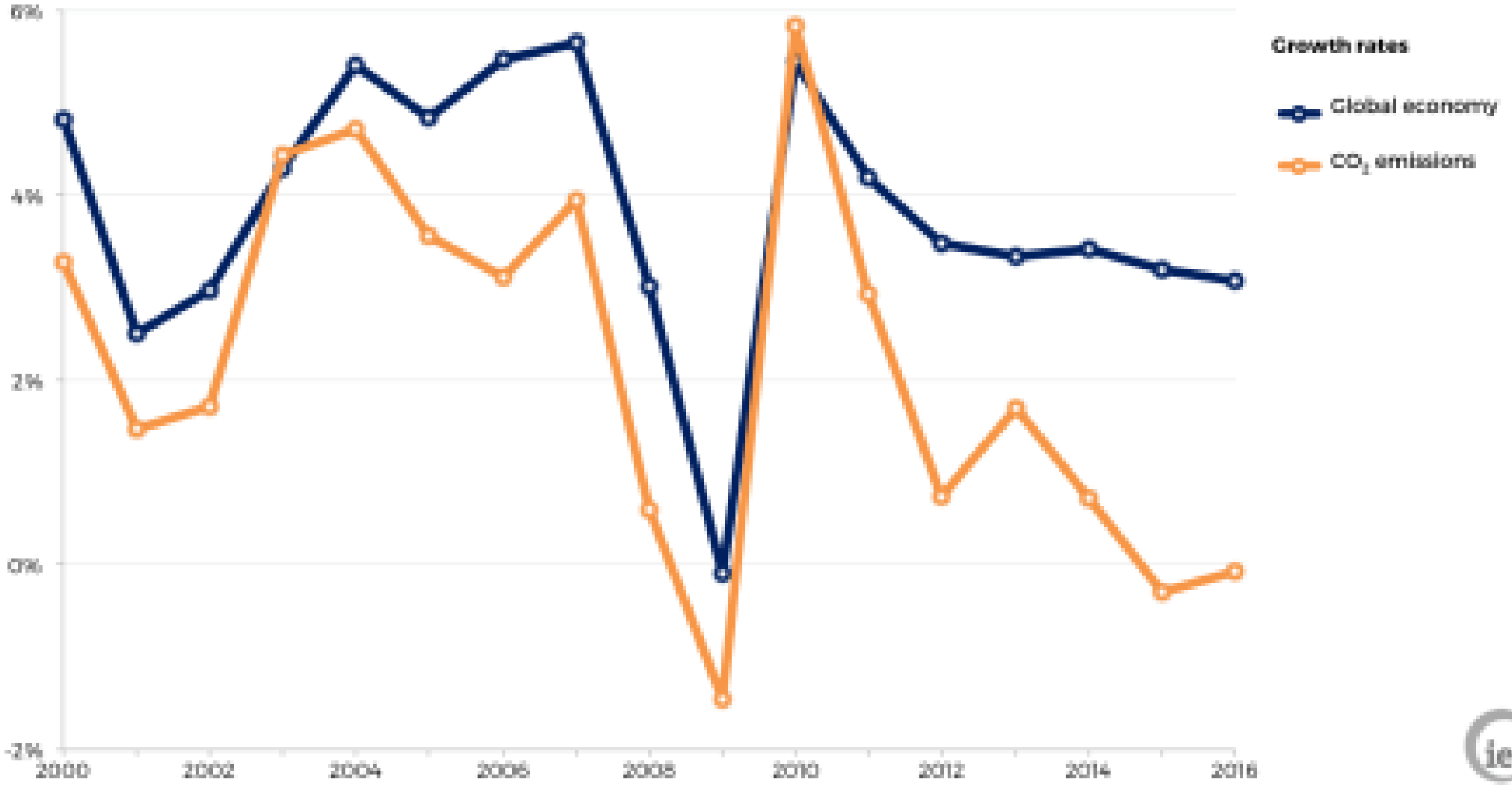
Billion tonnes of CO2 per year



Source: Global Carbon Project, CDIAC & IEA

