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Double Global Sustainability: International Macroeconomic Perspectives and Long-Term Green Modernization

Paper prepared for the European Sustainable Development Network Workshop

8th ESDN Workshop: Financial Markets, Institutions and Policies in the Context of Sustainable Development

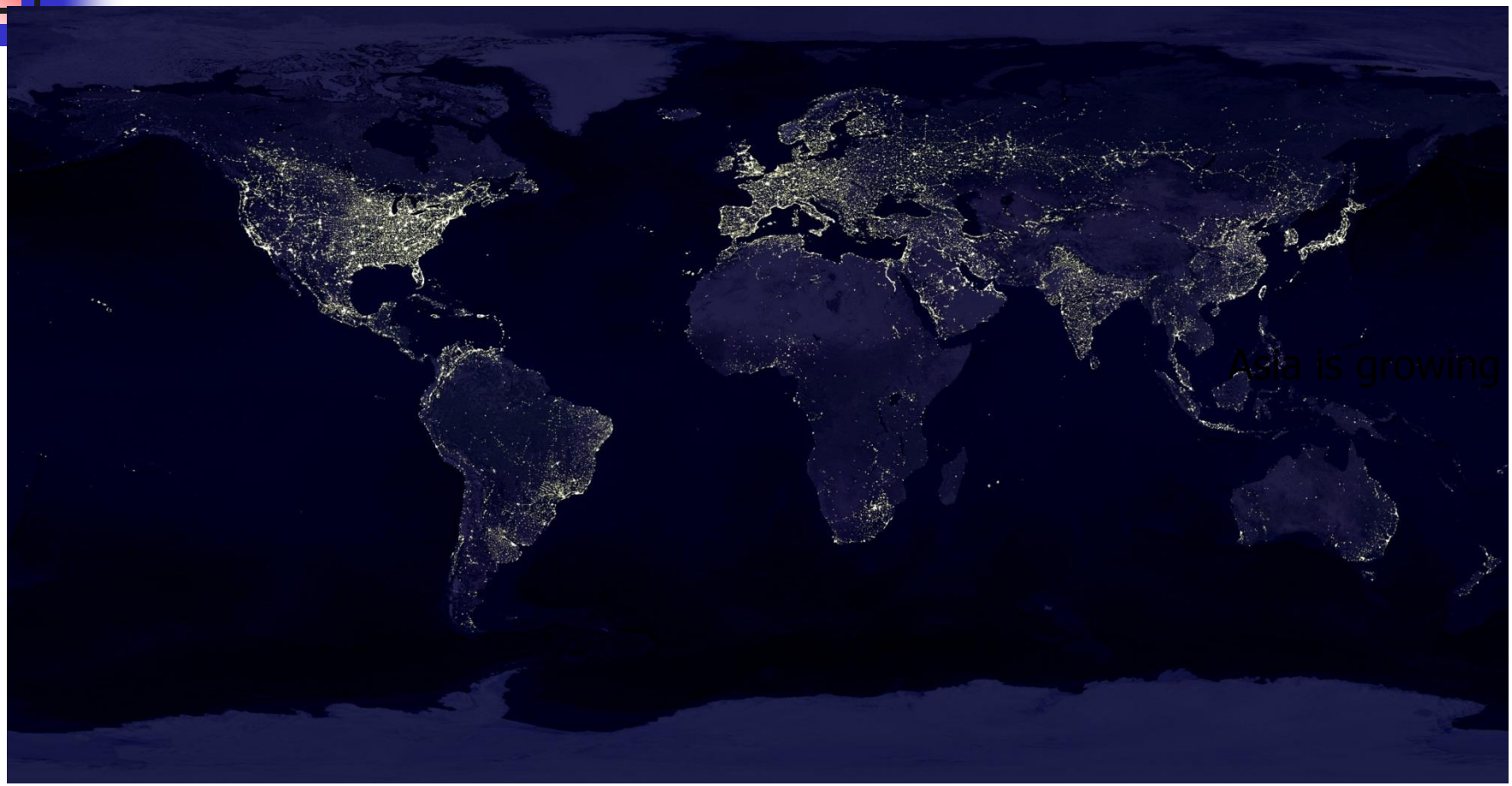
Brussels, Nov. 22-23, 2012, EESC, Room TRE 7701, Tréves Building, 74, rue de Trèves

Table of Content

1. Introduction

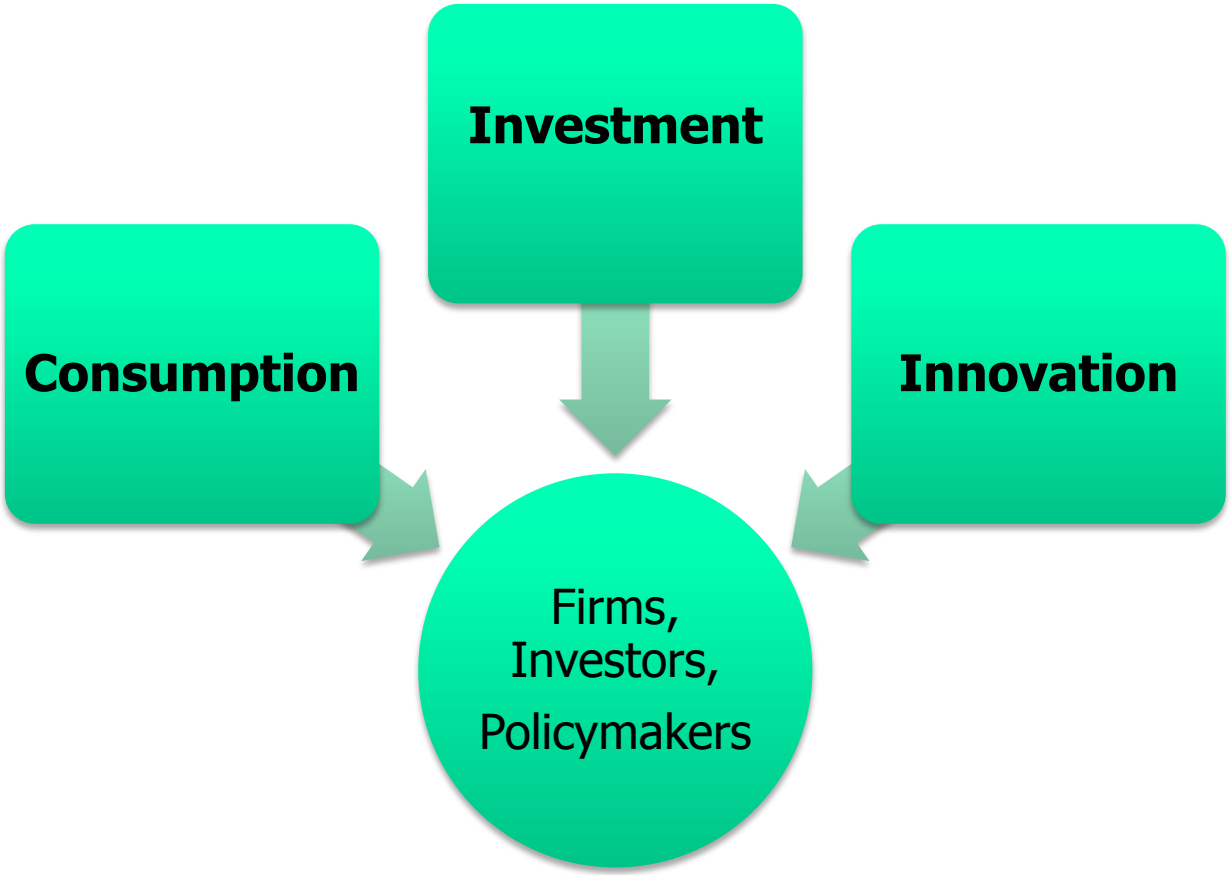
- **Global emphasis on sustainability: UN, G20, EU**
- **Europe 2020** and policy agenda of EU member countries emphasizes sustainability; **resource-saving projects, lead markets in several fields**
- However, **global growth of population and output raises serious problems** for sustainability
- **environmental-friendly (green) innovations &investment**
- Green innovations and investment projects require **long term orientation of investors and fund managers**
- **Transatlantic Banking Crisis of 2007-09** has clearly shown that short-termism is part of the problem of the financial sector

Global Spotlight...

