



# FRAMING MEASUREMENT BEYOND GDP

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# Outline

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1. Introduction: *Beyond GDP, GDP and Beyond*
2. *Production sphere*: what gets in and what comes out of the "factory gates"
3. *Well-being sphere*: what shapes people's lives?
4. *Asset sphere*: the resources for future well-being
5. Conclusions



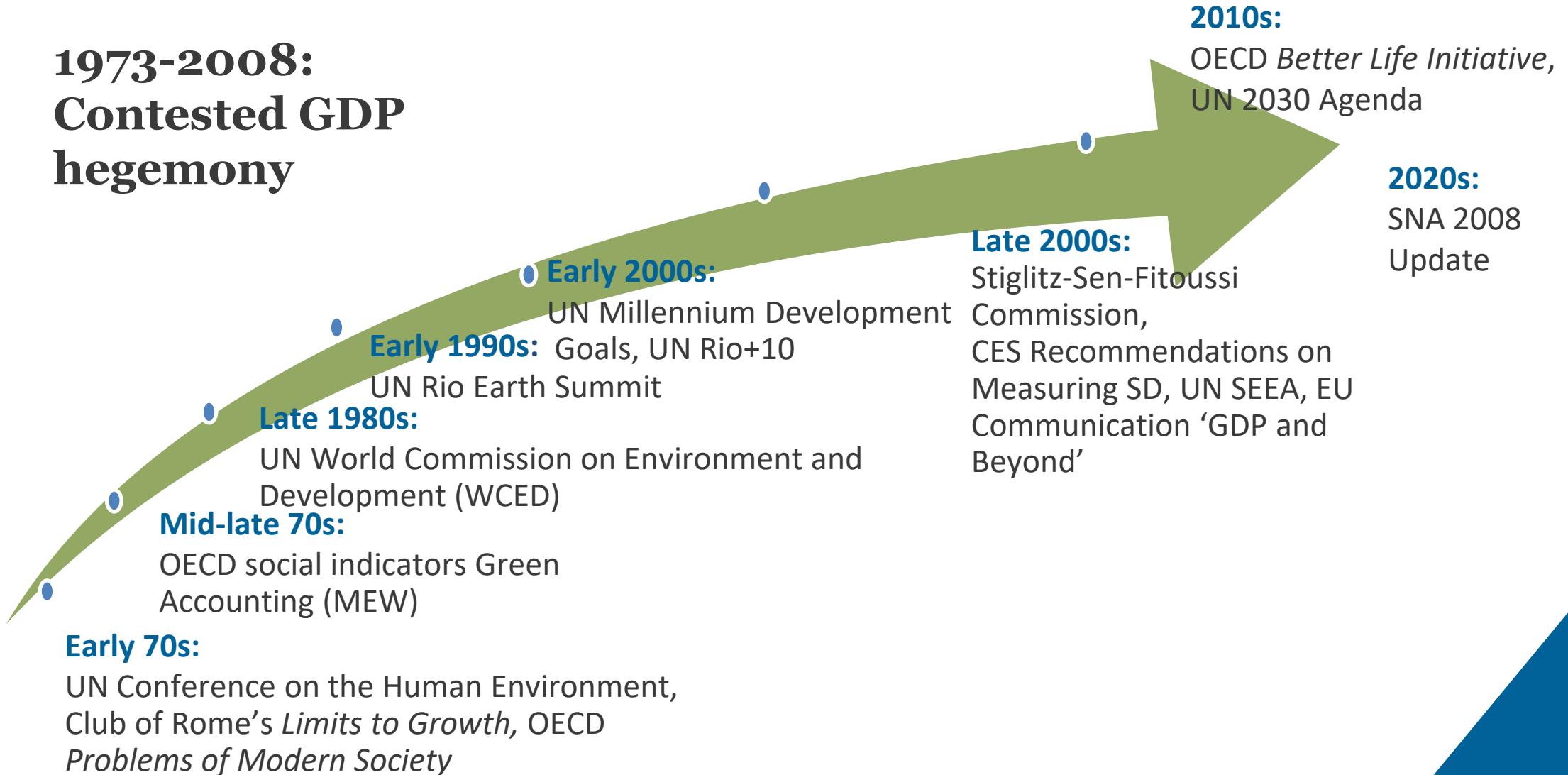
# Beyond GDP, GDP and Beyond

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- New **social, environmental and economic issues** over the last two decades
- Pandemic: *'Building Back Better'*
- **GDP not enough** as a guide
- Alternative single indexes and dashboards



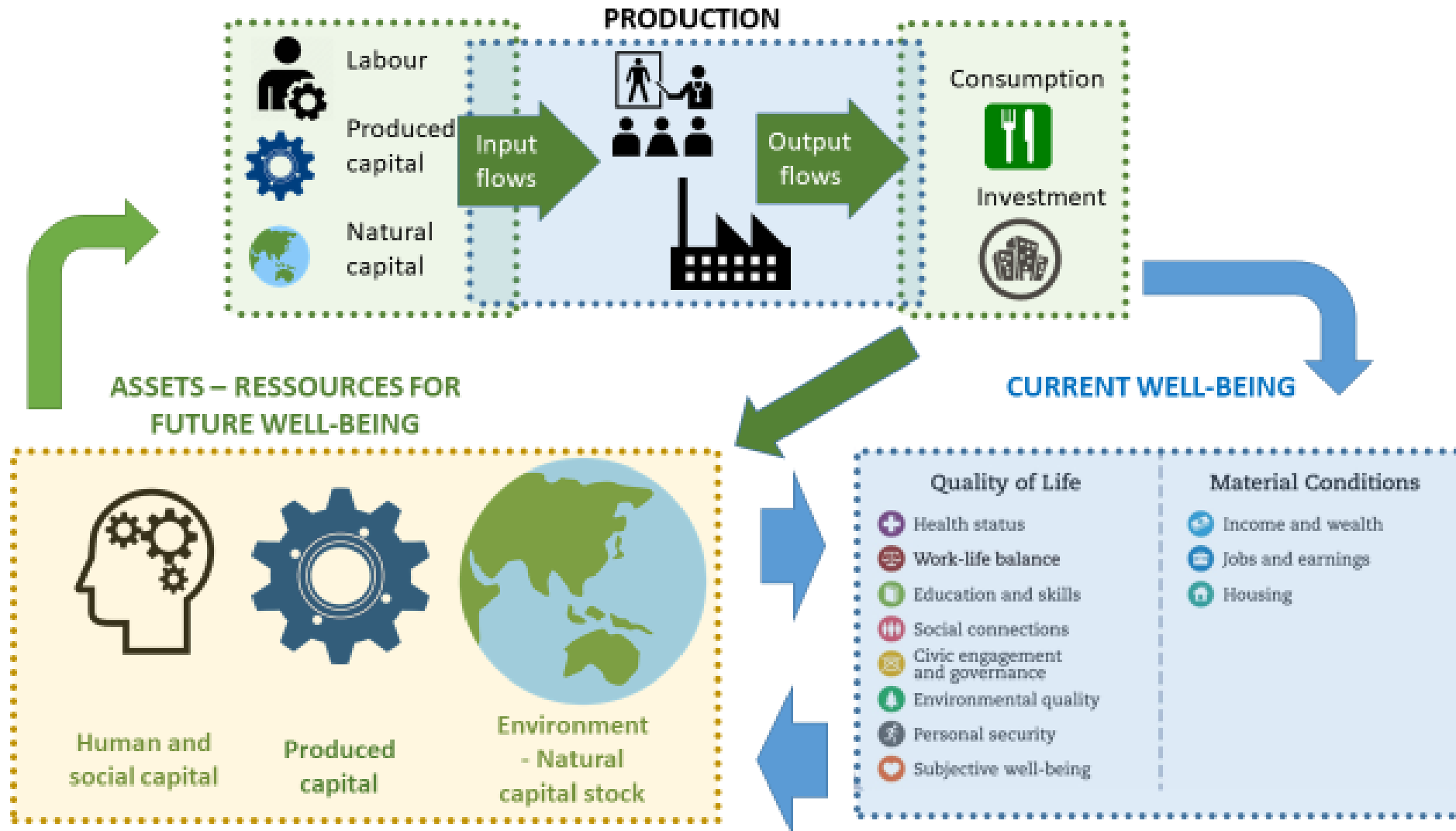
# Moving 'Beyond GDP': a long journey with many different approaches (incomplete)