BBC

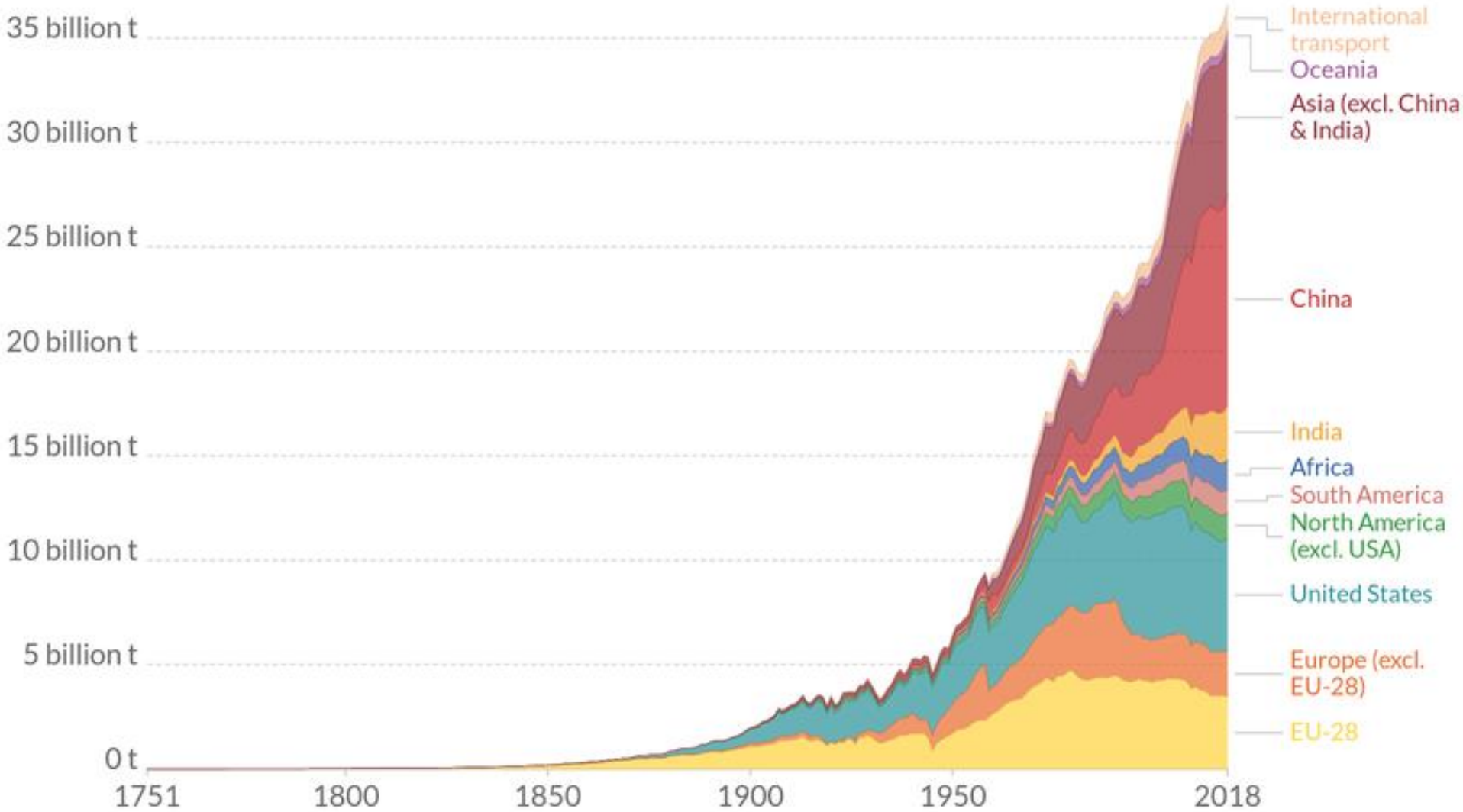
CO_2 Emissions and Global Economy Growth Rates