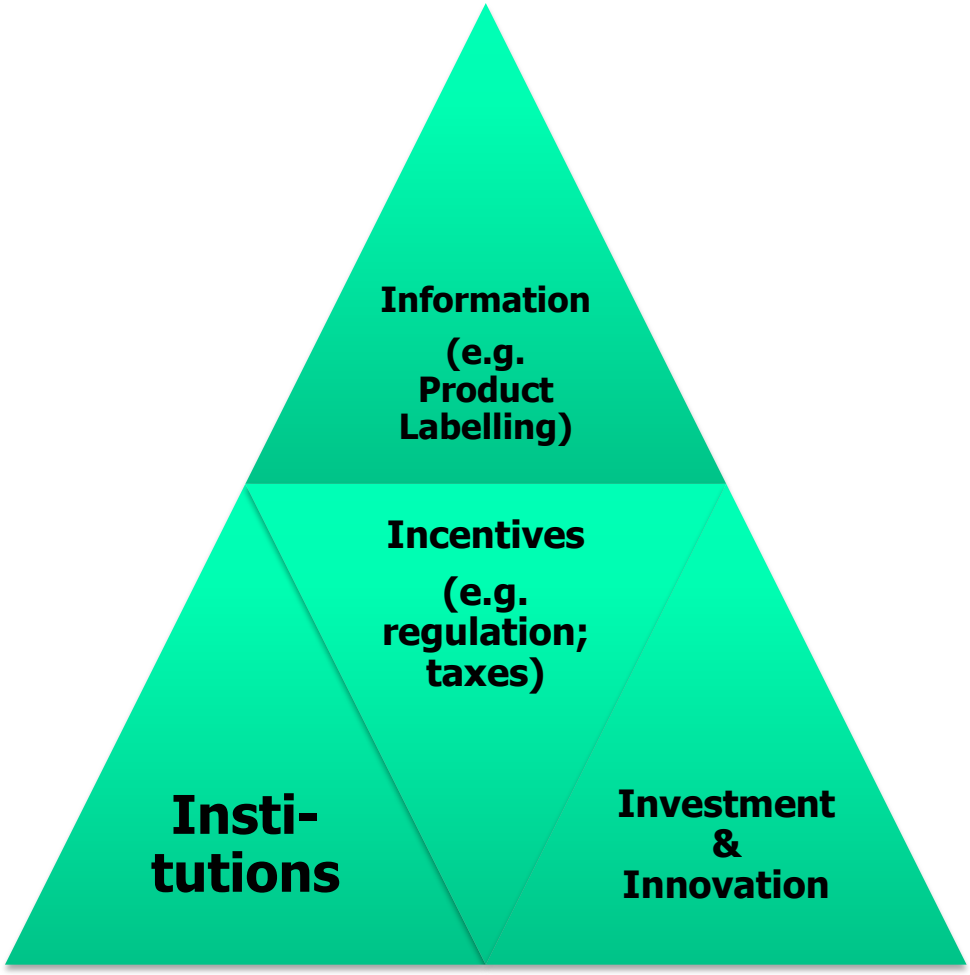


Quelle: NASA Online; http://visibleearth.nasa.gov/view_rec.php?id=1438

Sustainability Perspectives



Sustainability Perspectives

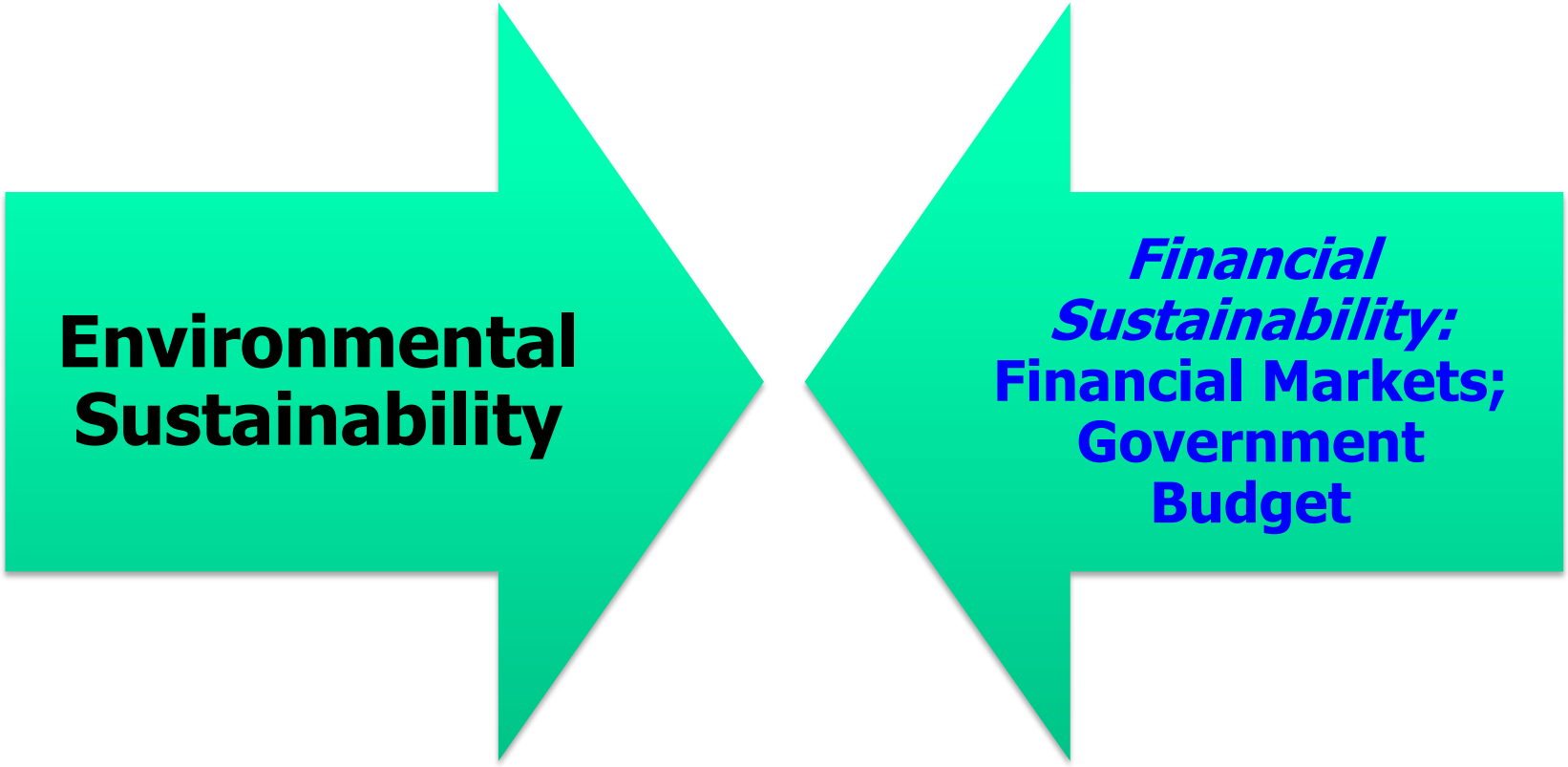


Long Term Analysis in Economics and Environmental Analysis

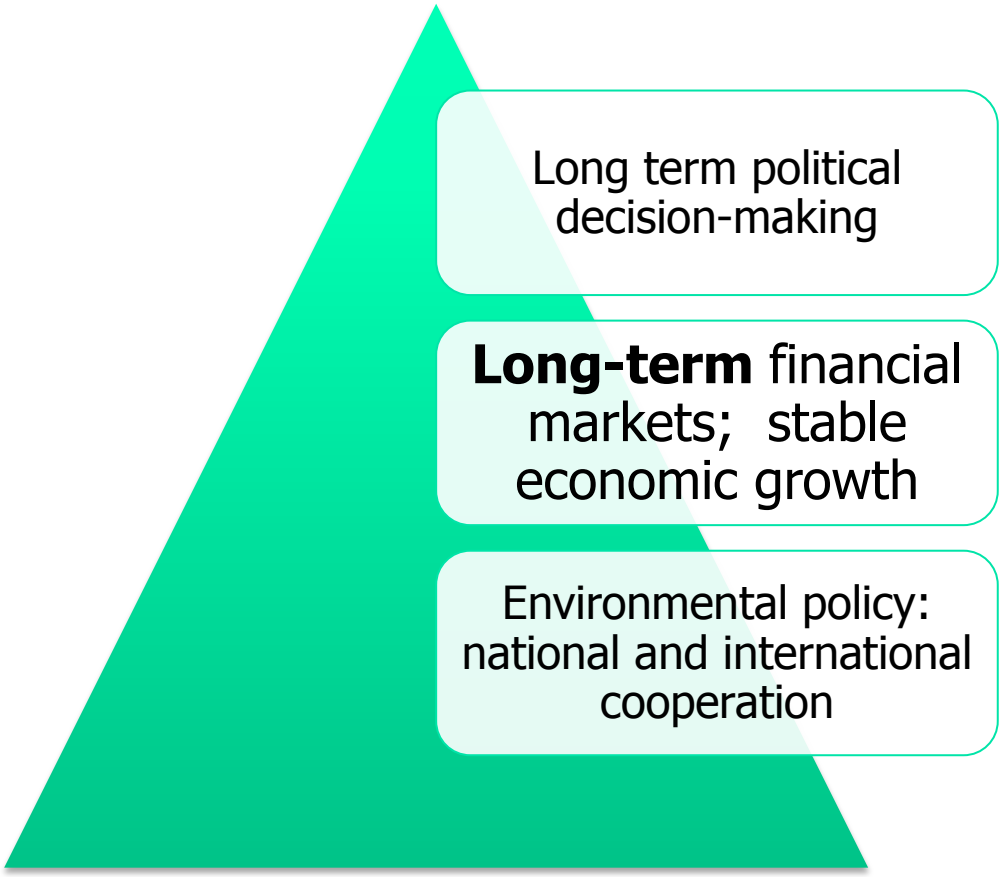
- **Life-cycle analysis for products** (environmental analysis) is expanding;
- **Financial market products: Labelling/Standardizatin;** How about Life-cycle analysis
- Certain private banks and insurance companies often have long term investment focus (plus family companies)
- Neoclassical growth modeling is long term (infinitely lived households maximize utility...)

Problems After 2007-2012

2. Double Sustainability



Sustainability means

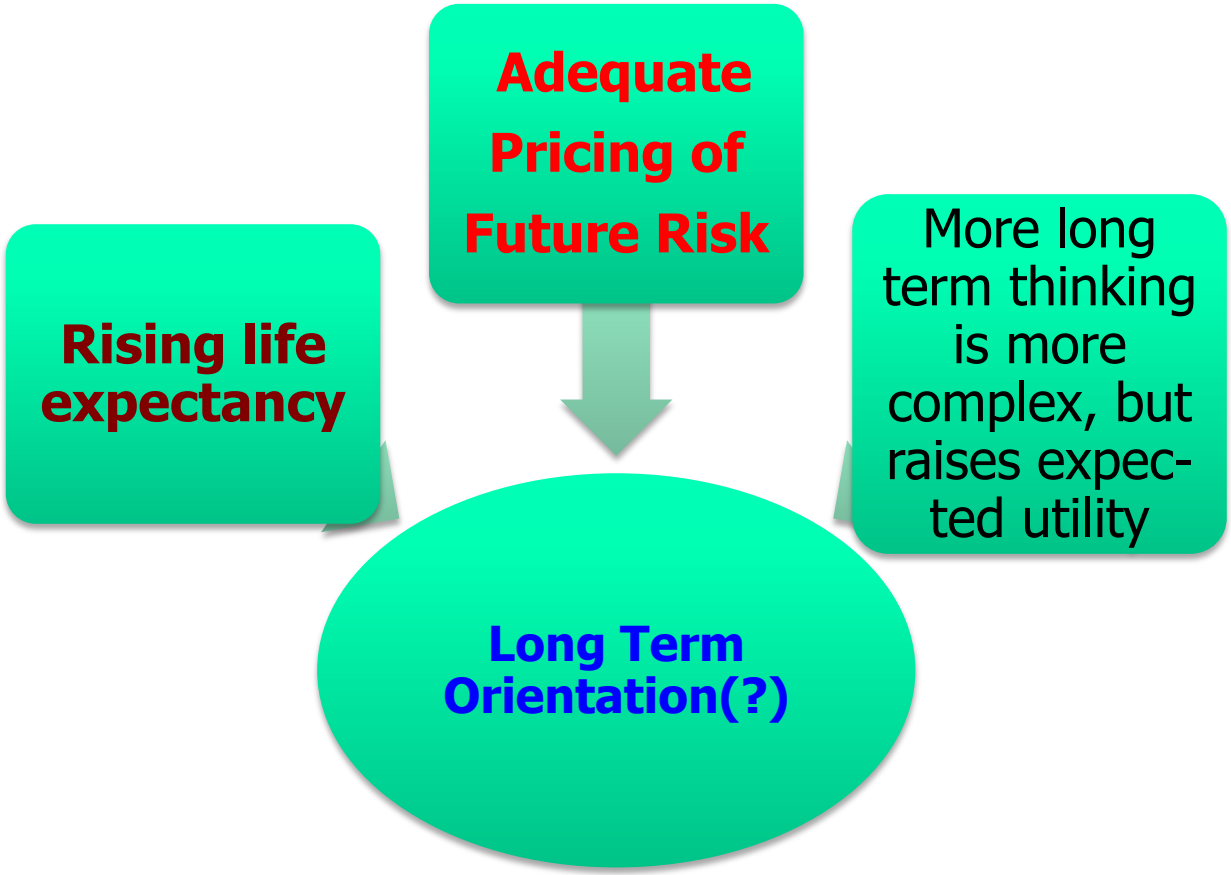


Environment policy in combination with green social policy; e.g. U-turn in energy policy should be affordable to ALL;; complementary measures in edu-cation

