

EPFL

ECOLOGICAL ECONOMICS

Env-610

Philippe THALMANN

Marc VIELLE

Frank VÖHRINGER

Philippe Thalmann

- Born in 1963 in Lausanne
- Bachelor in economics, University of Lausanne, 1984
- Master in economics, University of Lausanne, 1986
- PhD in economics, Harvard University, 1990
- Maître-assistant, University of Geneva, 1990-1994
- Assistant professor (50%), Univ. of Lausanne, 1993-1994
- Associate professor with tenure of economics of the natural and built environment, School of Architecture, Civil and Environmental Engineering, Swiss Federal Institute of Technology Lausanne (EPFL), since 1994
- Married, 2 adult sons



Introduction

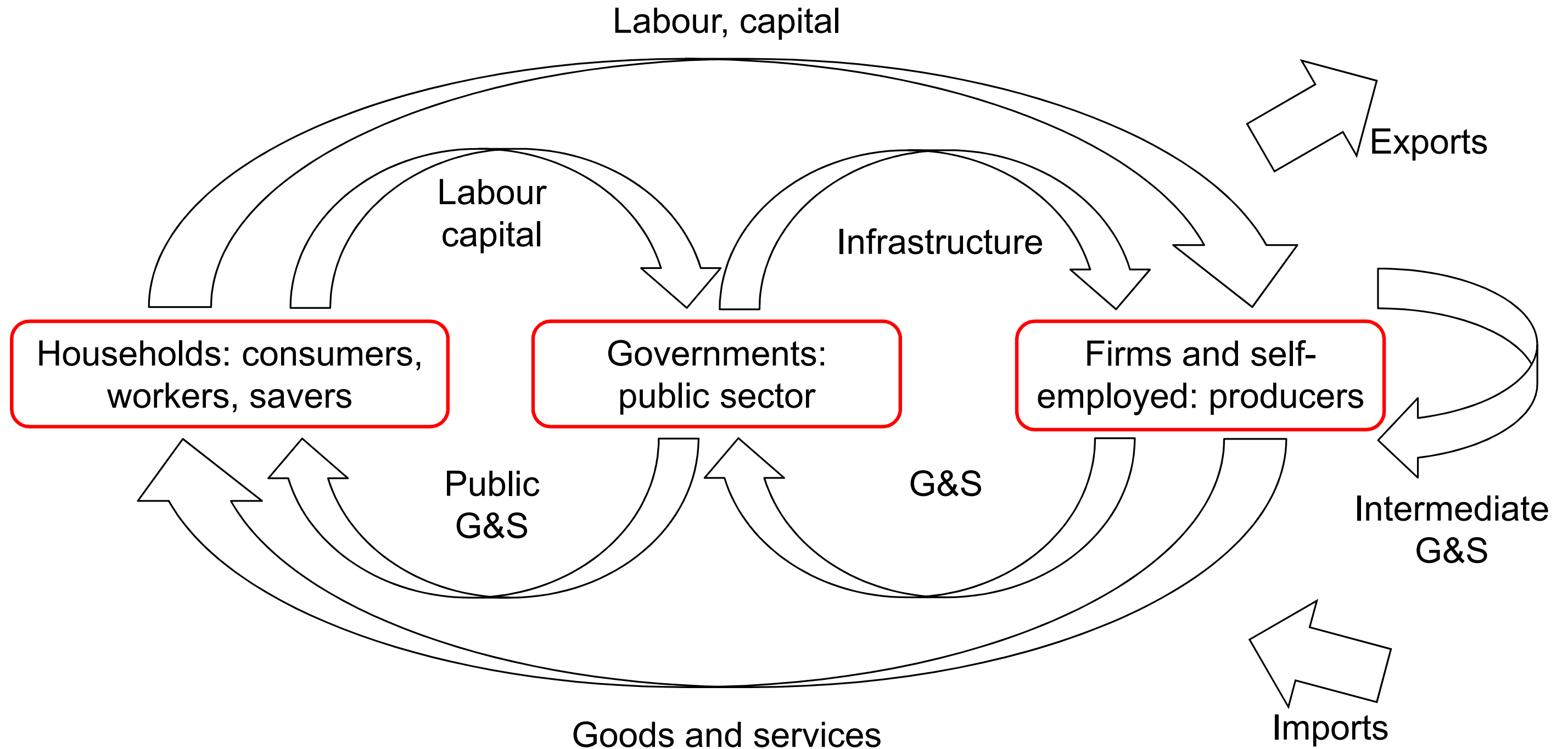
ECONOMICS

ENVIRONMENTAL AND ECOLOGICAL

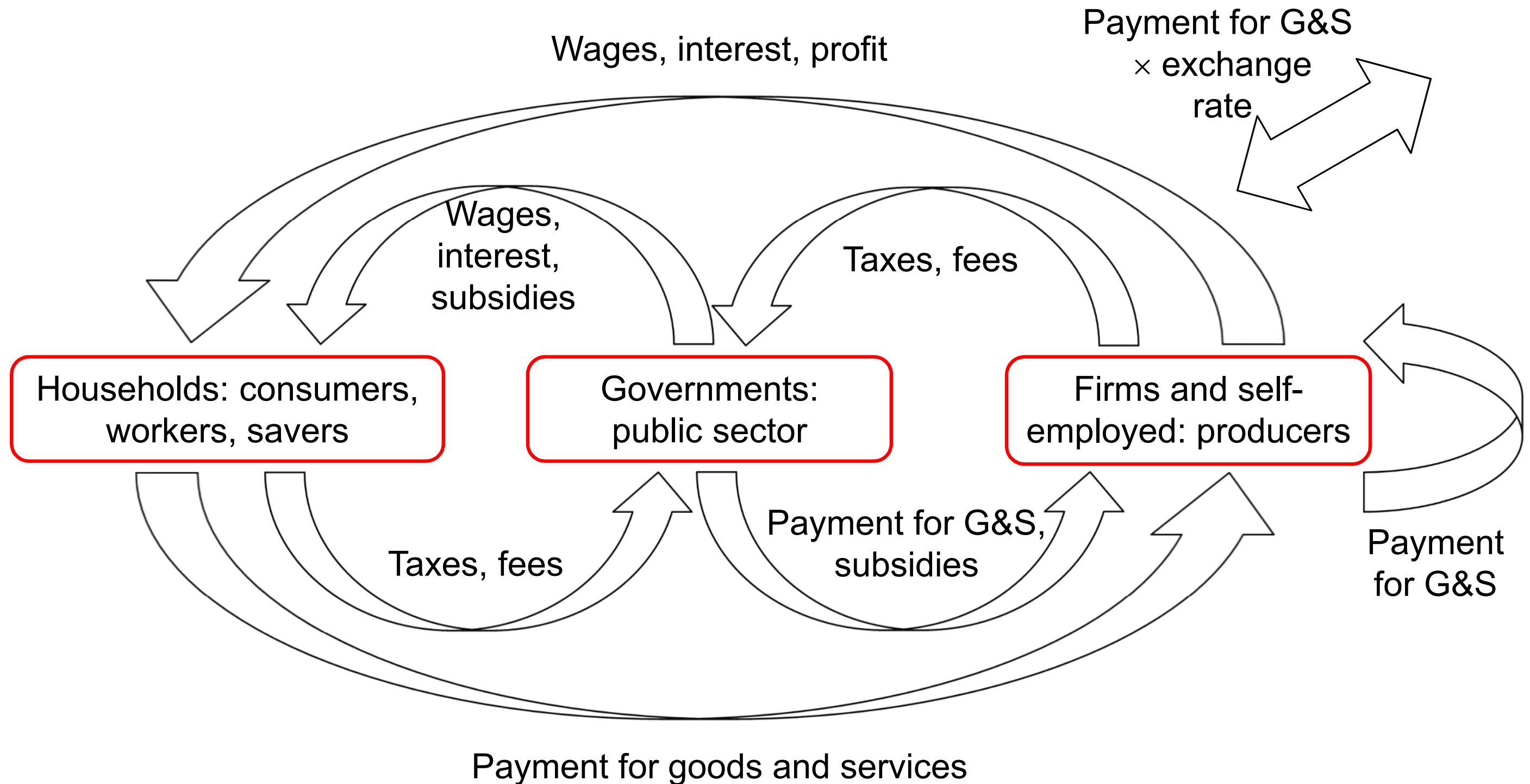
Economics – building blocs

- **Definition:** The study of how individuals and societies use scarce resources to satisfy potentially unlimited wants
- **Actors:** Producers, consumers, State/government/public sector/regulator
- **Resources:** Land (natural resources), labour, capital
- **Payments for resources:** rent (land), wage (labour), interest (capital)
- **Scarcity** → We have to choose among alternatives

Main actors – economic circuits – real trades



Economic circuits – monetary flows



Economics – key assumptions

- **Models** can draw a simplified version of the world and yet yield practical results
- Actors are **rational** and **selfish**: they make choices that maximize their interest
- Actors care only about **outcomes**, not how they were attained
- **Government is benevolent**: always ready to improve the economic outcomes if necessary
- ***Ceteris paribus***: it is sensible to hold everything else constant
- Deviations from these assumptions are not ignored: they are 'imperfections' that can be taken care of (imperfect information, errors in decision making, selfish government, etc.)