# Framing Measurement: Three Spheres

## Basic features in line with Green Accounting Literature

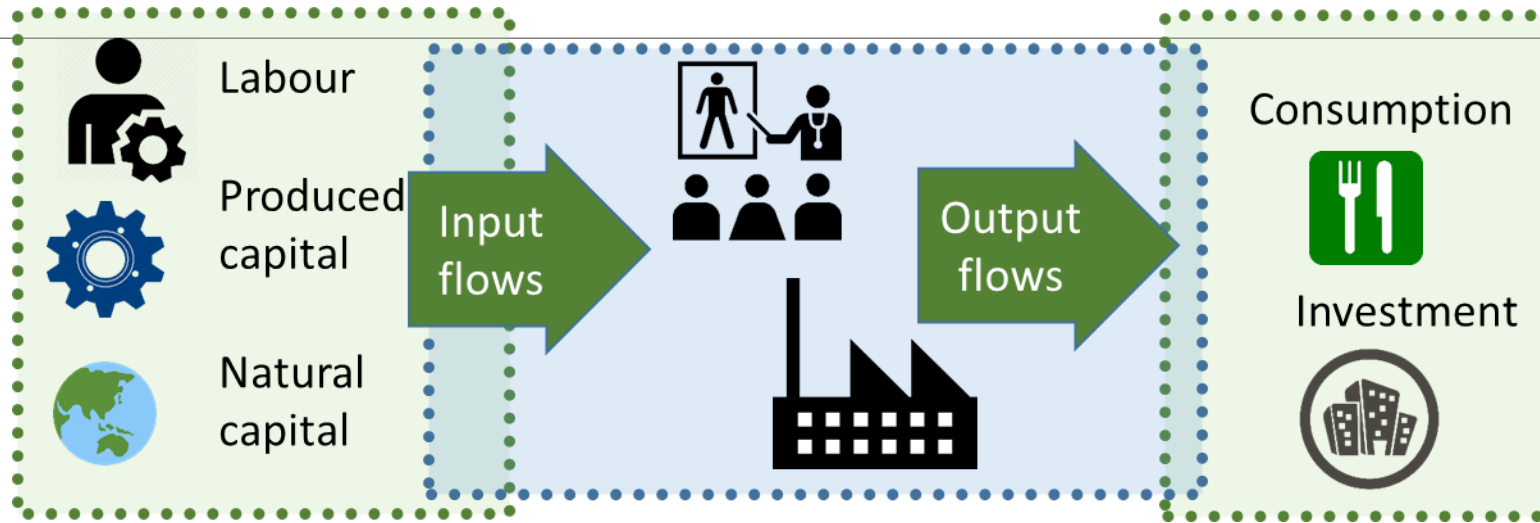




*Production sphere: what gets in and what comes out of the "factory gates"*



# Production sphere



$\phi^t \equiv [(Q, L, S_K, S_N) : (L, S_K, S_N) \text{ can produce } Q \text{ in period } t]$

$Q$ : GDP

$S_K$ : capital services from 'SNA'-type assets

(M&E, structures, R&D, land, subsoil, mineral assets, timber,...)

$S_N$ : non-market ecosystem services

$L$ : Labour



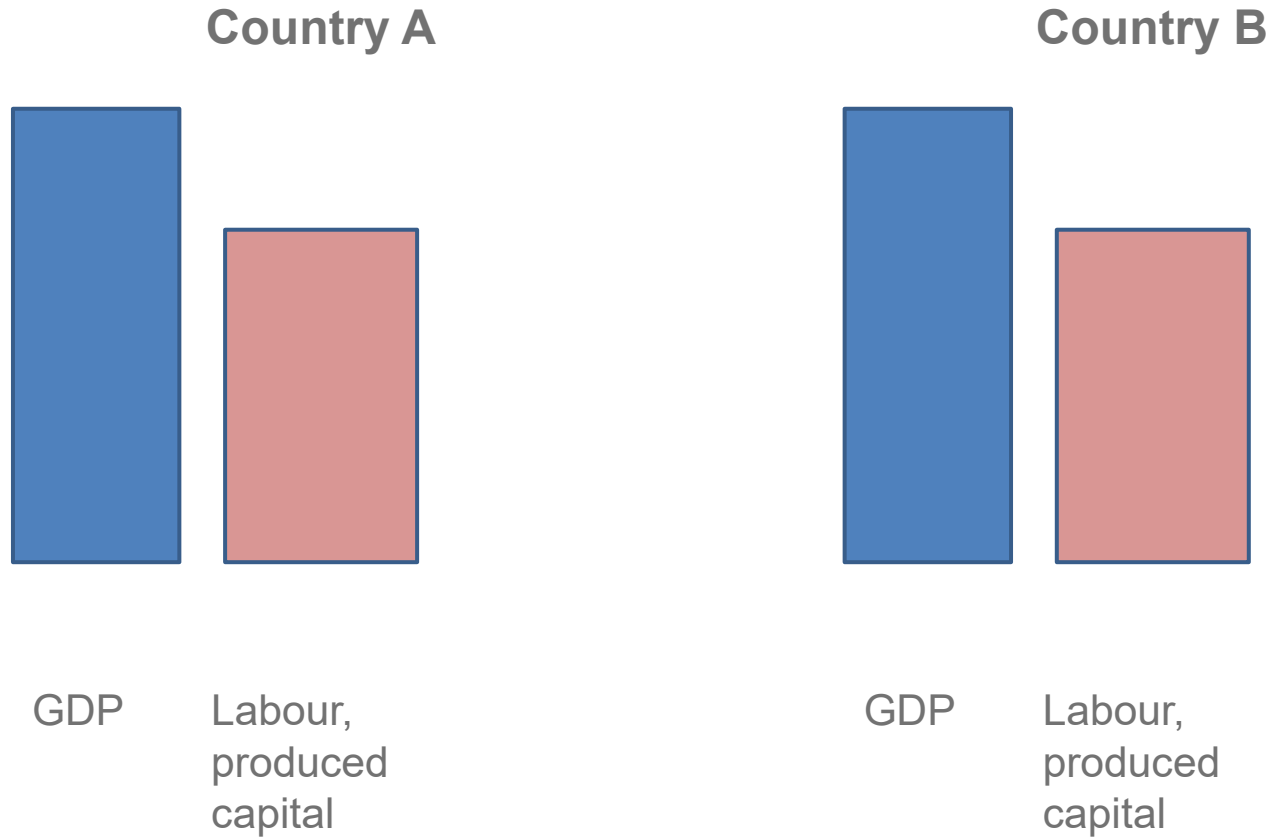
# Productivity – growth accounts: what’s missing? (1)

- Full set of capital services from ‘SNA’ assets  $S_K$ . Often missing:
  - Land
  - Subsoil assets
  - Minerals
- Selected ‘bad’ outputs (or quality adjustment of ‘pieces of ‘good’ outputs)
  - Air emissions
  - ....
- Abatement is costly
  - Pollution growth < GDP growth
  - Effective output growth > GDP
  - MFP growth has been *understated*