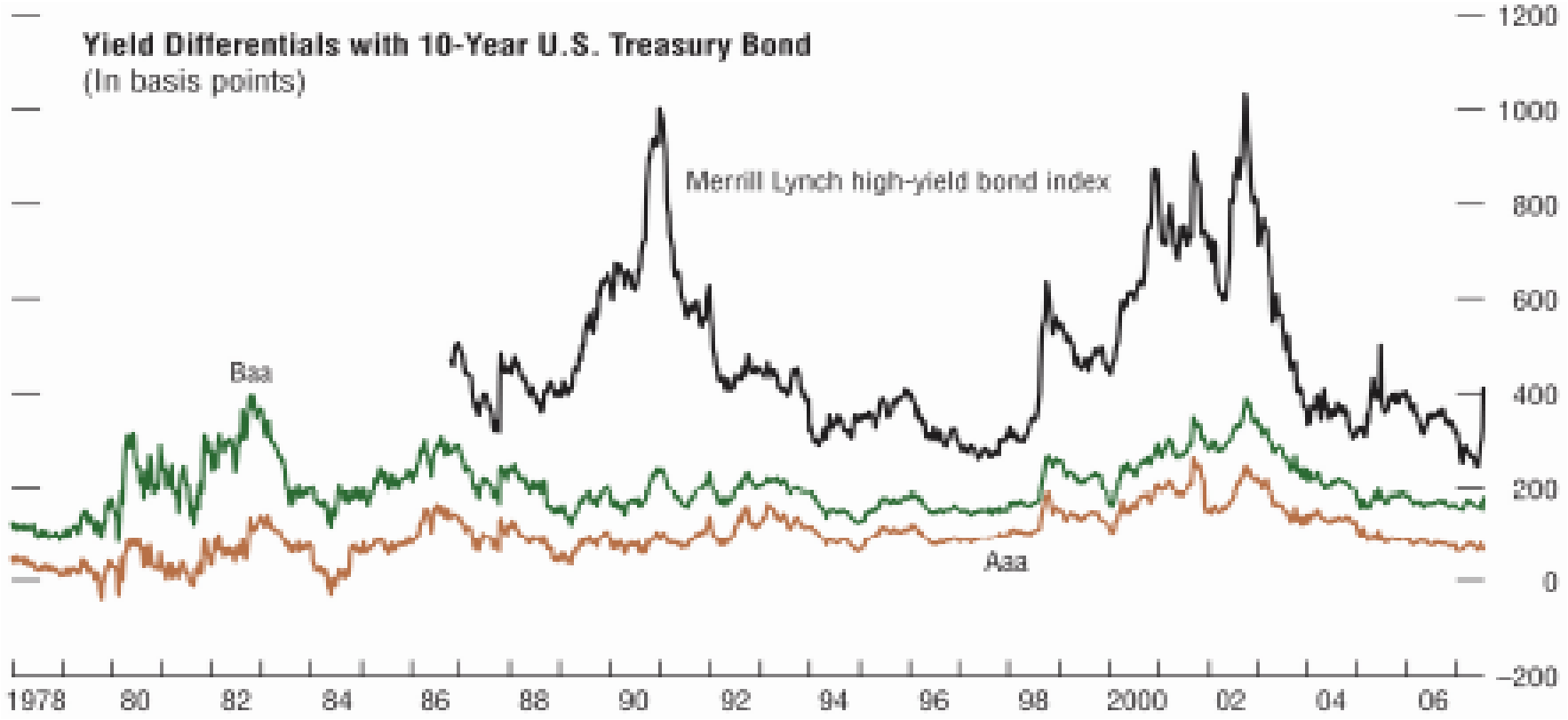
3. Traditional and New Sustainability Challenges

- Sustainability challenges
  - E.g. raising energy efficiency, reducing CO2 emissions/raising share of renewables
  - Reducing waste from consumption and production
- New sustainability challenges:
  - Banking/private equity have short time horizon
  - Insurance; e.g. life insurance (in Germany) with 12 year horizon, ½ of contracts ending early

Why Should We Think More Long Term?



Risk Premiums in US Capital Markets: Artificially Low 2003-06: Overinvestment in Short-run, Crisis in Medium Term