Economics – differentiations

- **Positive vs. normative:** purely descriptive / policy evaluations and recommendations (which always involve value judgements)
- **Micro vs. macro:** individual agents and markets / large economic aggregates
- **Environmental vs. ecological economics**

Environmental vs. ecological economics

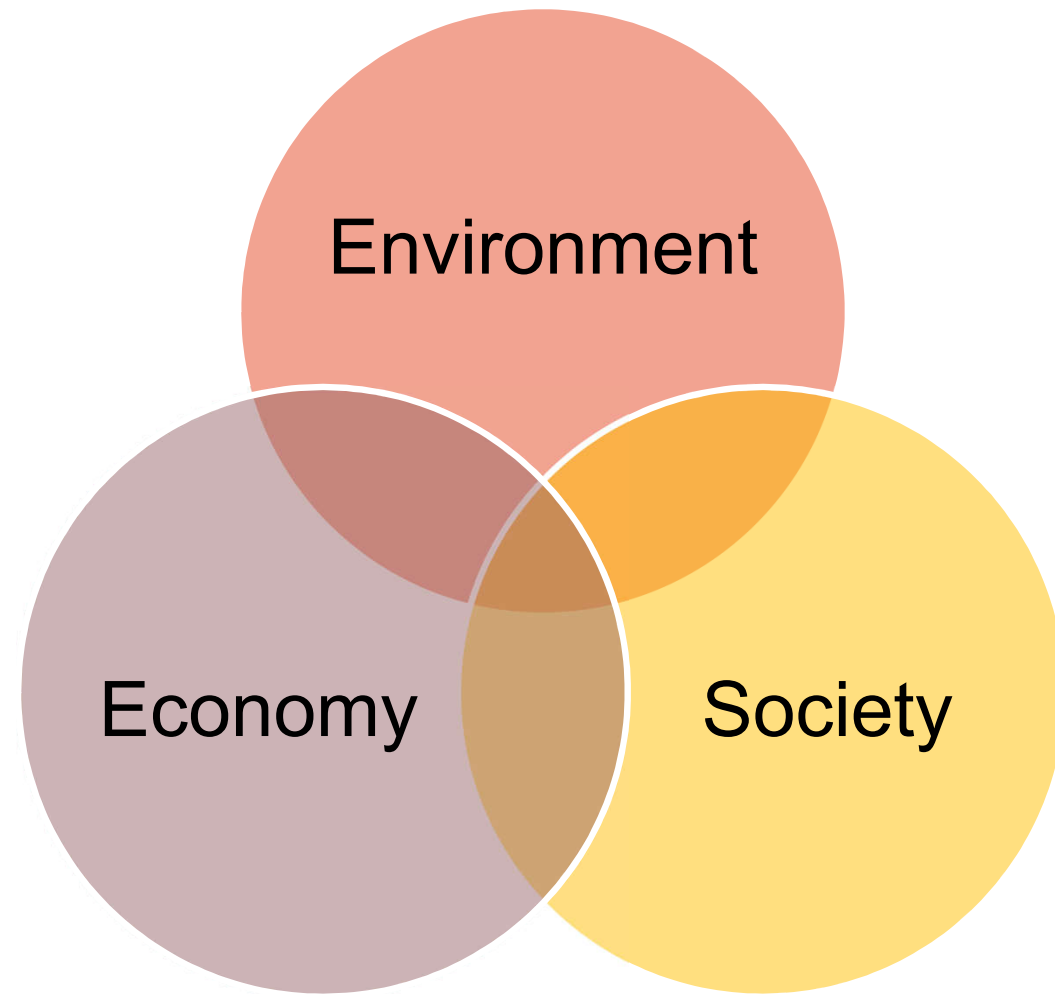
Environmental economics

- Natural resources as factors of production
- Pollution as external cost
- Development = growth in manufactured + immaterial + natural capital
- Sustainable development: total capital grows, which increases prosperity and welfare