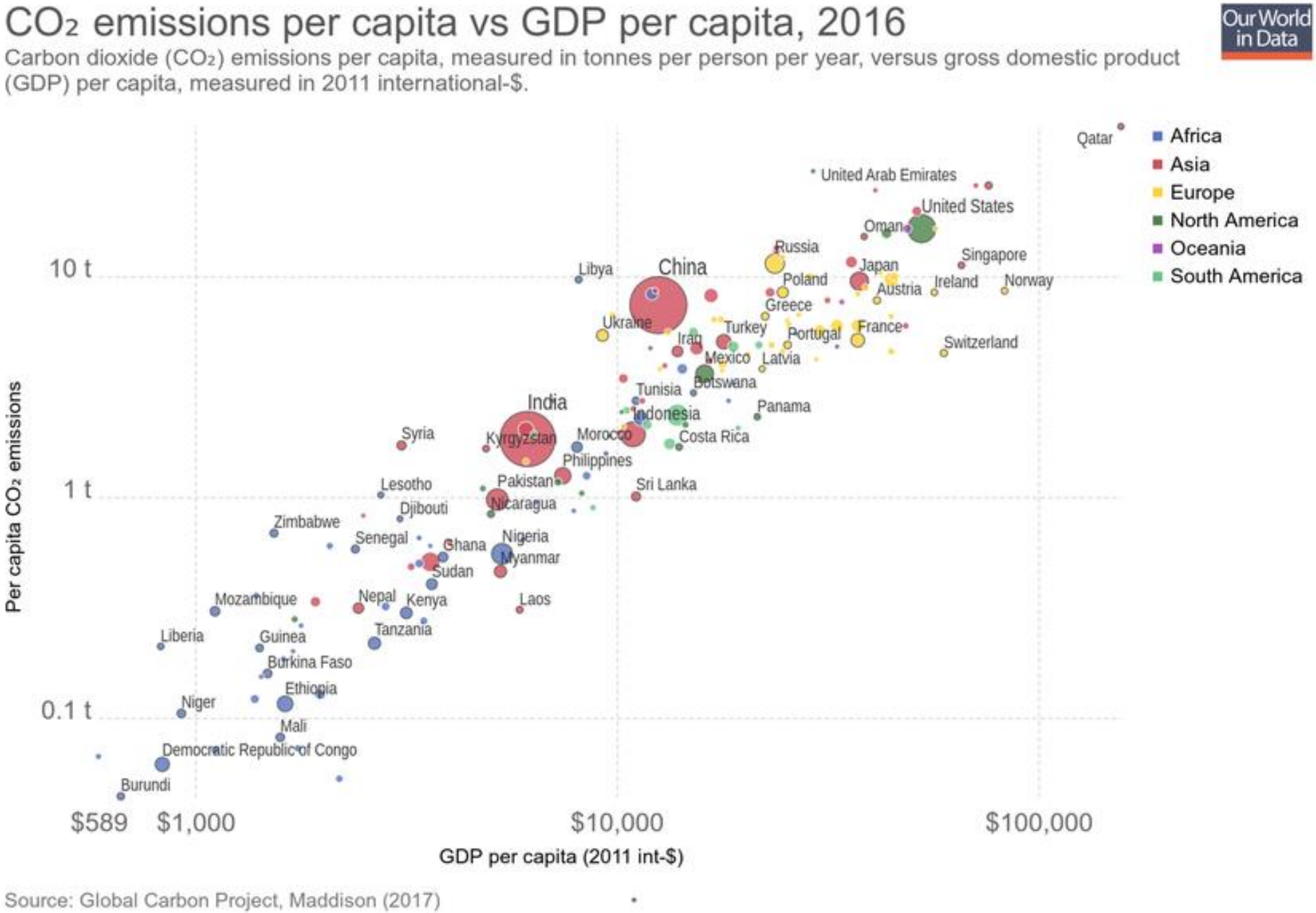
Annual total CO_2 emissions, by world region

This measures CO_2 emissions from fossil fuels and cement production only – land use change is not included.