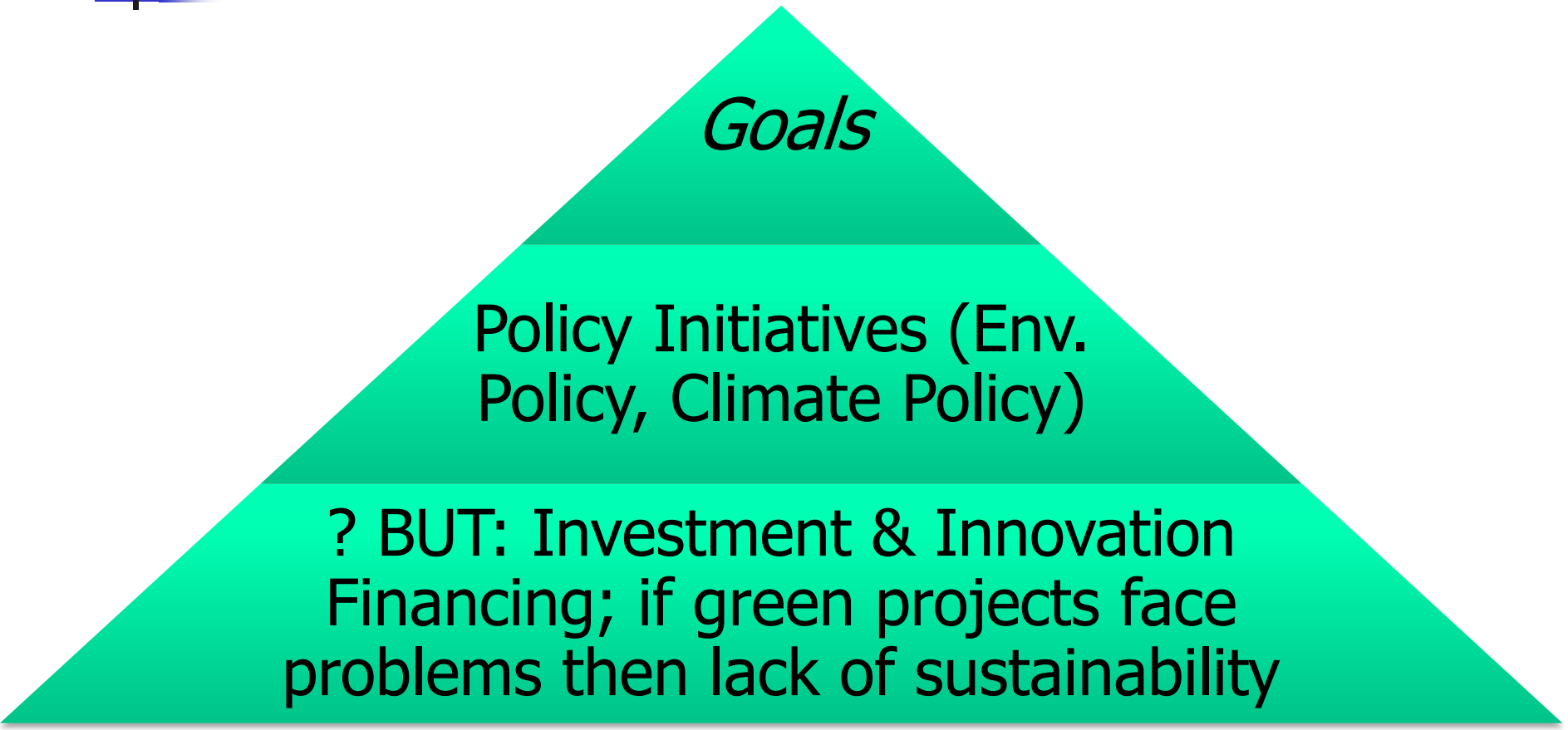


Quelle: IMF, Global Stability Report Statistical App., Sept. 2007 Figure 3

Time Horizon

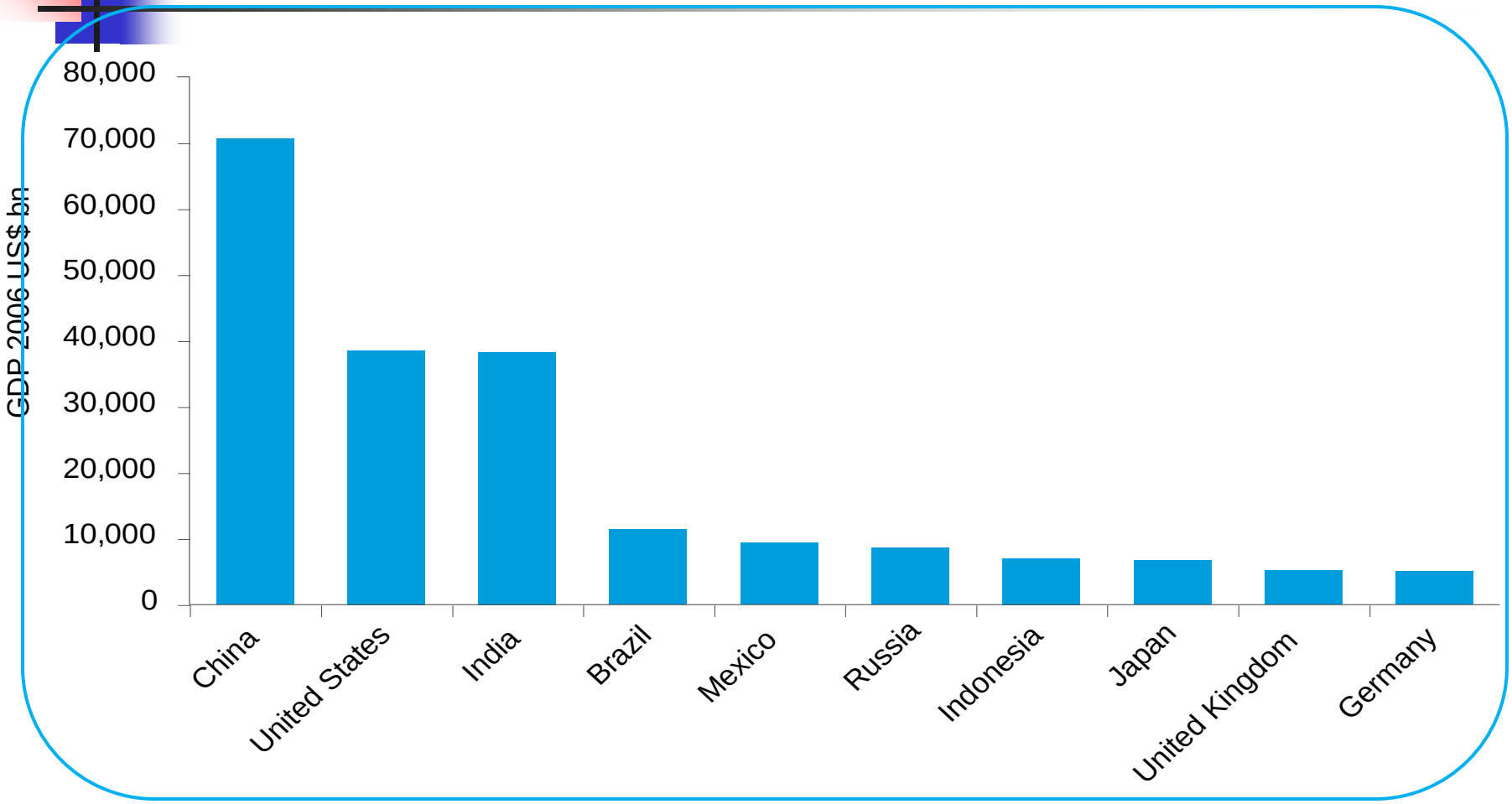
- Time horizon is long if
  - Life expectancy is increasing
  - Capital intensity is high (in some sectors: e.g. energy sector; air transportation)
  - Tax incentives could encourage long term decision-making in financing
  - Capital markets reward long term decisions
  - If „long term financial products“ are available

Goals, Strategies and Investment & Innovation Financing



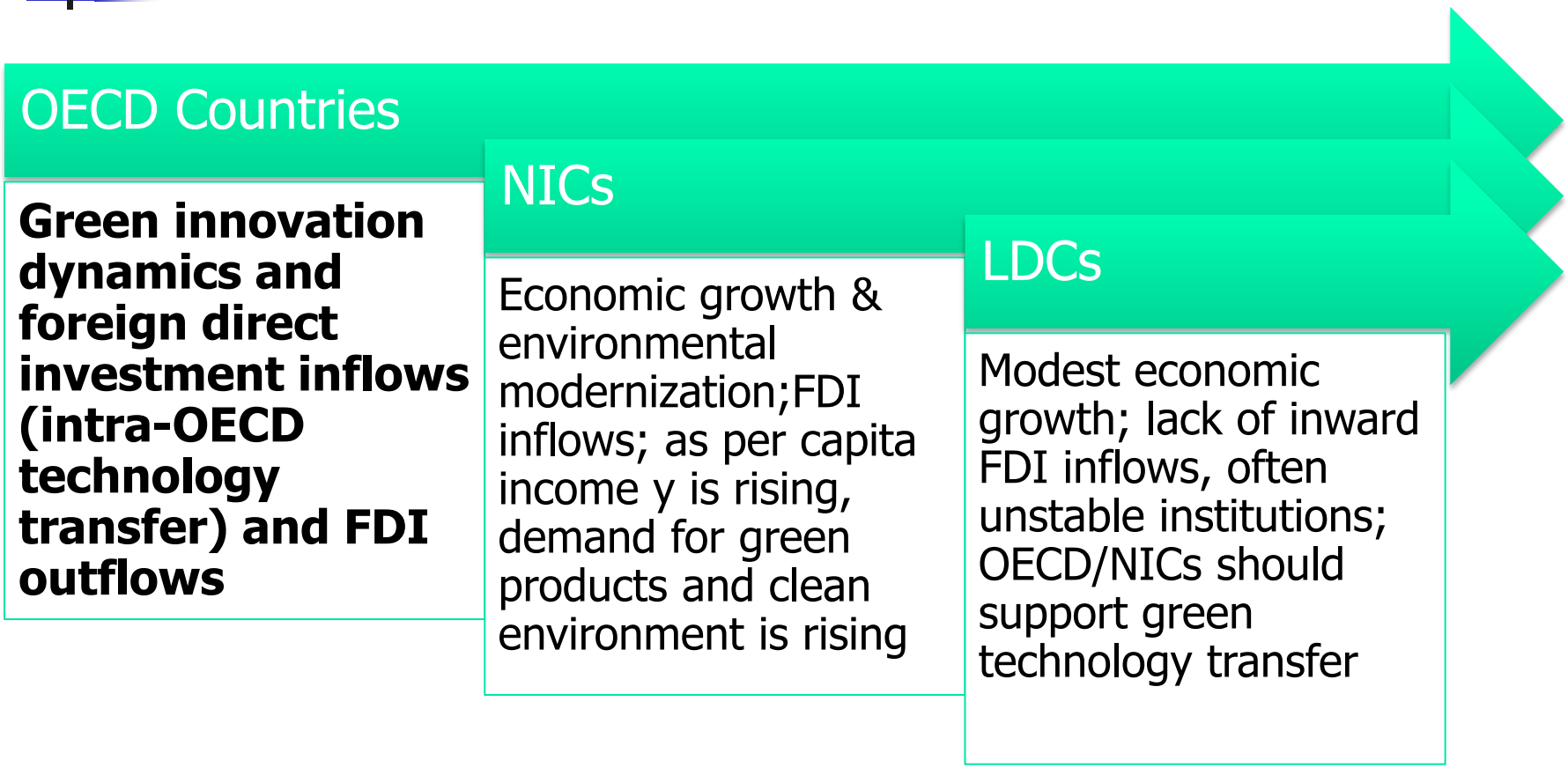
Growth: Global economic power is shifting

Top 10 economies by GDP in 2050



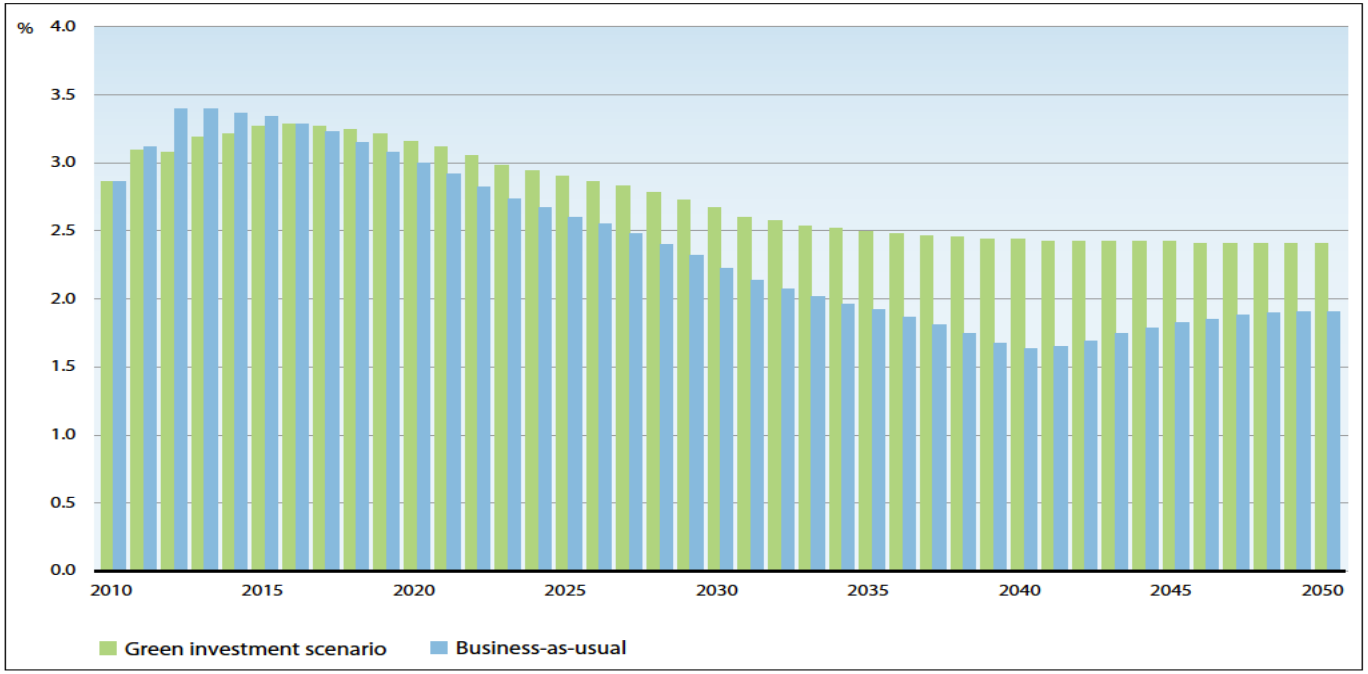
Source: Goldman Sachs, *BRICs and Beyond, 2007*

Growth in OECD Countries and Asia and ...



Green economy UNEP 2011: Growth Rates: Business-as-usual and Green investment-Szenario

Figure 9. Projected trends in annual GDP growth rate.