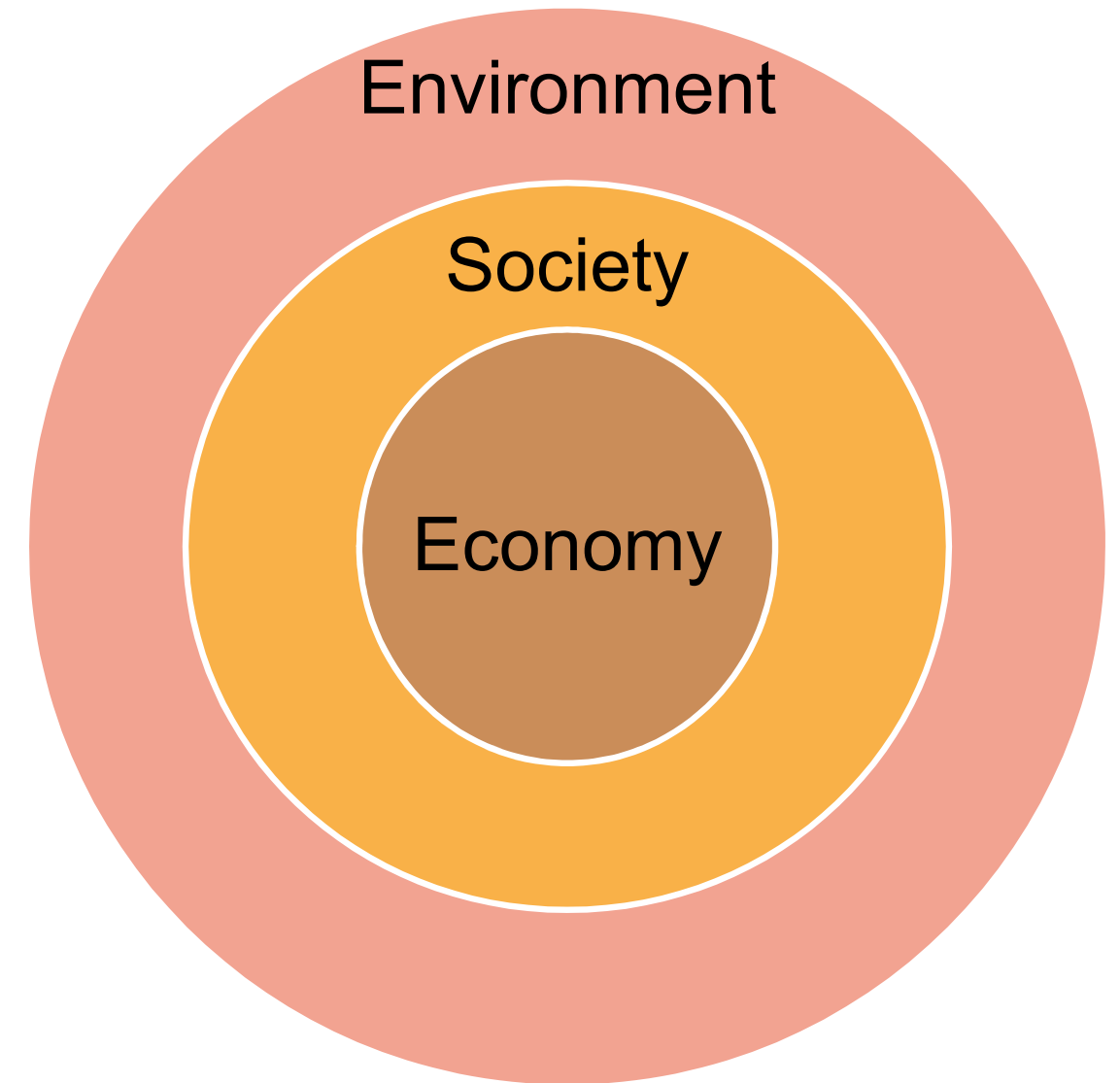
Ecological economics

- The economy is embedded in the ecological system
- Material and income flows within an economy are part of a larger transfer of materials and energy within the biosphere (entropy)
- Planetary boundaries, carrying capacity
- No sustainable development with a degradation of natural capital