Our World in Data

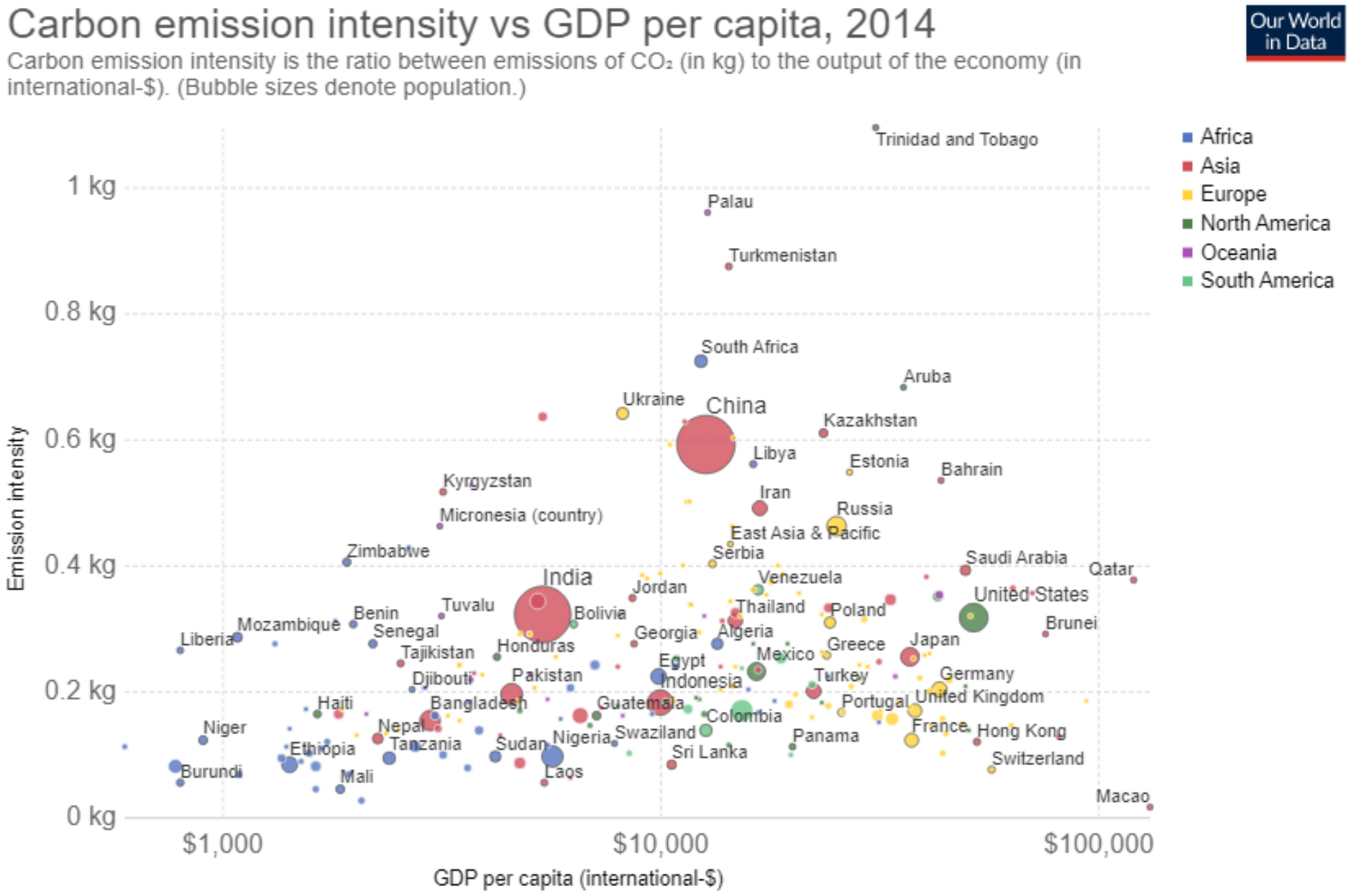


Source: Carbon Dioxide Information Analysis Center (CDIAC); Global Carbon Project (GCP)
Note: 'Statitistical differences' included in the GCP dataset is not included here.



Eixo Y: emissões CO2 per capita

Eixo X: PIB per capita



Eixo Y: emissões CO2 por unidade de PIB

Eixo X: PIB per capita

Síntese

- Tecnologias disruptivas (AI, life-enhancing technologies…)
- Destruição criativa schumpeteriana… Criação destrutiva?
- Crise ambiental: Neomalthusianismo fundamentado?
- Factores compensatórios?

Bibliografia:

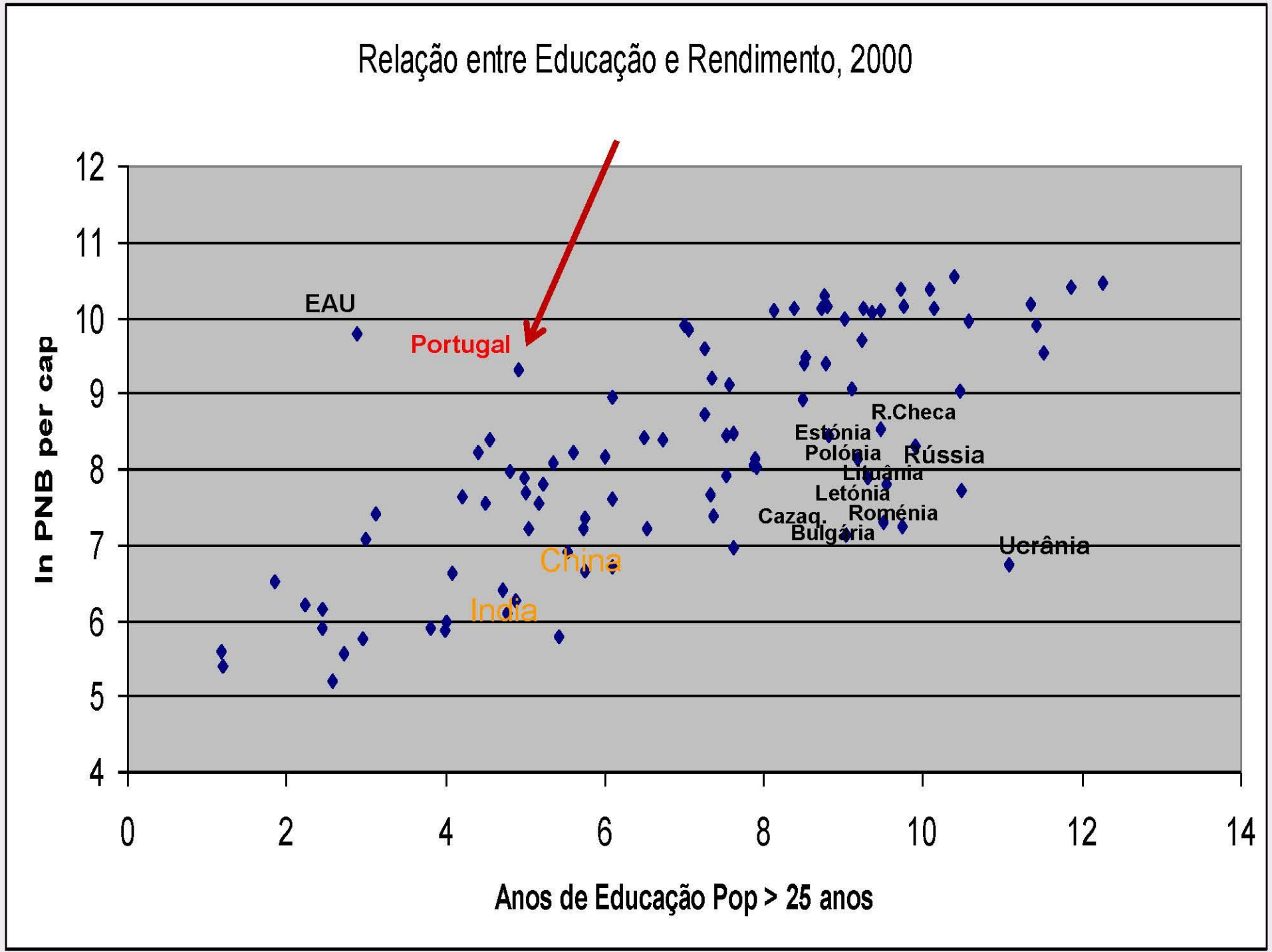
Jan Fagerberg and Manuel Mira Godinho (2006), Innovation and Catching-Up , Cap. 20 in Fagerberg, D. Mowery and R. Nelson (eds.), Oxford Handbook of Innovation, Oxford Univ. Press.

Manuel Mira Godinho (2016), Uma Brevíssima. História do Futuro. Ensaio sobre como limitar os futuros possíveis a futuros preferíveis. Apresentado como “lição de sapiência na abertura do ano lectivo 2016/2017, ISEG”. https://www.iseg.ulisboa.pt/aquila/getFile.do?method=getFile&fileId=806082

IPCC (2018), SPECIAL REPORTGlobal Warming of 1.5 ºC, An IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. https://www.ipcc.ch/sr15/

Max Roser (2018) - "Economic Growth". Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/economic-growth