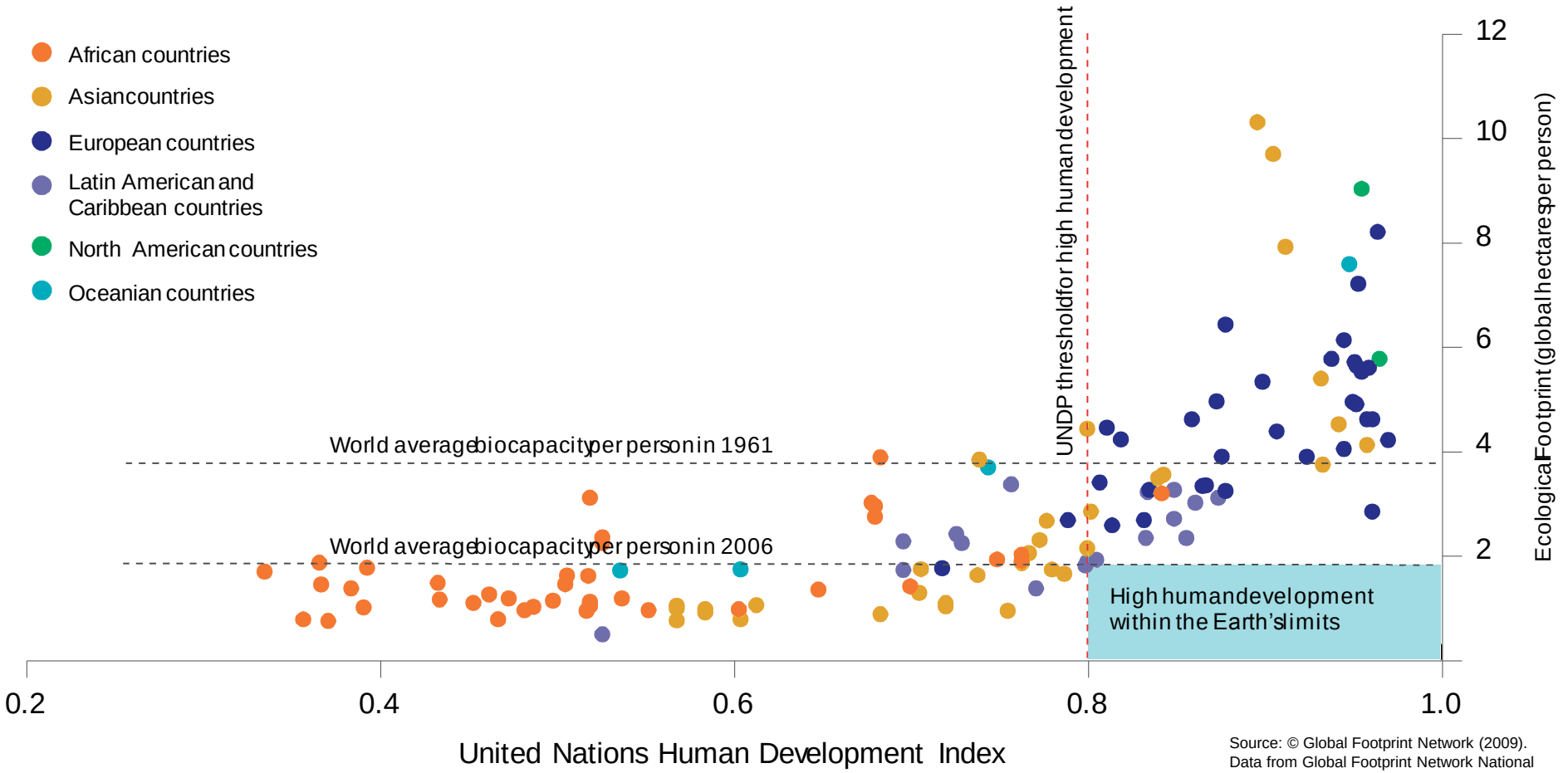
Quelle: UNEP (2011):Towards a Green Economy - Pathways to Sustainable Development and Poverty Eradication, synthesis for policy makers 32

Green Economy could be compatible with growth; even support long run growth in EU countries

Meeting human demands within the natural limits of planet earth

Meeting the dual goals of sustainability

High human development and low ecological impact



World Business Council for Sustainable Development)

Source: © Global Footprint Network (2009). Data from Global Footprint Network National Footprint Accounts, 2009 Edition; UNDP Human Development Report, 2009

Key Points in Policy Approaches

UNEP (2011) Towards a Green Economy

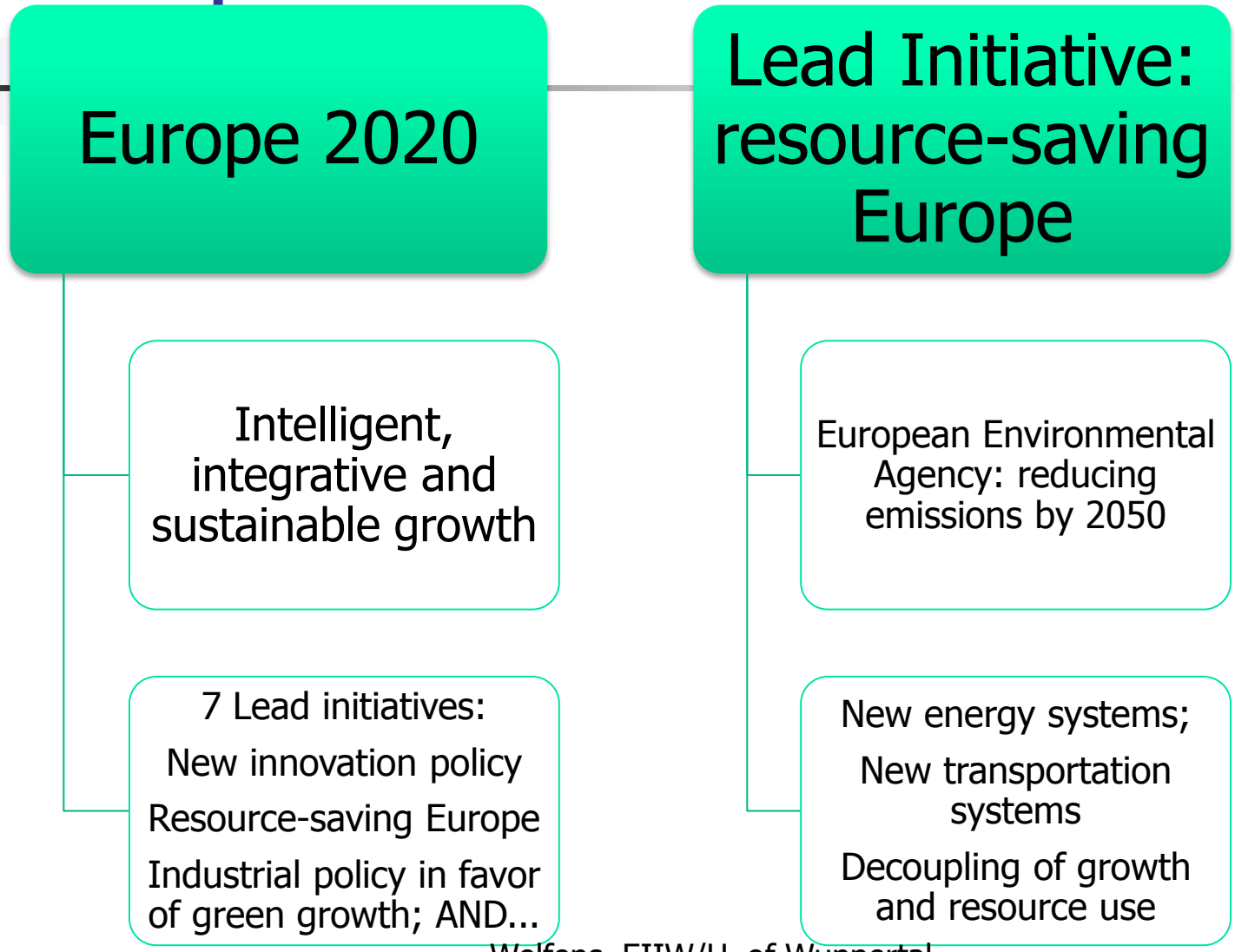
OECD: Green Growth Strategy

Europe 2020

G20: Against energy subsidies (Pittsburgh summit)

Sustainability Indicators

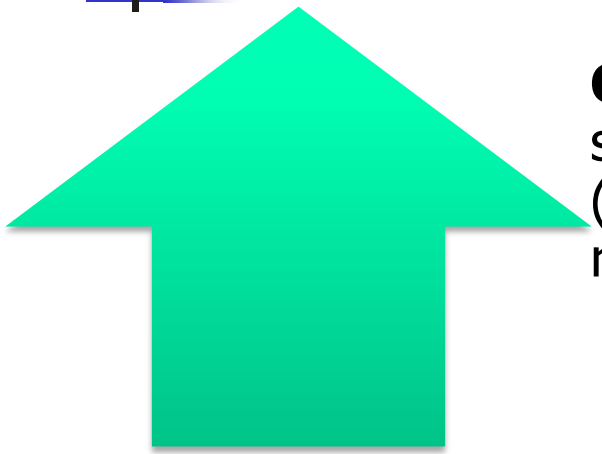
European Union



4. Theory: Savings, Financial Markets and Sustainable Growth in Open Economies

- Macro perspective: 1) **size of savings rate and of income tax rate (corporate tax rate)**
- **Structural perspective**: allocation of savings to sectors/projects – **how much sustainable investment and green innovation do we get?**

Two Analytical Questions



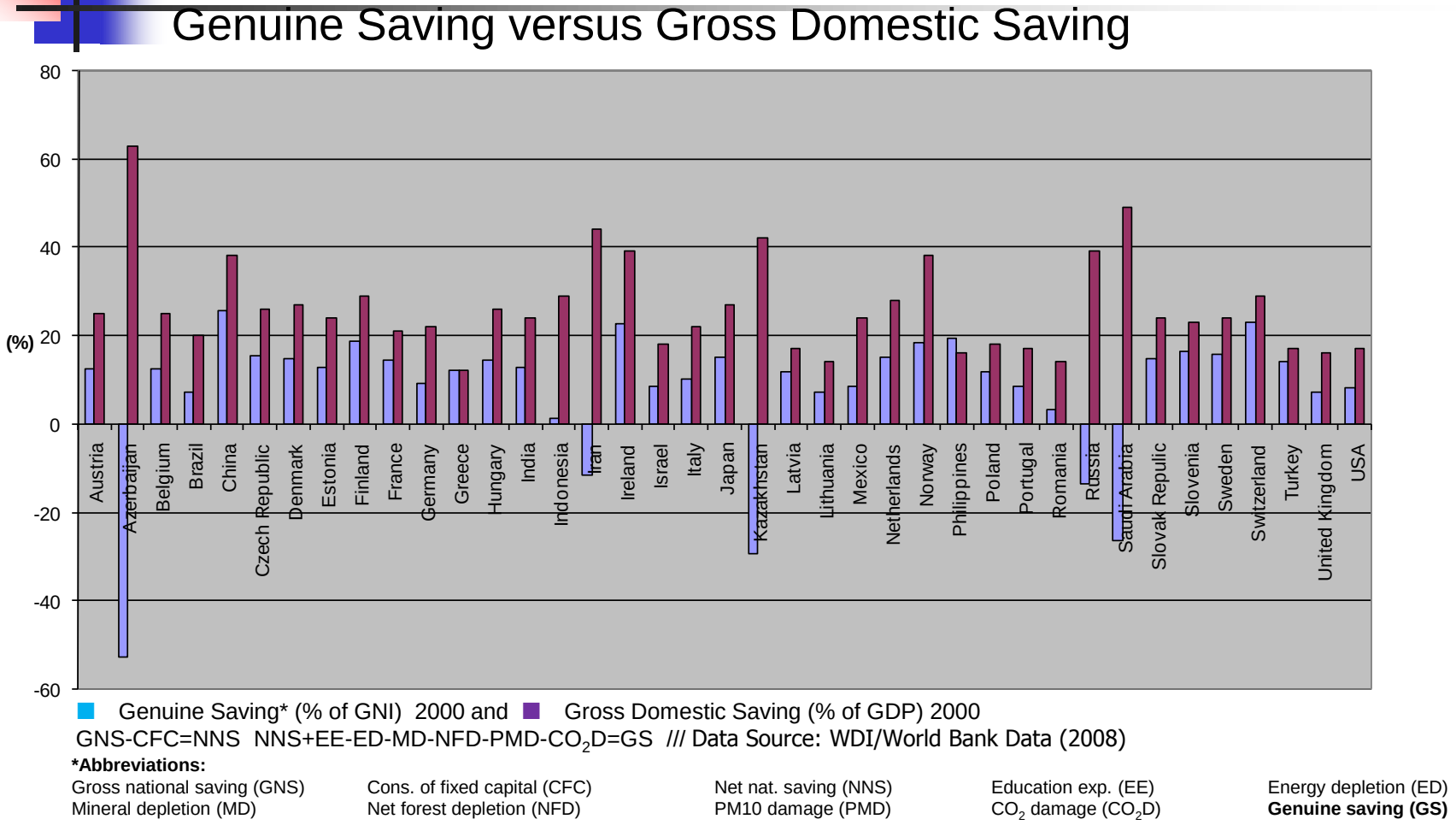
Correct measurement of savings rate?; see World Bank genuine gross savings rate (includes depreciation on the stock of natural ressources)