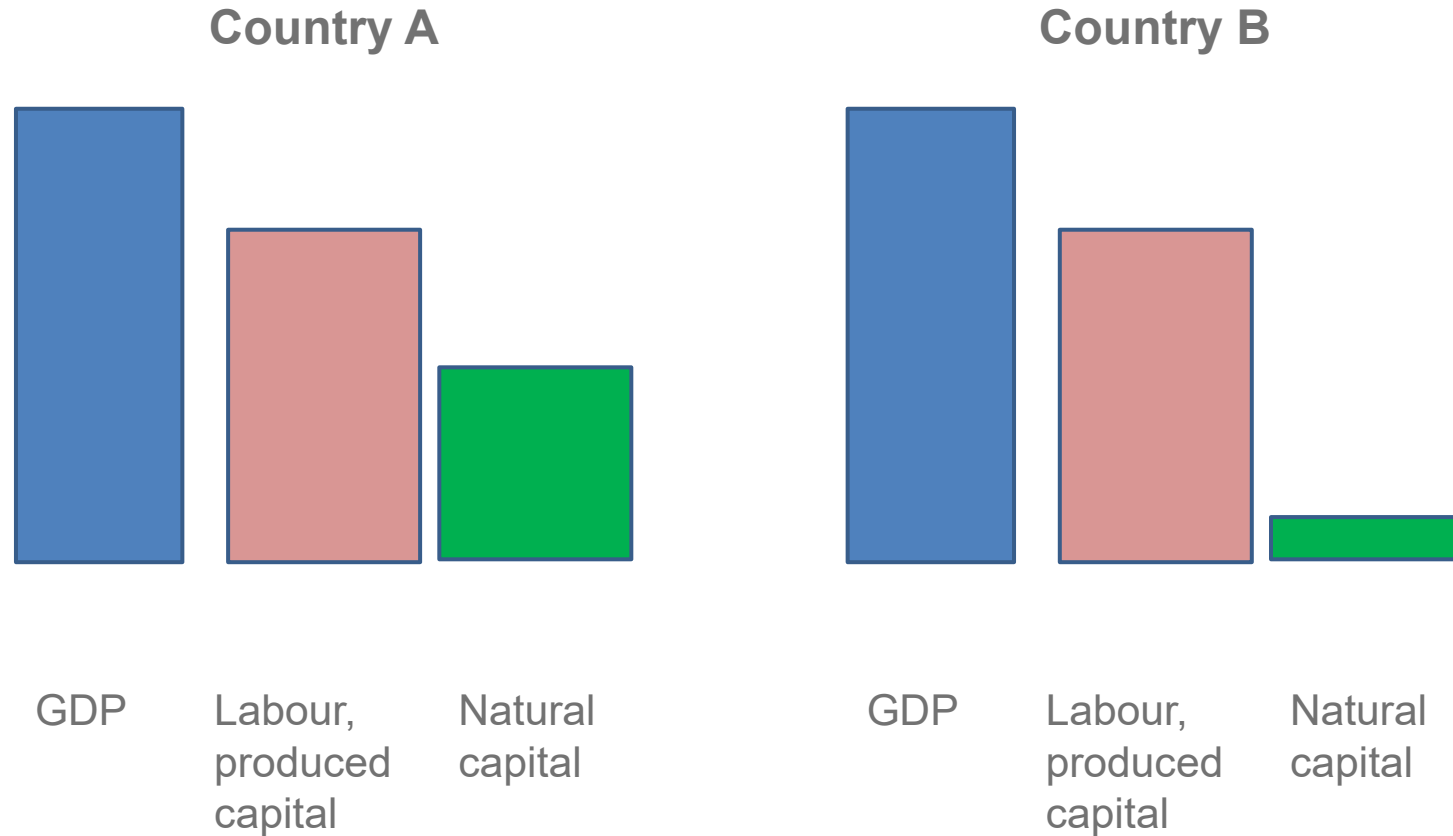


# Intuition





# Intuition (2) – same productivity?

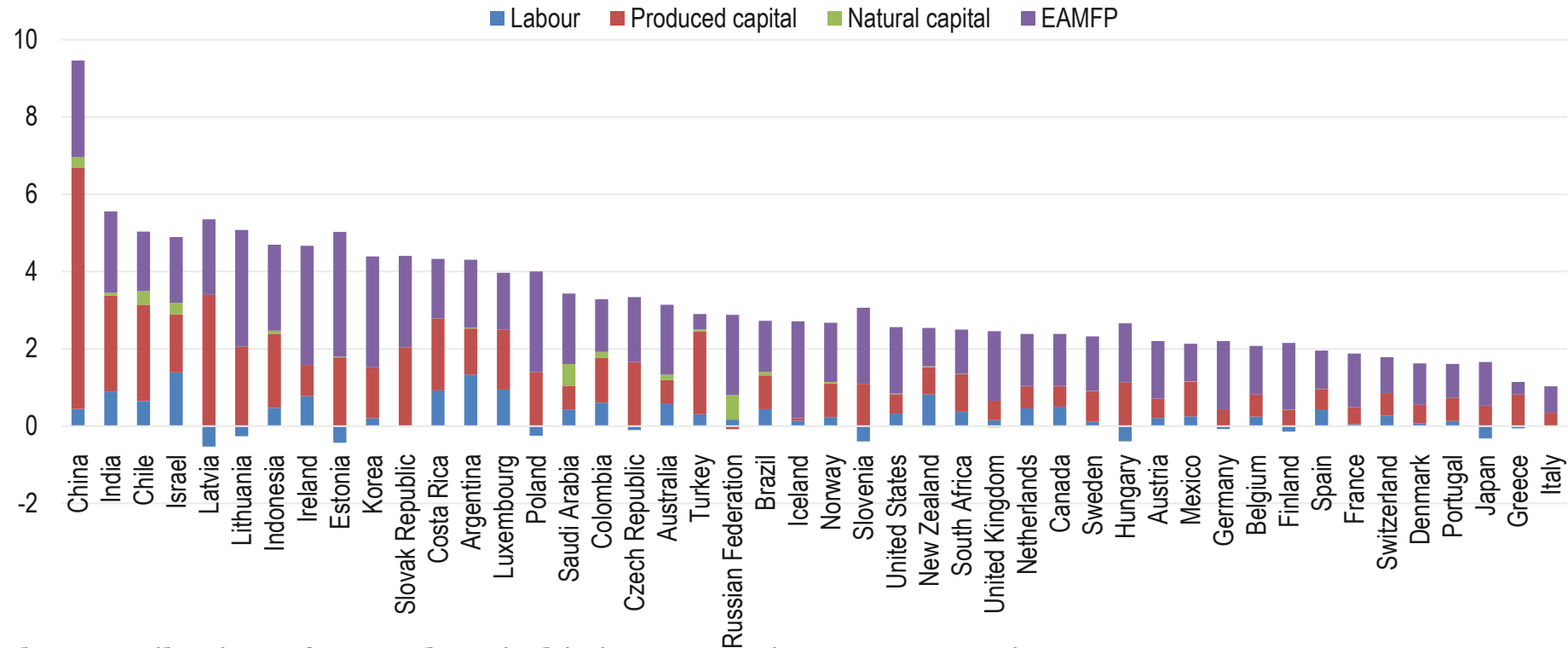


Similar: Country A or B over time



# Results

## Identification of sources of growth (1991-2013)



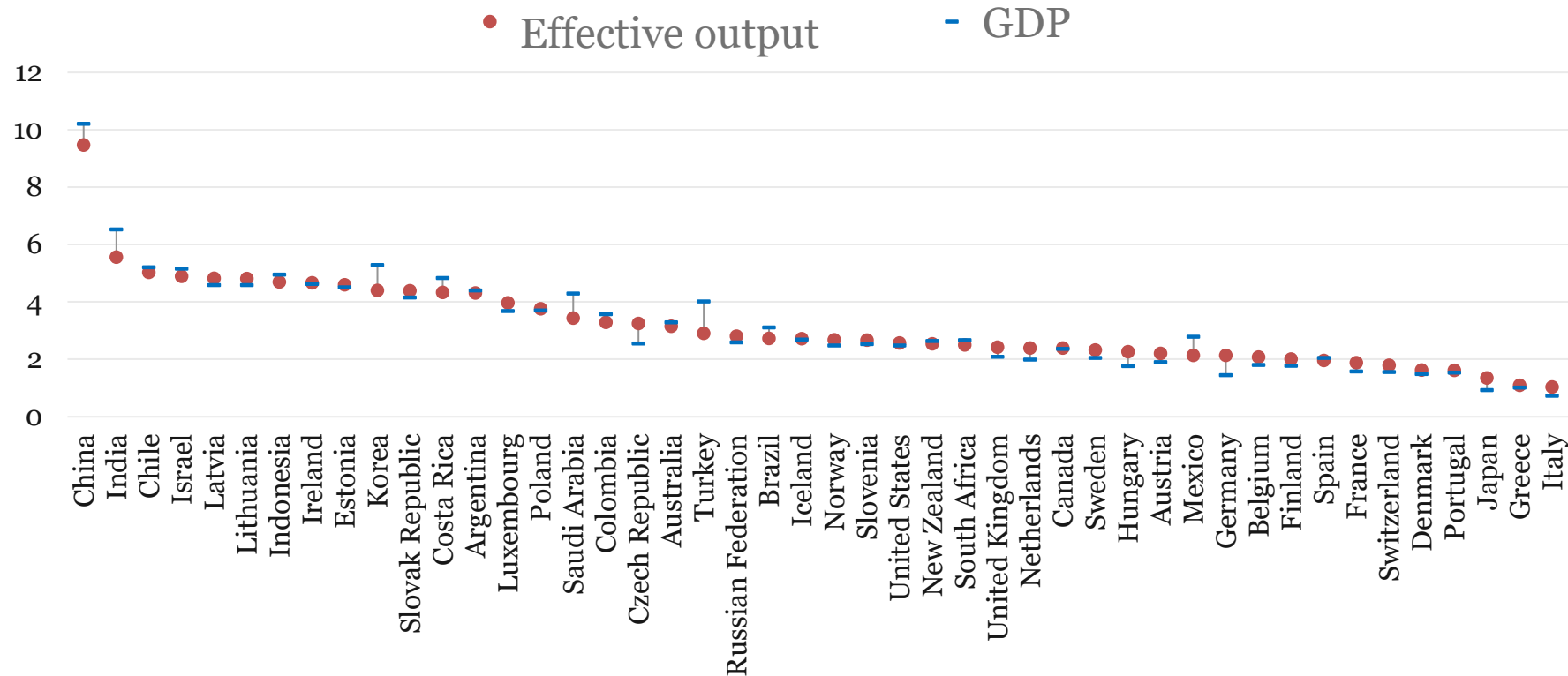
- The contribution of natural capital is important in some countries
- Some countries are becoming less dependent on natural resources to sustain growth
- EAMFP growth is the main component of output growth for most countries.

Source: Cárdenas Hašič and Souchier (2018)



# Results

## GDP growth + adjustment for air pollution abatement (1991-2013)



- Countries that have increased emissions: effective growth < GDP growth