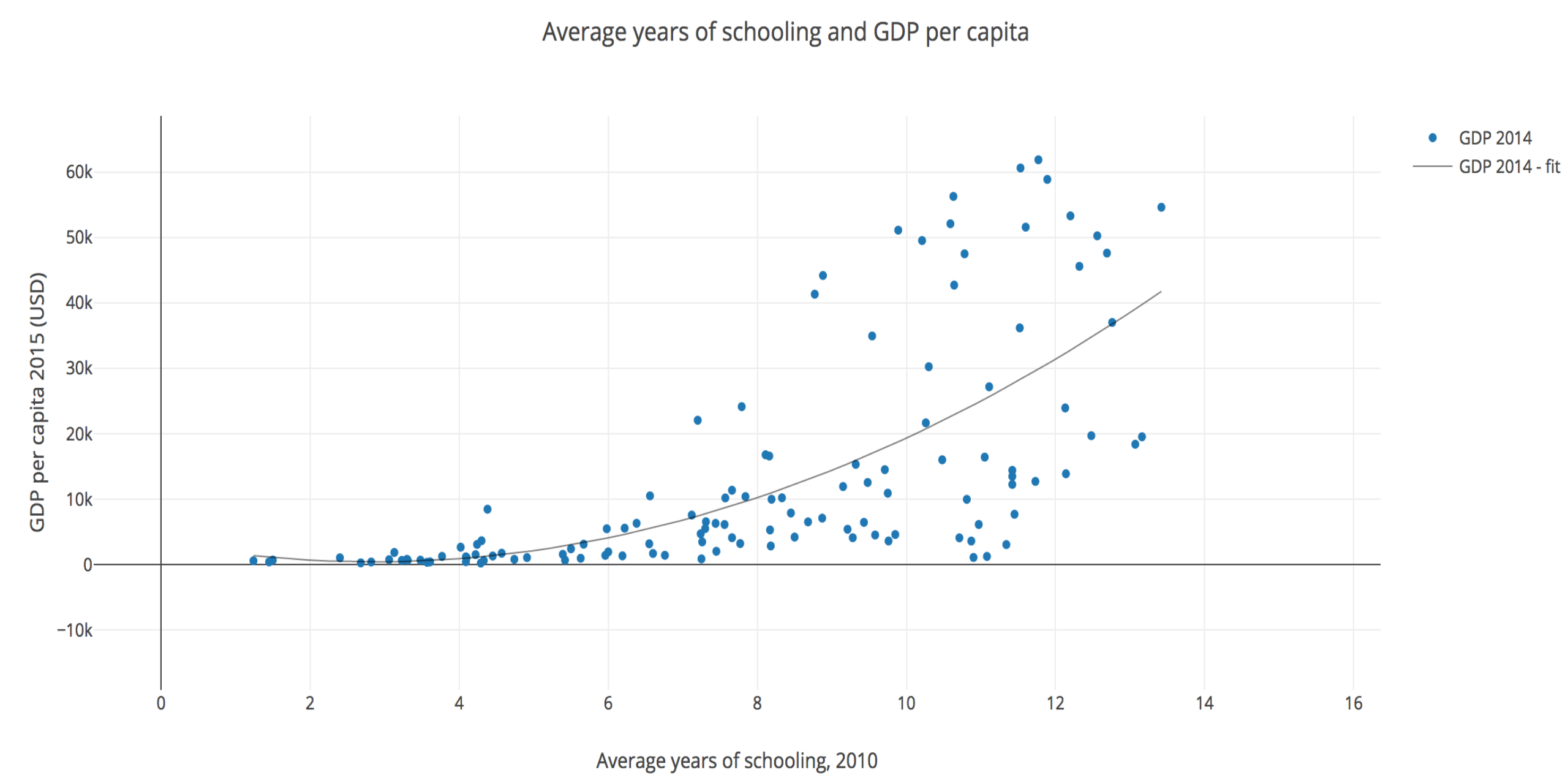
Anexo: educação e PIB per capita


Relação entre Educação e Rendimento, 2000
ln PNB per cap
12
11
10
9
8
7
6
5
4
0
2
4
6
8
10
12
14
Anos de Educação Pop > 25 anos
EAU
Portugal
China
India
R.Checa
Estónia
Polónia
Rússia
Lituânia
Letónia
Cazaq.
Roménia
Bulgária
Ucrânia