Golden rule **capital intensity k^{gold}= maximizing per capita consumption** in long run equilibrium of growing economy; if $k>k^{gold}$ to many capital goods (machinery & equipment) have been produced in home country I or foreign country II (Germany)= implies excessive emissions& resource use

Golden Rule Capital Intensity (Ratio of K to L)

- The **ecological rucksack of the production of capital goods** thus is quite important:
- a capital intensity which exceeds the golden rule capital intensity stands for a triple problem:
  - There is too much production, hence excessive emissions
  - and there had been unnecessary emissions during the production of the "excessive capital stock".
  - Third there is a stock adjustment problem in the sense that switching to the lower golden rule capital intensity there will be a period of reduced production of capital goods which goes along with idle capacity and an increasing per capita consumption

Fig. 1: The Genuine Savings Rate



***Abbreviations:**

Gross national saving (GNS)	Cons. of fixed capital (CFC)	Net nat. saving (NNS)	Education exp. (EE)	Energy depletion (ED)
Mineral depletion (MD)	Net forest depletion (NFD)	PM10 damage (PMD)	CO_2 damage (CO_2D)	**Genuine saving (GS)**

Financial Markets and Growth (t is time; A_0 initial level of knowledge; growth rate dlnA/dt=a; dlnL/dt=n)

- Traditional aspects to be explored:
  - Goal of economic activities is **maximizing per capita consumption:** achieved through **golden rule k**
  - Neoclassical growth model (Y is gross domestic product, K capital, A knowledge, L labor):
    - (1) $Y= K^{\beta}(AL)^{1-\beta}$, $0<\beta<1$; $Y/(AL) = k^{\beta}$; $k:=K/(AL)$
    - (2) $S= s(1-\tau)Y$; s is savings rate, τ income tax rate
    - (3) $S = dK/dt +\delta K$ (δ is depreciation rate of capital)
    - (4) per capita income $y\#=((s(1-\tau)/(a+n+\delta))^{\beta/(1-\beta)}A_0e^{at}$
    - **(5) $k\#=$**$((s(1-\tau)/(a+n+\delta))^{1/(1-\beta)}A_0e^{at}$; $C\#/(AL)=c(1-\tau)y\#$

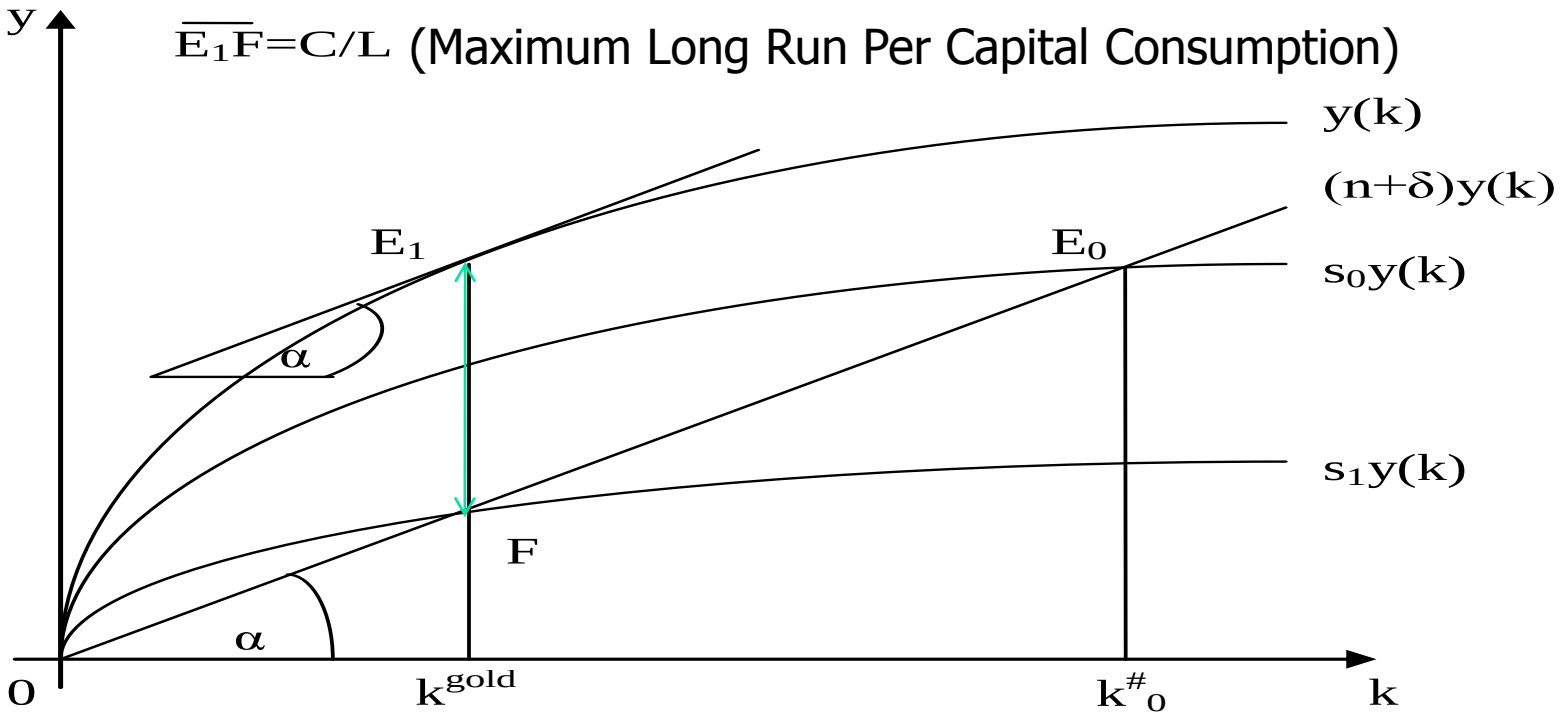
Golden Rule is an important approach: Real interest=growth rate of output

- Note: **golden rule implies s(1-τ)= ß** (see WELFENS, Innovations in Macroeconomics, 3rd. Edition, Heidelberg: Springer, 2011)
- If profit maximization yields net MPC=r we have r = growth rate of output = golden rule age
- Assume that savings function is different (assumption savings rate of capital owners s"$>$s):
  - S= s(1 -τ)(1-ß) + s"(1 – τ)ß; s savings rate of workers
  - Then **optimum tax rate** $\tau=(ß(s"-s) -1)^{-1} –(s"-s)^{-1}$; **it is negative function of ß**

Traditional Neoclassical Growth Modeling (with Knowledge A=1; income tax rate is set as 0)

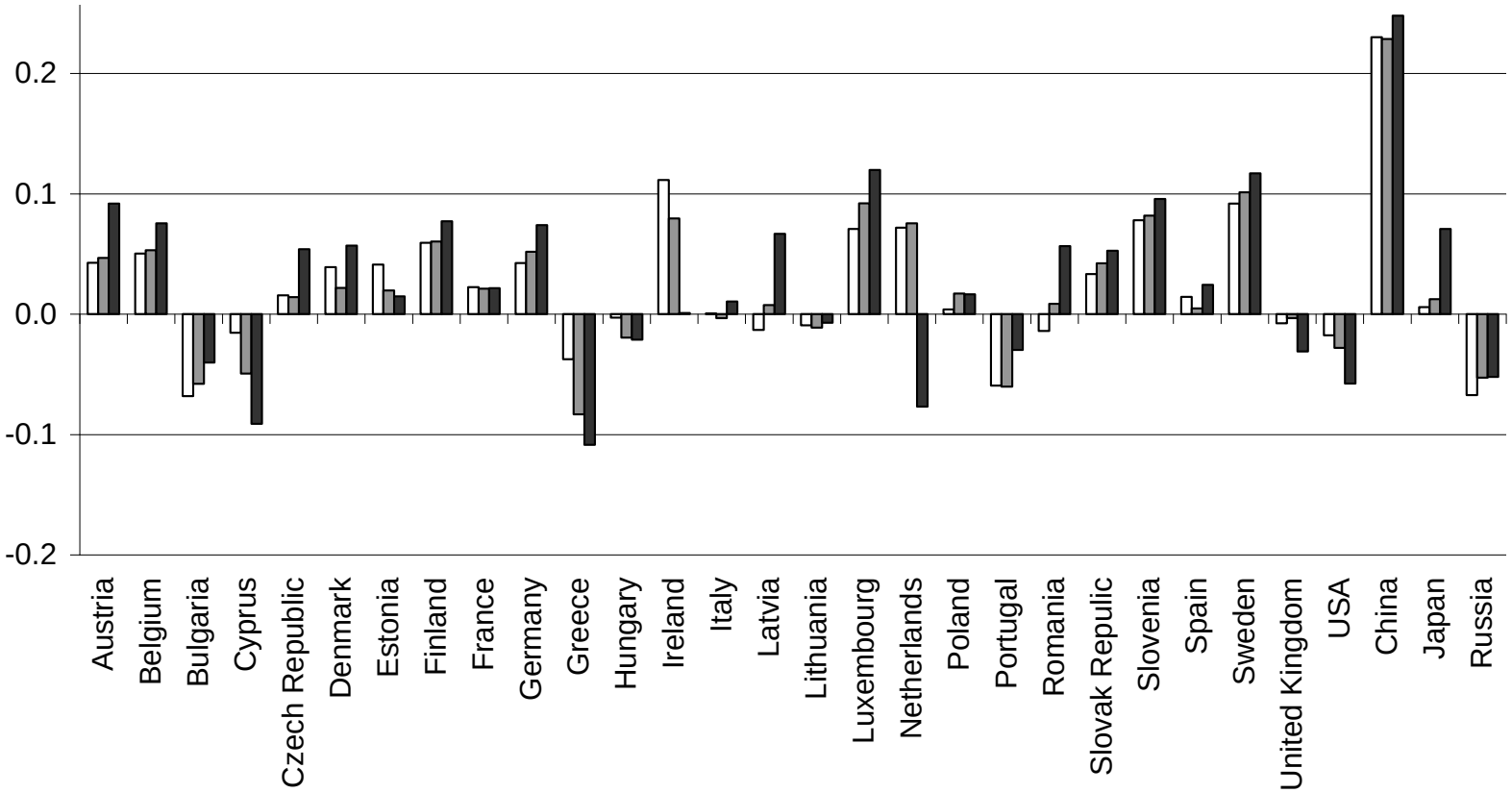
Golden Rule in Standard Neoclassical Growth Model (E_1F= C/L)