- Countries that have decreased emissions: effective growth > GDP growth
- The adjustment is small for many countries

Source: Cárdenas Haščíč and Souchier (2018)

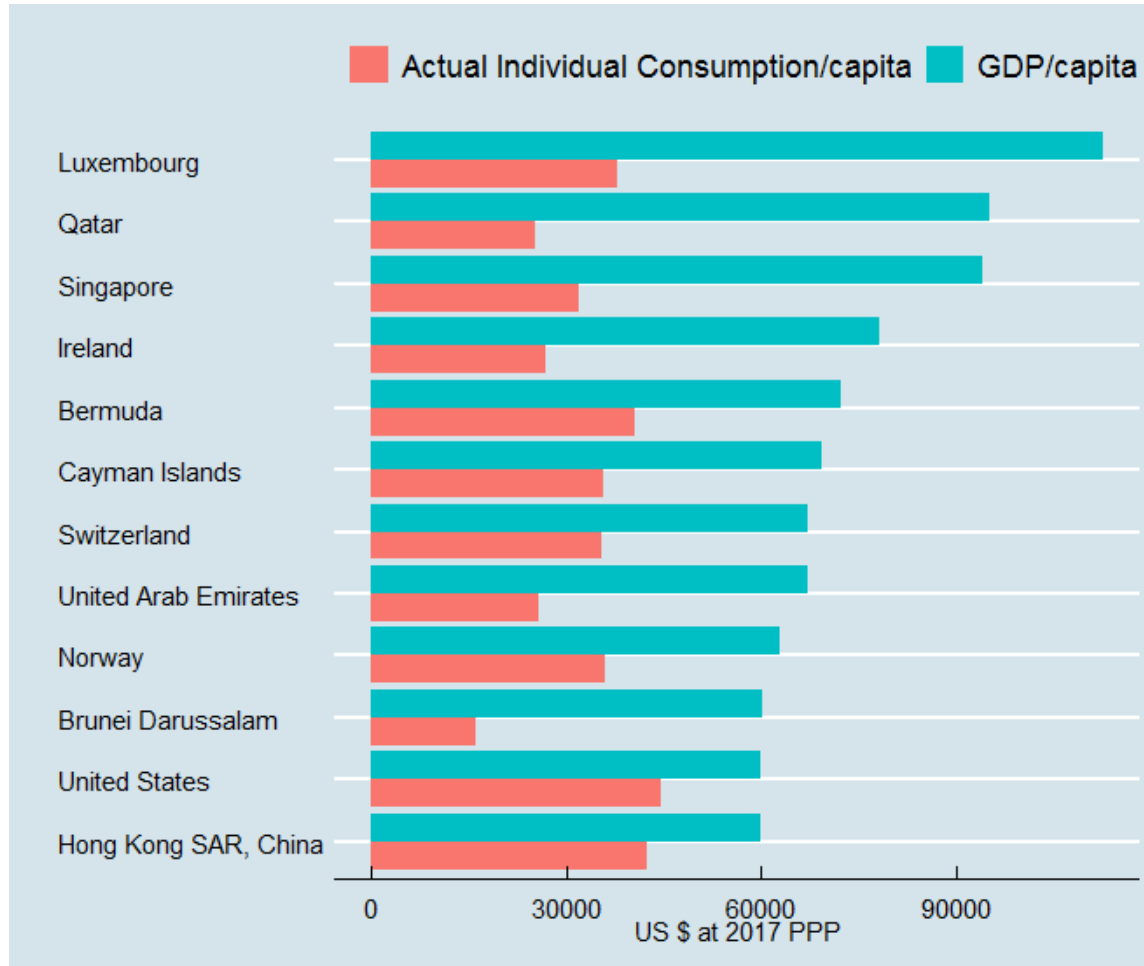
# Productivity – growth accounts: what's missing? (2)

- Some important non-market ecosystem services:
  - Water filtering by wetlands
  - Climate, weather
  - Carbon sequestration of forests
  - ....
- No adjustment suggested but keep in mind that our measures of growth and MFP are conditional



# Aggregate measures, especially GDP remain poor guides to people's well-being, even material

## Top twelve countries by GDP per capita in ICP 2017



Source: Deaton and Schreyer (2021), based on ICP.