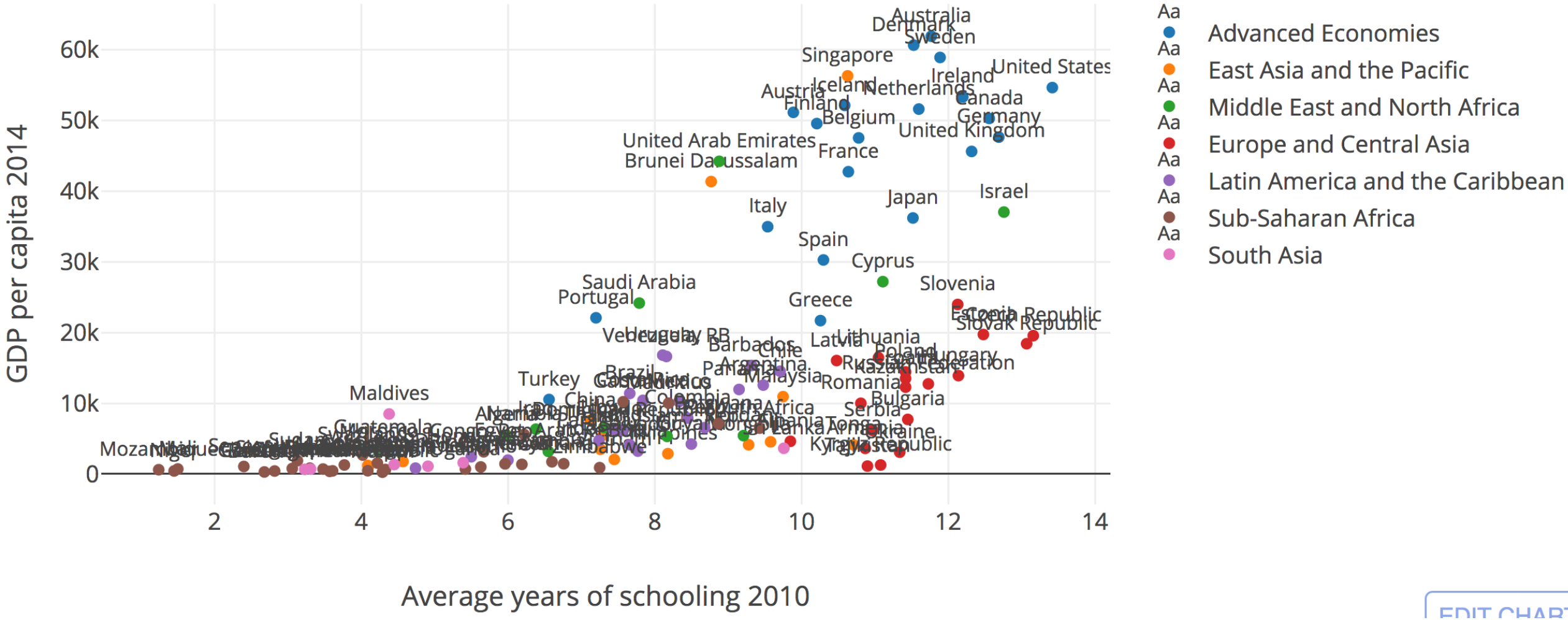
Fontes quadro anterior:

Average years of schooling of population over 25 years of age in 2000 or last year available (1990 for Estonia, Kazakhstan, Latvia, Lithuania and Vietnam, and 1980 for St.Vincent) from *Barro and Lee database*. The data for Cote d'Ivore, Lebanon, Morocco, Nigeria and Tanzania are from the *Human Development Report 1994*, The number for Belize comes from *http://www.ethnologue.com/*. The number for Ukraine is the value for mean actual years of schooling in 2000 from *Gorodnichenko and Sabirianova's working paper "Returns to Schooling in Russia and Ukraine: A Semiparametric Approach to Cross-Country Comparative Analysis," University of Michigan working paper, September 2004.*