Sustainable development

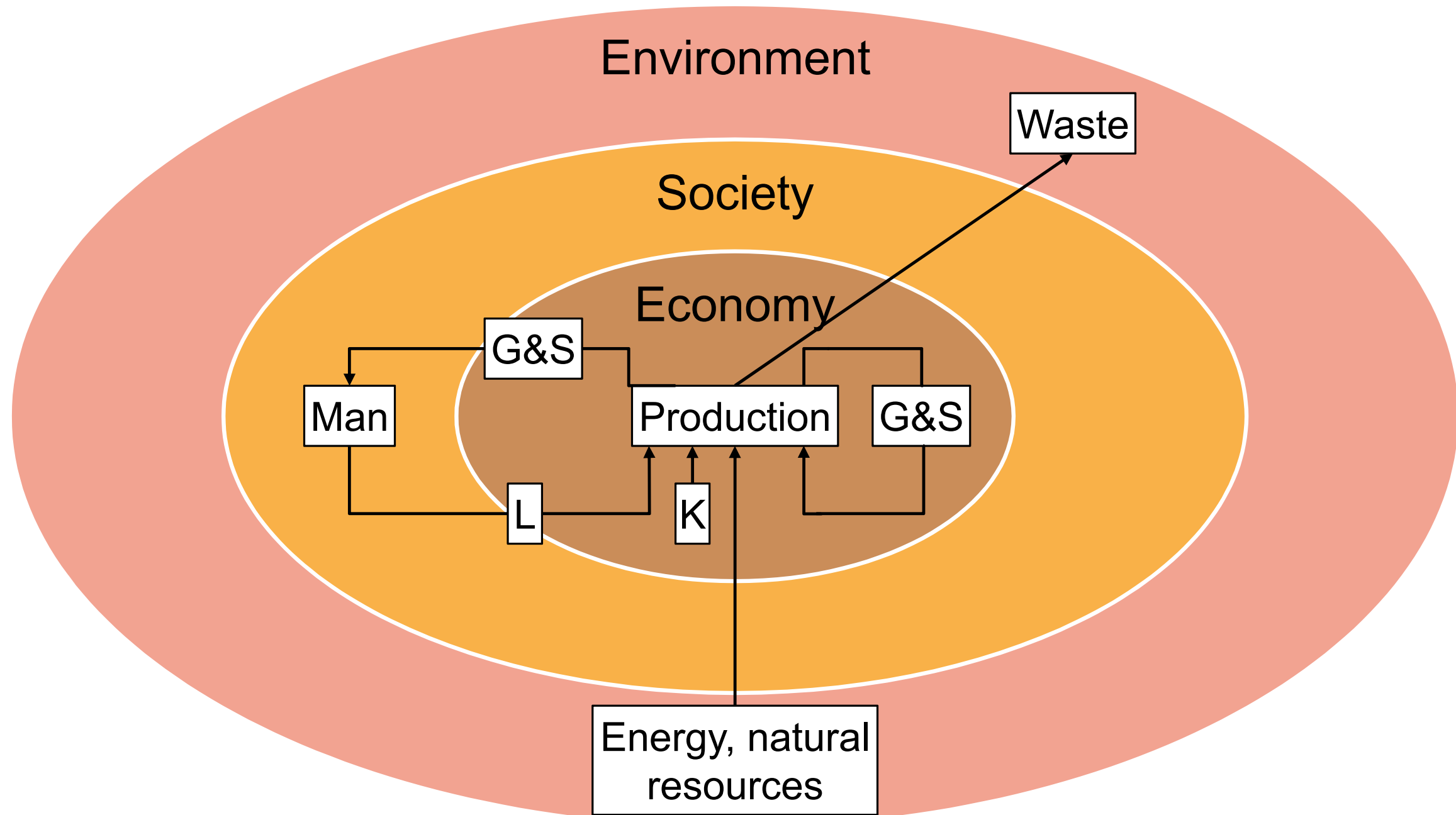


Environmental economics



Ecological economics

Economic production in the three spheres



Human-centred view ... or not

- **Human-centred view (*anthropocentrism*):** assess natural resources from the point of view of human needs or preferences
 - Individual preferences (individualism)
 - Collectives or social preferences

Swiss Constitution

Swiss Confederation

101

Art. 74 Protection of the environment

¹ The Confederation shall legislate on the protection of the population and its natural environment against damage or nuisance.

Human-centred view ... or not

- **Non human-centred view:** the other species also have rights, independent of how useful they are for Mankind
 - Animal rights (*antispeciesism*)
 - Intrinsic value of eco-systems (*deep ecology*)
 - Protecting 'Nature' rather than (our) 'Environment'

Constitution of Ecuador, 2008

CHAPTER SEVEN

Rights of nature

Article 71. Nature, or Pacha Mama, where life is reproduced and occurs, has the right to integral respect for its existence and for the maintenance and regeneration of its life cycles, structure, functions and evolutionary processes.