Savings rate s could be too high: per capita consumption too low!! = political unrest potential; capital intensity k is too high ($k^{\#}_0$)



Growth Perspectives: 2007/08/09

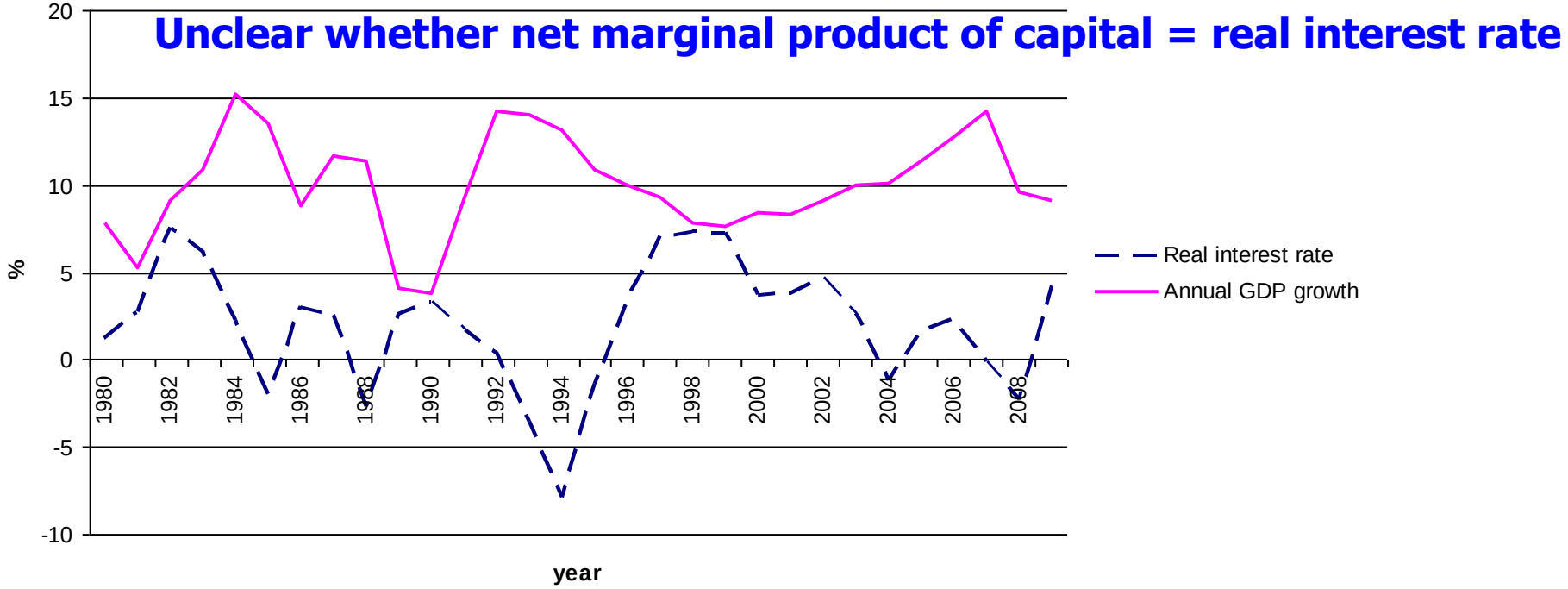
Genuine Savings Rate / World Bank



Data Source: WDI Online, own calculations (RCA)

Golden Rule Aspects in an Economy with Technological Progress: **China**

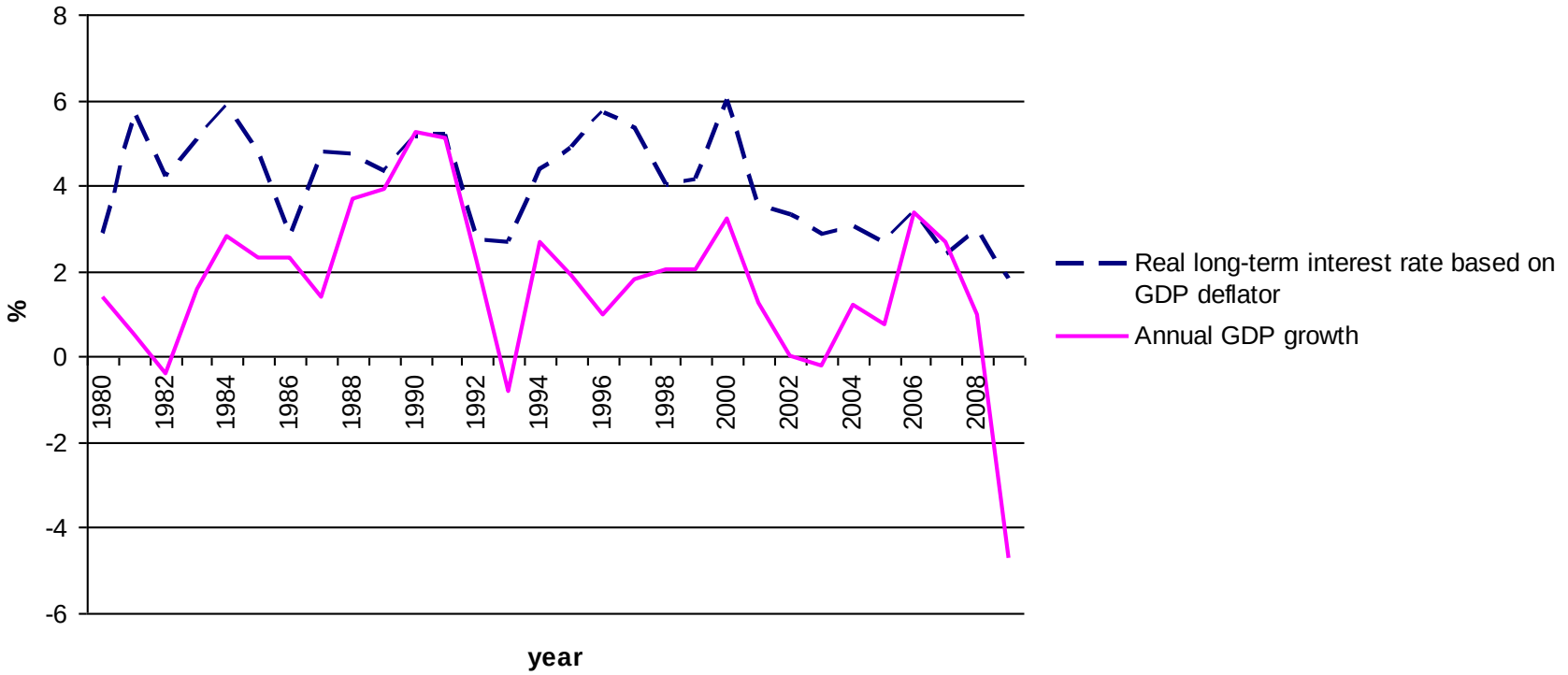
Real Interest Rate and Growth Rate of Real GDP in Selected Countries: CHINA



Data Source: EUROPEAN COMMISSION AMECO database (Real long-term interest rate based on GDP deflator (%)); WORLD BANK, World Development Indicators & Global Development Finance (Real interest rate [real lending rate] (%), GDP growth (annual %))

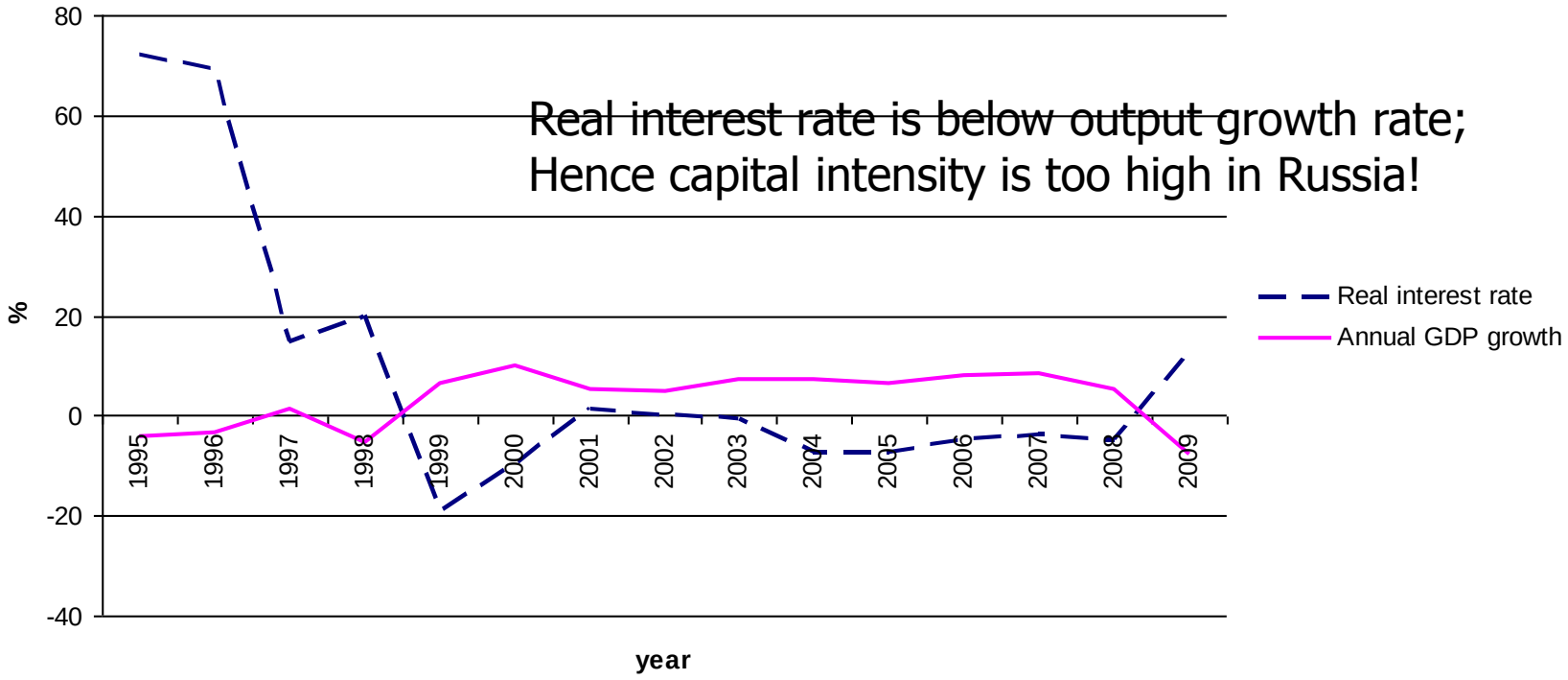
Golden Rule Aspects in an Economy with Technological Progress