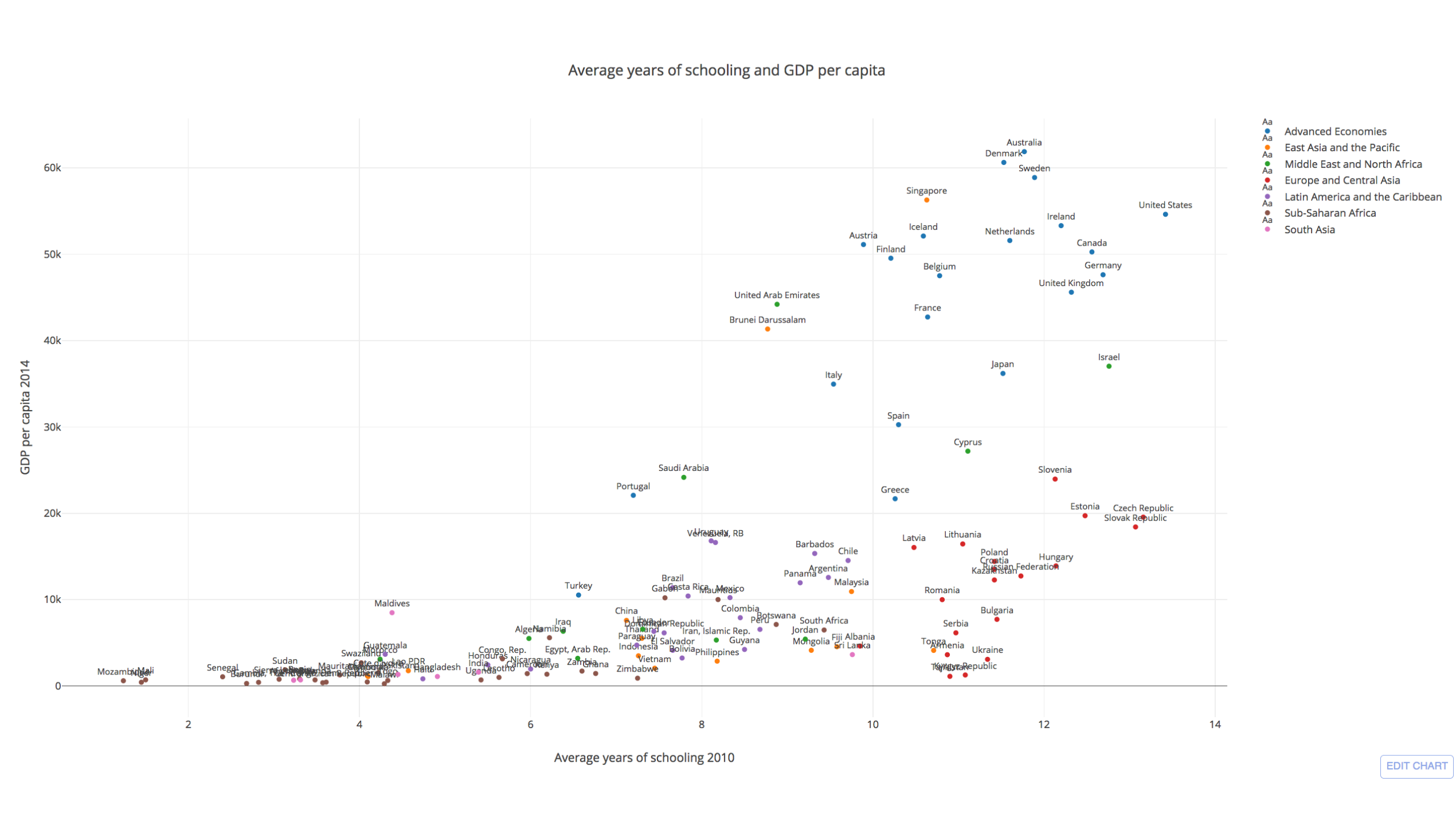
Logarithm of GNP per capita in 1999, Atlas method, expressed in current US dollars. When 1999 income data in US dollars was not available, the latest available number was used (1996 for Kuwait, 1997 for Cayman Islands, Gibraltar, Turks and Caicos Island, 1998 for Anguilla, Bahrain, Netherlands Antilles, United Arab Emirates). Income for Anguilla, the British Virgin Islands, the Cayman Island, Gibraltar, Monaco, the Netherlands Antilles, and the Turks and Caicos Islands is GDP per capita (PPP) from the CIA World Factbook. *Source: World Development Indicators*.


Average years of schooling and GDP per capita
GDP 2014
GDP 2014 - fit
GDP per capita 2015 (USD)
60k
50k
40k
30k
20k
10k
0
−10k
0
2
4
6
8
10
12
14
16
Average years of schooling, 2010

Average years of schooling and GDP per capita



EDIT CHART


Average years of schooling and GDP per capita
GDP per capita 2014
Average years of schooling 2010
60k
50k
40k
30k
20k
10k
0
2
4
6
8
10
12
14
Advanced Economies
East Asia and the Pacific
Middle East and North Africa
Europe and Central Asia
Latin America and the Caribbean
Sub-Saharan Africa
South Asia
Australia
Denmark
Sweden
Singapore
United States
Ireland
Iceland
Austria
Netherlands
Canada
Finland
Belgium
Germany
United Kingdom
United Arab Emirates
France
Brunei Darussalam
Japan
Israel
Italy
Spain
Cyprus
Saudi Arabia
Slovenia
Portugal
Greece
Estonia
Czech Republic
Slovak Republic
Latvia
Lithuania
Barbados
Chile
Poland
Hungary
Argentina
Panama
Malaysia
Romania
Turkey
Brazil
Gabon
Costa Rica
Mexico
Maldives
Bulgaria
China
Colombia
Botswana
South Africa
Serbia
Iraq
Peru
Jordan
Fiji
Albania
Guatemala
Mongolia
Tonga
Armenia
Ukraine
Egypt, Arab Rep.
Guyana
Philippines
Bolivia
Zambia
Zimbabwe
Vietnam
Mozambique
Mali
Niger
Senegal
Sudan
Haiti
Bangladesh
Lesotho
Uganda
India
Honduras
Nicaragua
Congo, Rep.
Swaziland
Lao PDR
Ghana
Kyrgyz Republic

EDIT CHART

Fonte dos 3 slides anteriores:
https://alexandreafonso.me/2015/10/06/education-and-gdp-per-capita/