Four views on which to ground the moral imperative of protecting the planet

Individually human centred: protect resources and animals that are useful for me

Collectively human centred: protect ecosystems we depend on as a species

Antispeciesism: protect all other species because they have the same rights as us

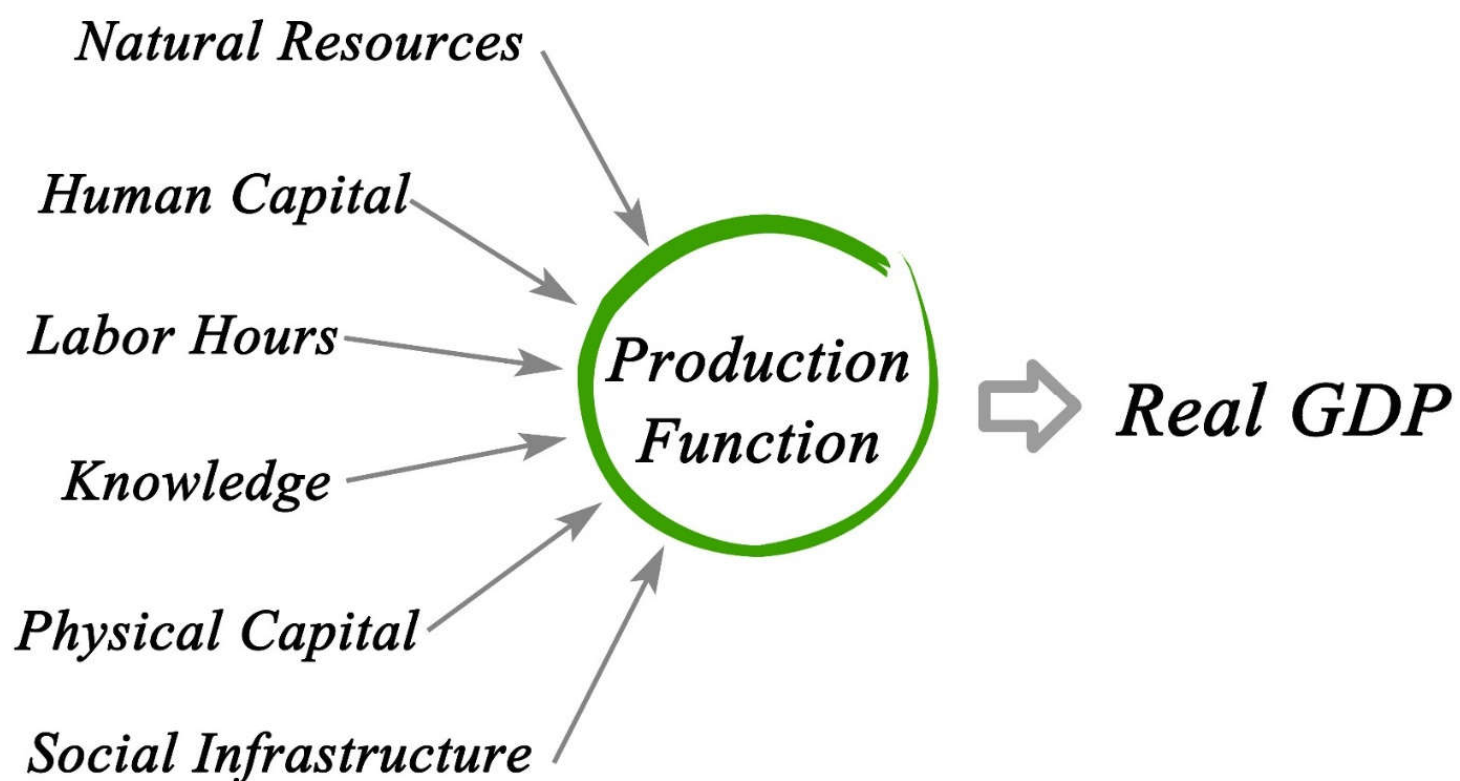
Deep ecology: protect all ecosystems

Both precepts are in the Book of Genesis

The opposition between Nature submitted to Man and Man, the guardian of Nature, is already found in Genesis:

- Then God said, “Let us make human beings in our image, to be like us. They will reign over the fish in the sea, the birds in the sky, the livestock, all the wild animals on the earth, and the small animals that scurry along the ground.” (Chapter 1:26, New Living Translation)
- The LORD God placed the man in the Garden of Eden to tend and watch over it. (Chapter 2:15, New Living Translation)

Inputs to production → capitals



- **Natural capital** (K_N): natural resources and ambient absorption capacity
- **Manufactured capital** (K_M): infrastructures, buildings, urbanised soil, machines, tools
- **Human capital** (K_H): manpower with its health, know-how and skills
- **Immaterial capital** (K_I): social capital of individuals, organisational capital of enterprises, institutional capital of societies
- **Financial capital** (K_F): receivables against third parties, which can be converted into goods and services

Weak condition for sustainable development

- **Weak condition:** $K_G = K_N + K_M + K_H + K_I + K_F$ does not decrease
- $GDP_t = f(K_{Nt}, K_{Mt}, K_{Ht}, K_{It}, K_{Ft}) = f(K_{Nt} + K_{Mt} + K_{Ht} + K_{It} + K_{Ft}) = f(K_{Gt})$
- Substitution possibilities (isoquants)
- NB: nature (K_N) at the sole service of mankind...
- The natural environment can be degraded, provided there is enough accumulation of other capital ... assuming that this accumulation is possible in a degraded natural environment

Strong condition for sustainable development

- **Strong condition:** weak condition + K_N does not decrease
- Therefore, substitutability between K_N and other forms of capital is not accepted
- Higher incomes for the next generation do not compensate for an impoverished planet
- Do we not also need a strong condition for other types of capital?
- Substitutability between components of K_N ?