# Links

- Production and Well-being: non-market production of households
- Production, Well-being and Assets: net income
  - Hicksian income
  - Real savings as change in inter-temporal economic well-being (Weitzman 1976, Sefton and Weale 2008)

$$NI^t \equiv Y^t - p_I^t D(K^{t-1}) = p_C^t C^t + p_I^t \Delta K$$

$$NI^t / p_C^t = C^t + \frac{p_I^t}{p_C^t} \Delta K$$

- But still aggregate measure



*Well-being sphere: what shapes peoples' lives?*





# Current well-being

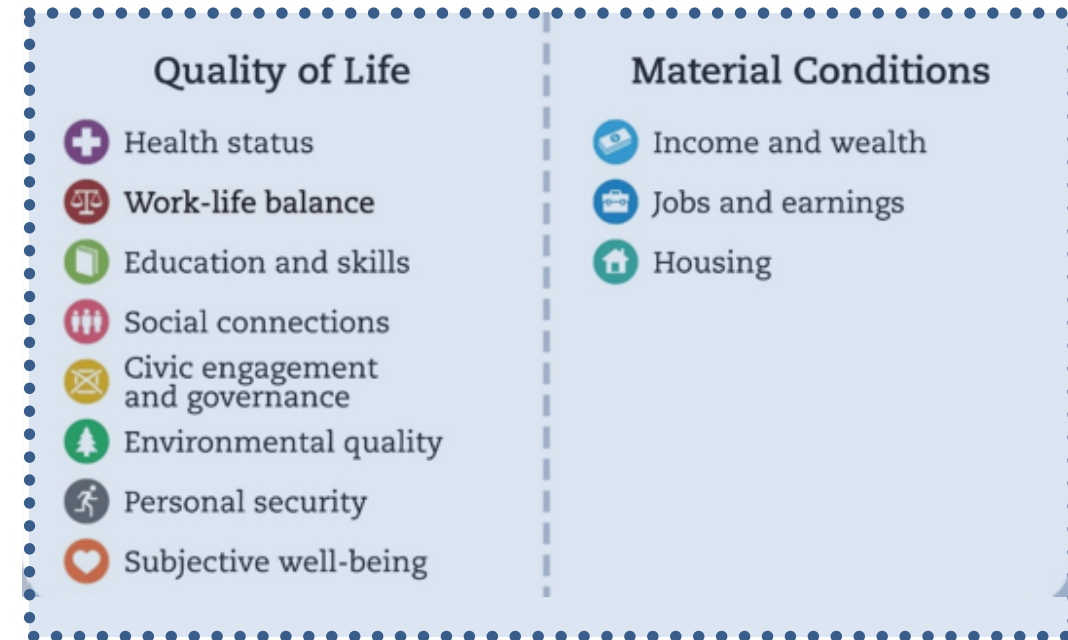
$$U_h = U_h(C_h, S_{Nh})$$

$U_h$  : utility household h

$C_h$ : consumption

$S_N$ : non-market ecosystem services

## CURRENT WELL-BEING

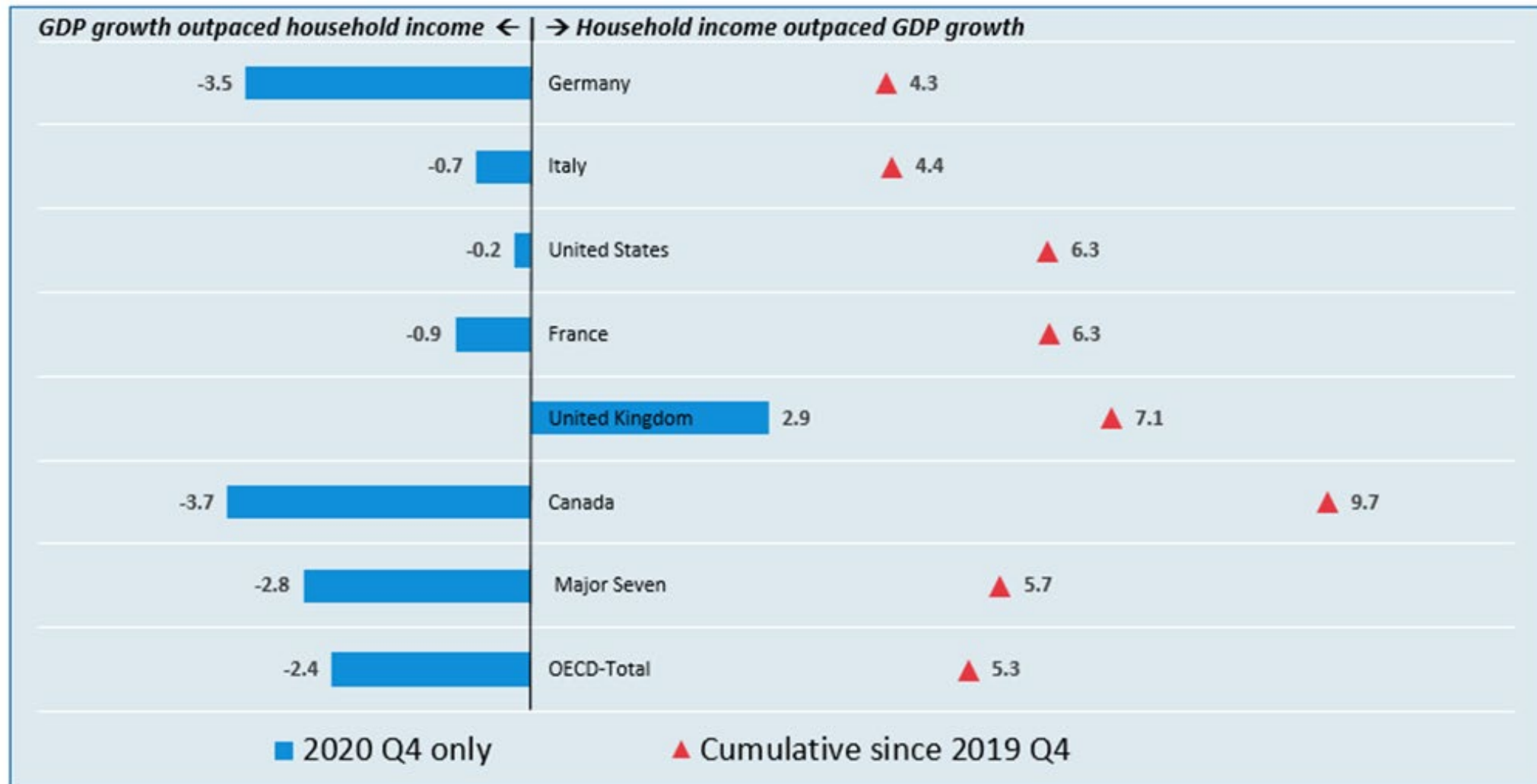


- Material conditions and quality of life dimensions



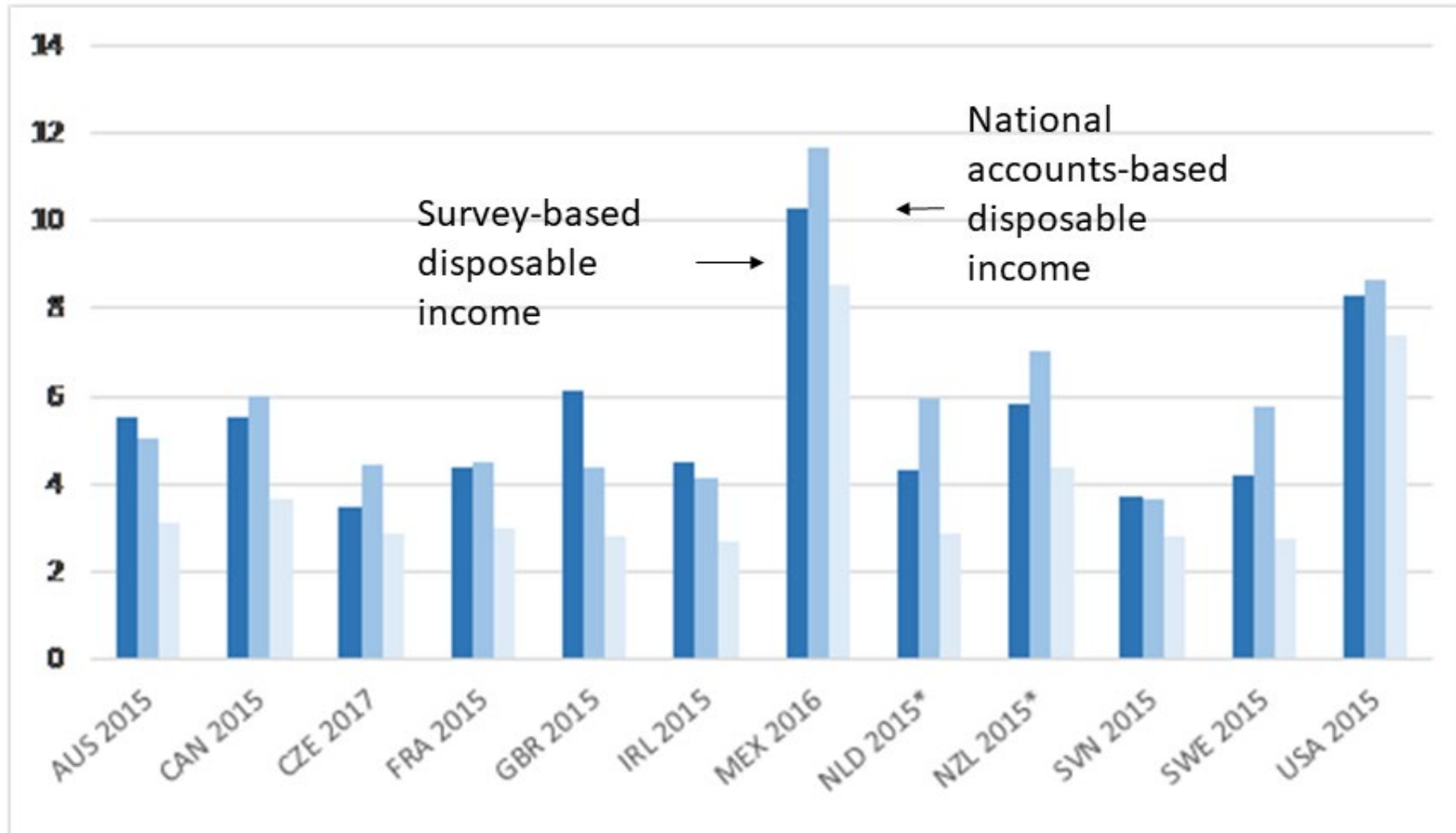
# Household aggregates instead of GDP...

Percentage points difference in cumulative growth rates of real household income and GDP per capita





# ...and their distribution – NA compatible



Source: Zwijnenburg al (2021, forthcoming)



# Can we aggregate across dimensions of current well-being?

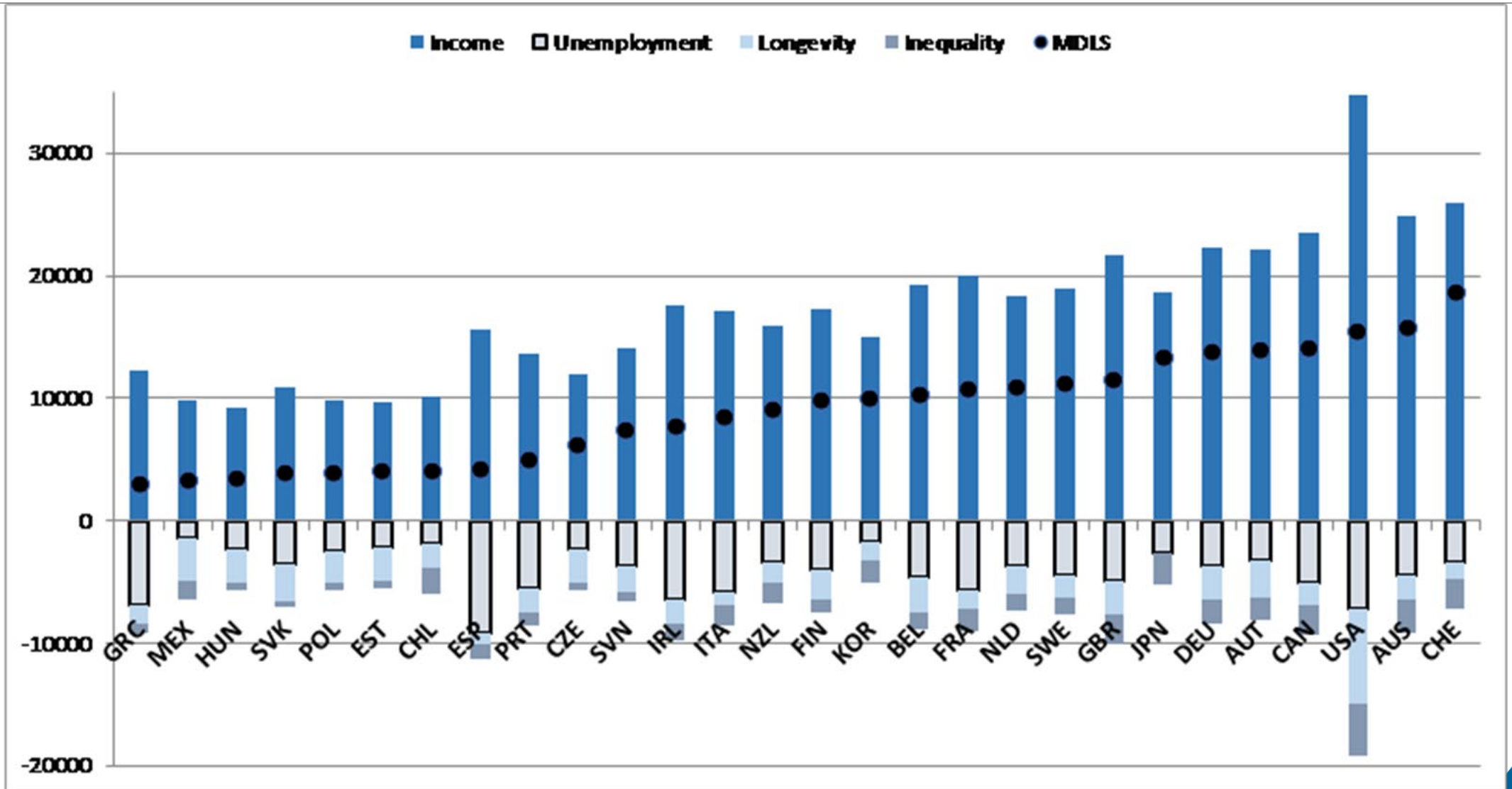
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- **Composite indicators**, typically ad-hoc aggregations (HDI,...)
- **Multi-dimensional poverty** measures – qualitative aggregates (Alkire, Foster,...)
- **Subjective well-being** (Layard, Clark,...) as summary measure
- **Aggregation with explicit modelling** (Jones and Klenov, Fleurbaey, Boarini et al)
  - Example: Multi-dimensional living standards using equivalent income



# Multi-dimensional Living Standards

## Median household, 2013



Source: Boarini et al (2021)