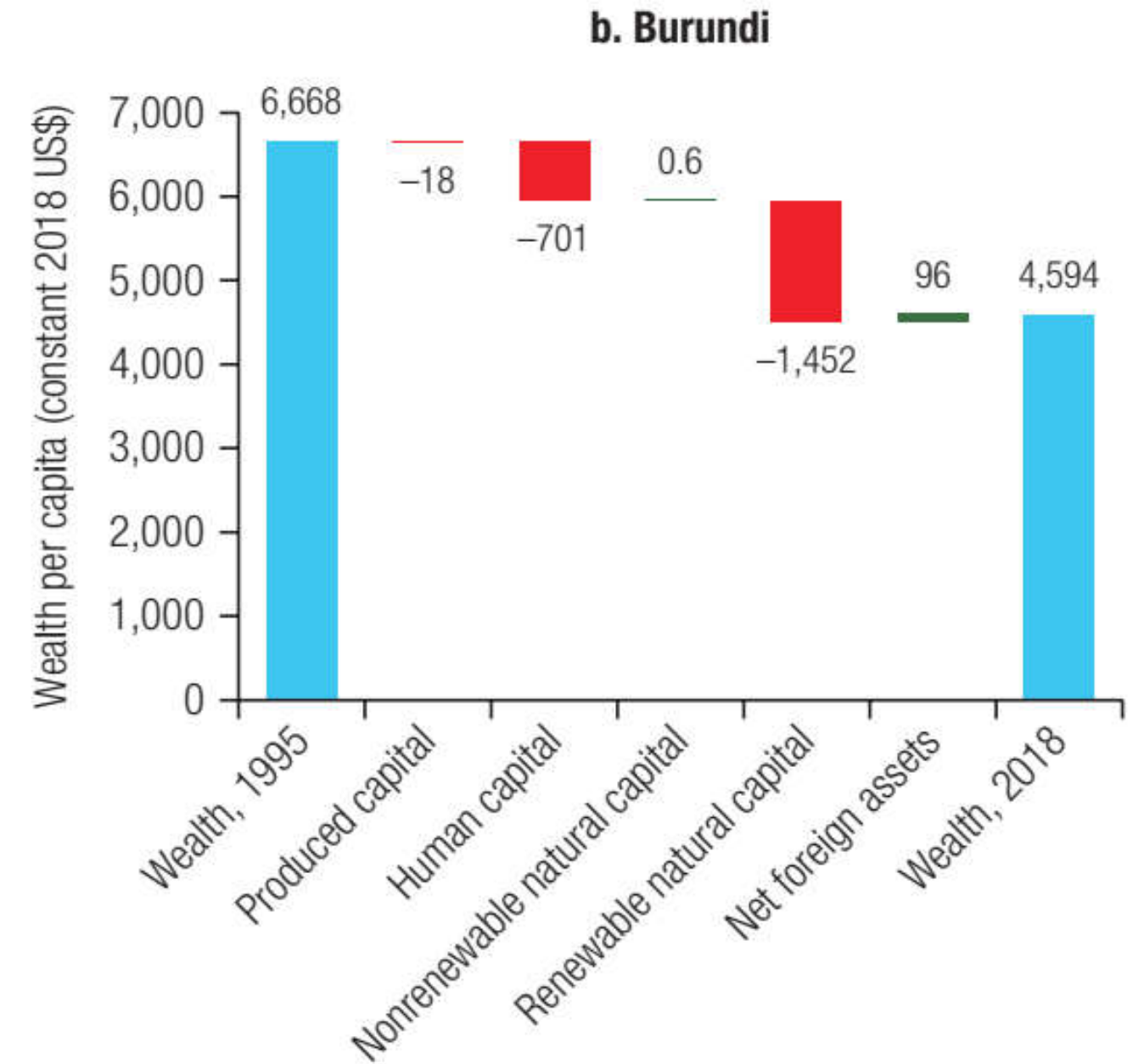
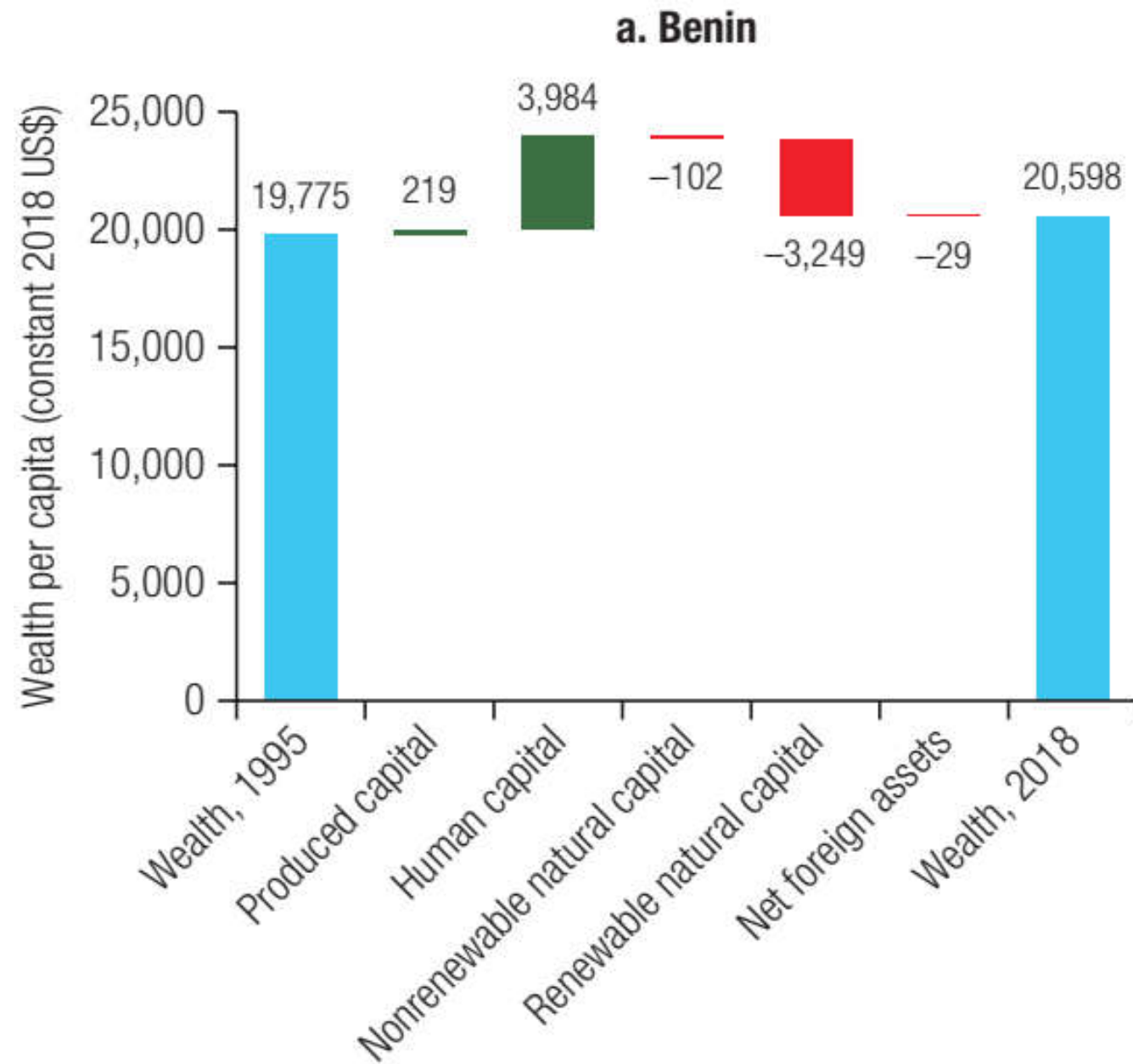
Wealth accounting by The World Bank

The World Bank is an international financial institution created in 1944 (together with the IMF) to provide loans and grants to the governments of low- and middle-income countries for the purpose of pursuing capital projects for their economic development. The World Bank also collects and processes large amounts of data related to development.

- Estimations for 1995 (World Bank, 1997), 2000 (World Bank, 2006), 2005 (World Bank, 2011), 1995-2014 (World Bank, 2018) and 1995-2018 (World Bank, 2021)
- Every time, the methods are improved
- The aim is to complement the information on GDP by projecting it towards the future
- Uses national accounts data as much as possible



Two countries with stagnating or declining wealth per capita



Total wealth per capita increased in most but not all countries between 1995 and 2018