# Can we aggregate across dimensions of current well-being? – summing up

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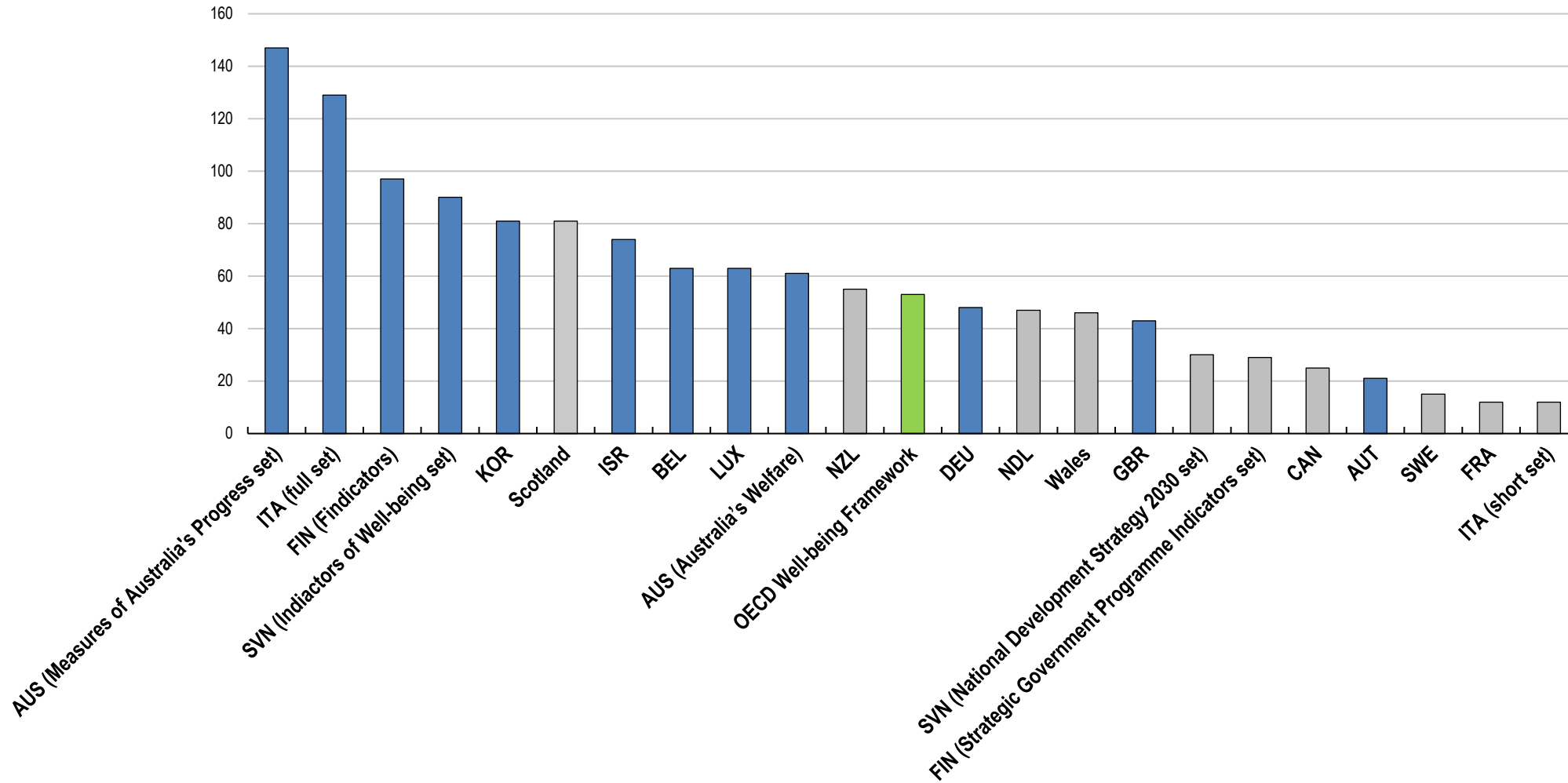
- Yes, but **limited number of dimensions**
- **Robust theory important**
- Transparency on **normative choices** (e.g. aversion to inequality)
- In **conjunction with dashboard** – at least that is what we do at the OECD
- **Dashboards:** in many countries

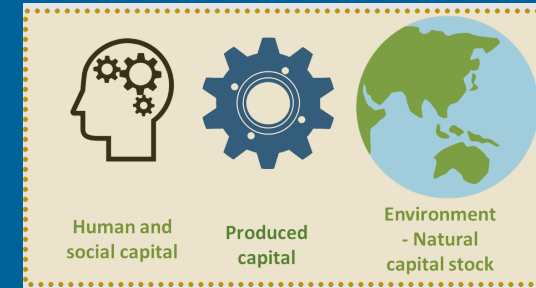


# Many OECD countries have developed dashboards of well-being indicators

Number of indicators

■ Well-being measurement, monitoring and reporting  
■ Well-being policy application





*Asset sphere: resources for future well-being*





# Can we bring it all together?

## The theory: inter-temporal social welfare

$$V^0 = \sum_{t=0}^{\infty} W(U_1(C_1^t, S_{N1}^t), \dots, U_H(C_H^t, S_{NH}^t))(1+r)^{-t}$$

$V^0$ : discounted flow of future social welfare  $W$

$$V^0 = V^0(C_1^0, \dots, C_H^0, K^0, N^0, \alpha)$$

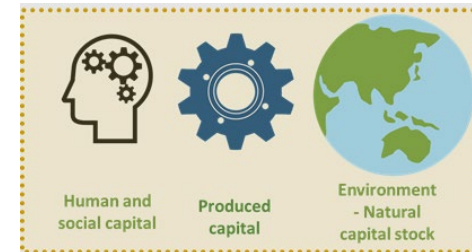
$\alpha$  resource allocation mechanism (Arrow et al 2003, Dasgupta 2009, 2021)

Welfare change  $\geq 0$ : sustainability gauge:

$$dV^0 = \sum_{i=1}^{m-1} p_{AKi} dK^0 + \sum_{i=1}^n p_{ANi} dN^0$$

with accounting (shadow) prices:

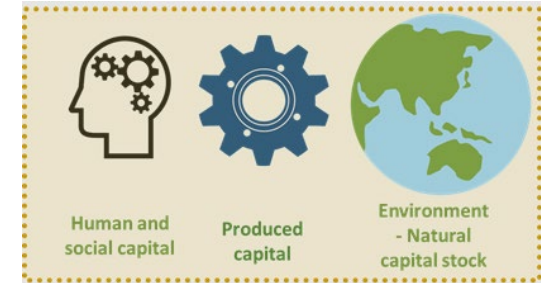
$$p_{AKi} \equiv \frac{\partial V^0(C_1^0, \dots, C_H^0, K^0, N^0, \alpha)}{\partial K_i}; \quad p_{ANi} \equiv \frac{\partial V^0(C_1^0, \dots, C_H^0, K^0, N^0, \alpha)}{\partial N_i}.$$





# The practice: quite some complications here

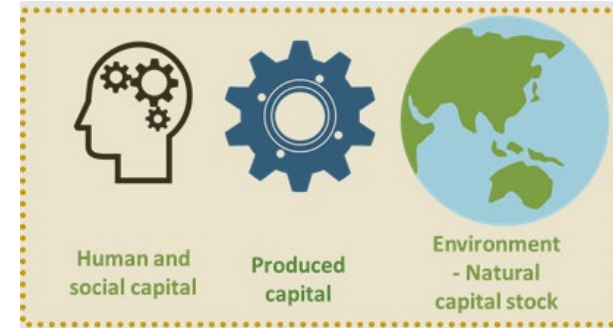
- **Accounting prices:** really, really hard to measure
  - Requires projection and valuation of  $\alpha$
  - Scenario building, modelling, horizon scanning
  - Needed also: path of future MFP and GDP
- **Comprehensive wealth:** what is the scope?
  - Health, human capital, ecosystem assets, all included?





# Pragmatism is the word

- **Measure and value capital - absolutely, but:**
  - Start with SNA capital (many gaps!)
  - Extend to SEEA natural capital, market valuation
  - Extend to human capital, market valuation
  
- **Social capital, ecosystem assets:** very important but ambition should not be comprehensive social valuation, at least not for NSOs





## Pragmatism is the word (2)



Monetary market valuation

Possible aggregation


Physical measures,  
Monetary valuation  
where useful

No aggregation, but  
comparisons with  
NA aggregates

The price: no single sustainability indicator



# But really useful – example (1):




**FACT SHEET**  
GERMANY

### Pilot accounts under development

#### Summary table of accounts

Account		Ecosystem Types / Ecosystem Services	Link to research
Accounts for ecosystem assets	Ecosystem extent account	All ecosystems*	Grunewald et. al, 2020
		All ecosystems	Schröter et al., 2015
	Ecosystem condition account	All ecosystems	
	Ecosystem monetary asset account		
Accounts for ecosystem services	Ecosystem services supply and use table - physical terms	Natural soil fertility of cropland and grassland*	Grunewald et al., 2021
		Soil erosion mitigation*	Syrbe et al., 2018
		Pollination service potential*	
		Recreation services*	
		Amenity value of public urban green spaces*	Grunewald et al., 2021
		Appreciation of species and habitat services*	
		Timber of woodlands*	Elsasser et al., 2021
	Ecosystem services supply and use table - monetary terms	Carbon sequestration of woodlands*	Elsasser et al., 2021
		Climate gas mitigation*	
		Urban climate regulation*	
		Natural soil fertility of cropland and grassland*	Grunewald et al., 2021
		Amenity value of public urban green spaces*	Grunewald et al., 2021
		Appreciation of species and habitat services*	
		Timber of woodlands*	Elsasser et al., 2021
Thematic accounts	Carbon sequestration of woodlands*	Elsasser et al., 2021	
	Climate gas mitigation*		
	Recreation services*		

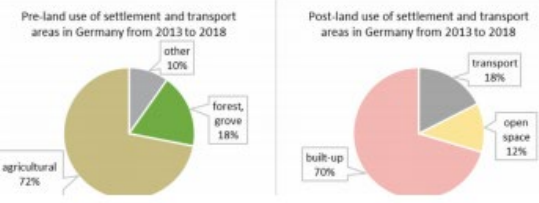


**Proportion change of agricultural land 2000-2018**

Federal Level: 55.0% (2000) to 52.0% (2018)

District level: 
 

- ≥ 12% decrease (R)
- ≥ 9% decrease (T)
- ± 9% decrease (Z)
- ± 9% decrease (S)



**Pre-land use of settlement and transport areas in Germany from 2013 to 2018**

- agricultural: 72%
- forest, grove: 18%
- other: 10%

**Post-land use of settlement and transport areas in Germany from 2013 to 2018**

- built-up: 70%
- transport: 18%
- open space: 12%

Scale	State of development
National	Finished
Regional	Ongoing
Local	None ongoing or published

\*Highlighted in the fact sheet

Figures source: Grunewald et al. (2020)

MAIA (Mapping and Assessment for Integrated ecosystem Accounting)

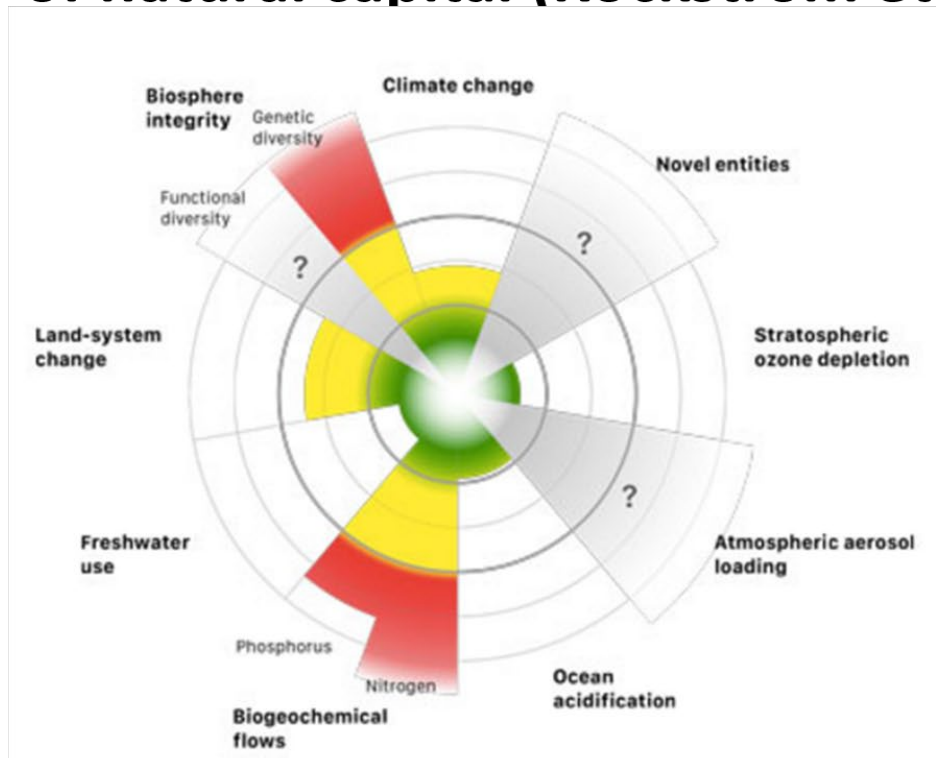
Based on SEEA Ecosystem Accounts

<https://maiportal.eu>



## But really useful – example (2):

### Boundaries and tipping points: 9 “critical thresholds” of natural capital (Rockstrom et al.)



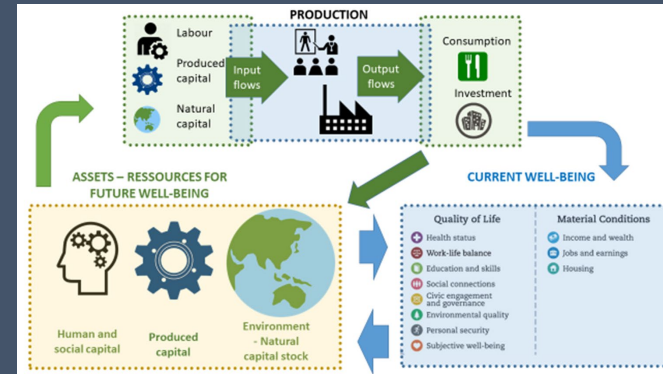
status of control variables for 9 planetary boundaries (not quantified for 3, aerosol loading, functional diversity, novel entities)

**Green zone** is the safe operating space

**Yellow zone** (increasing risks), with uncertainties: climate

**Red zone** (high-risk): biodiversity, nitrogen cycle)

<https://www.youtube.com/watch?v=SieN0lrZ5wg>

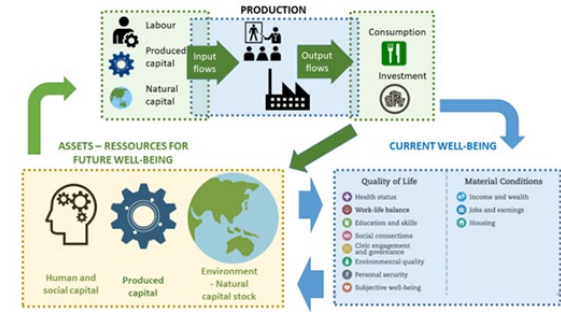


# Conclusions



# Conclusion: general points

- **Theoretical reference:** a complete accounting system
- Not everything can be implemented
- But **what we implement should fit the reference framework**
- **Three spheres complementary, not in competition**
- Of particular interest: **links between spheres**

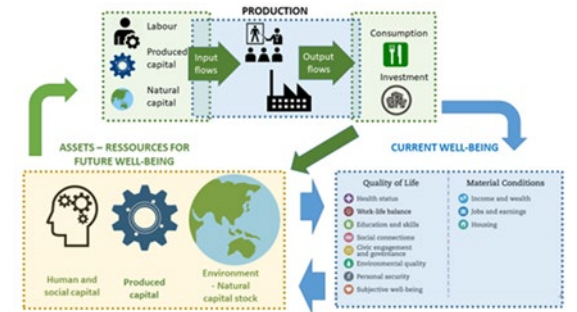






# On the practical side (1)

- Implementation of 2008 SNA
  - Land, sub-soil assets
- 2008 SNA update:
  - NA consistent distribution of consumption, income and wealth of households
  - Non-market production of households consistently measured

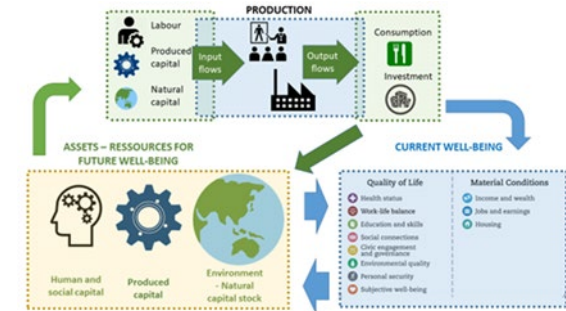




## On the practical side (2)

- Closing statistical gaps in key dimensions of **quality of life**
  - Mental health,
  - Distribution of QoL by gender and ethnicity
  - ...
- **Implementation of SEEA**

Central framework: emission and asset accounts  
Ecosystem services where needed
- **Use of SEEA data in analysis** => e.g., adjusted MFP
- **But not everything can or should be added up!**





# Thank you!



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