GERMANY: **capital intensity is too low! Consumption per capita too low!**



Data Source: EUROPEAN COMMISSION AMECO database (Real long-term interest rate based on GDP deflator (%)); WORLD BANK, World Development Indicators & Global Development Finance (Real interest rate [real lending rate] (%), GDP growth (annual %))

Golden Rule Aspects in an Economy with Technological Progress: Russia



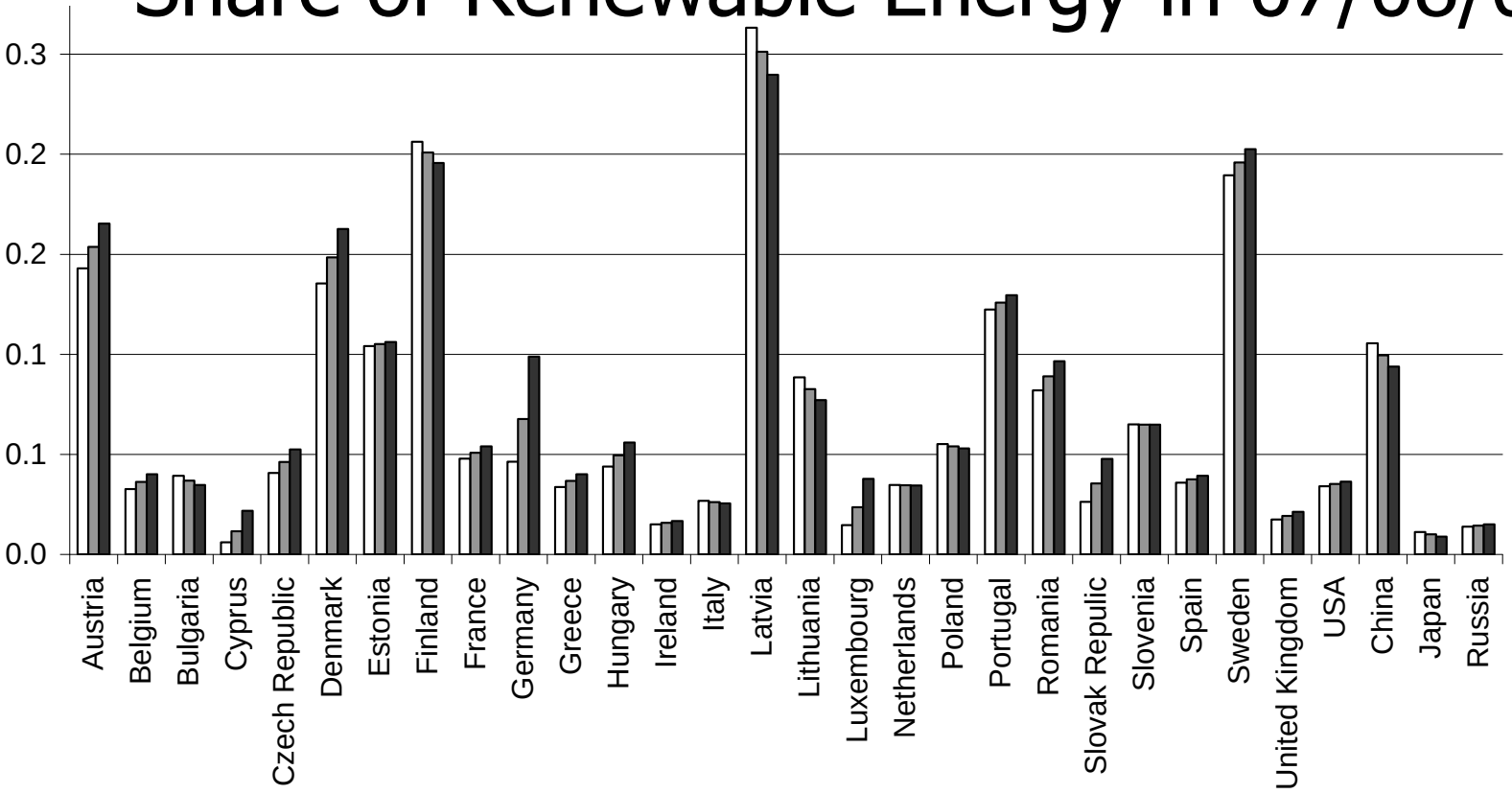
Data Source: EUROPEAN COMMISSION AMECO database (Real long-term interest rate based on GDP deflator (%)); WORLD BANK, World Development Indicators & Global Development Finance (Real interest rate [real lending rate] (%), GDP growth (annual %))

5. Global Sustainability Indicator

- **Several approaches** which often are confusing (with many many indicators in a summary indicator)
- **EIIW vita indicator is compact – compatible with OECD indicator handbook -** and takes into account static green aspects and **green innovations – the latter is reflected in the relative share of green exports**

New Global Sustainability Indicator

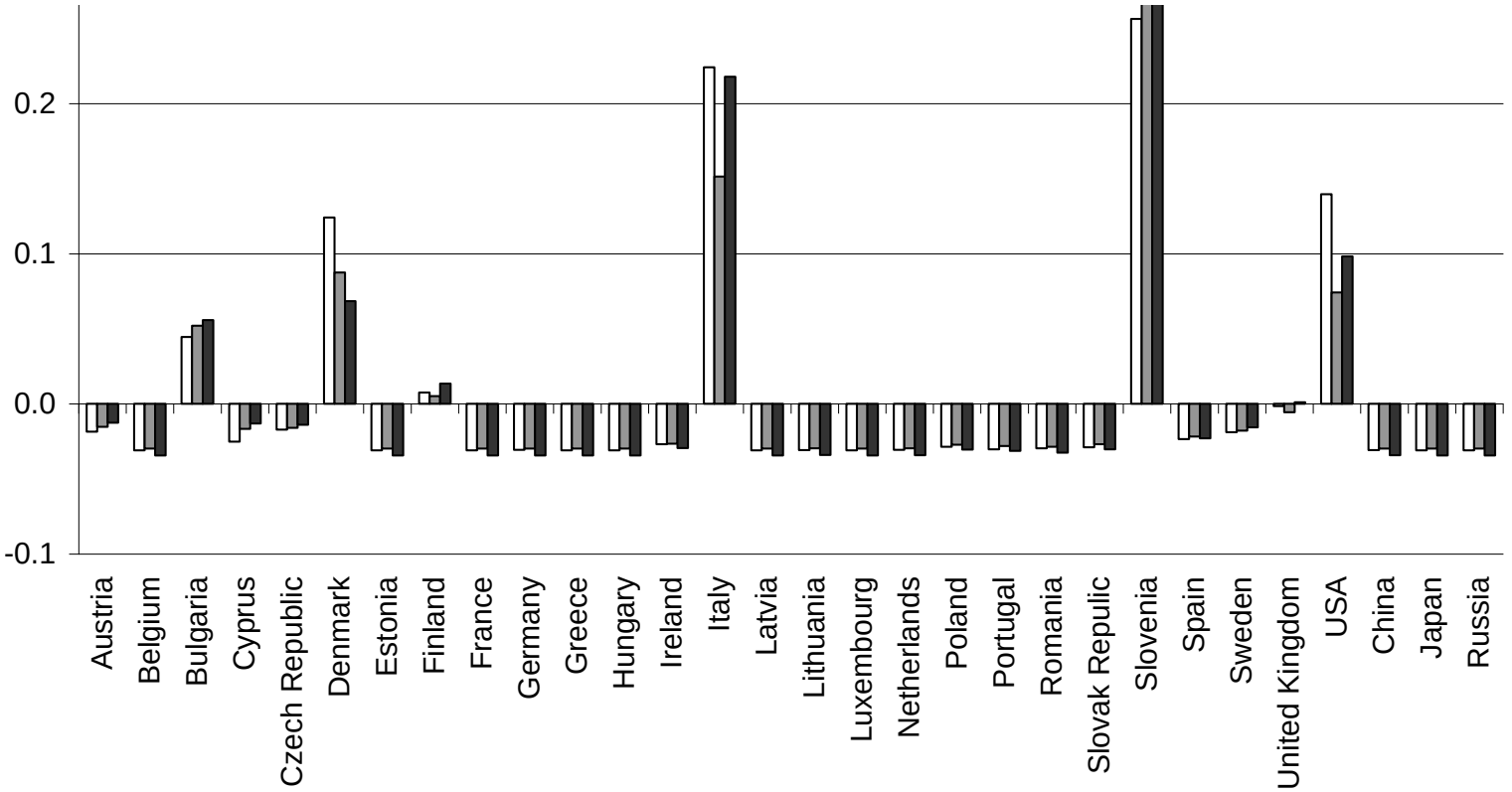
Share of Renewable Energy in 07/08/09



Data Source: WDI Online, own calculations (RCA)

Green Exports: Revealed Comparative Advantage (RCA)

Volume Based RCAs for "green exports"



Data Source: WDI Online, own calculations (RCA)

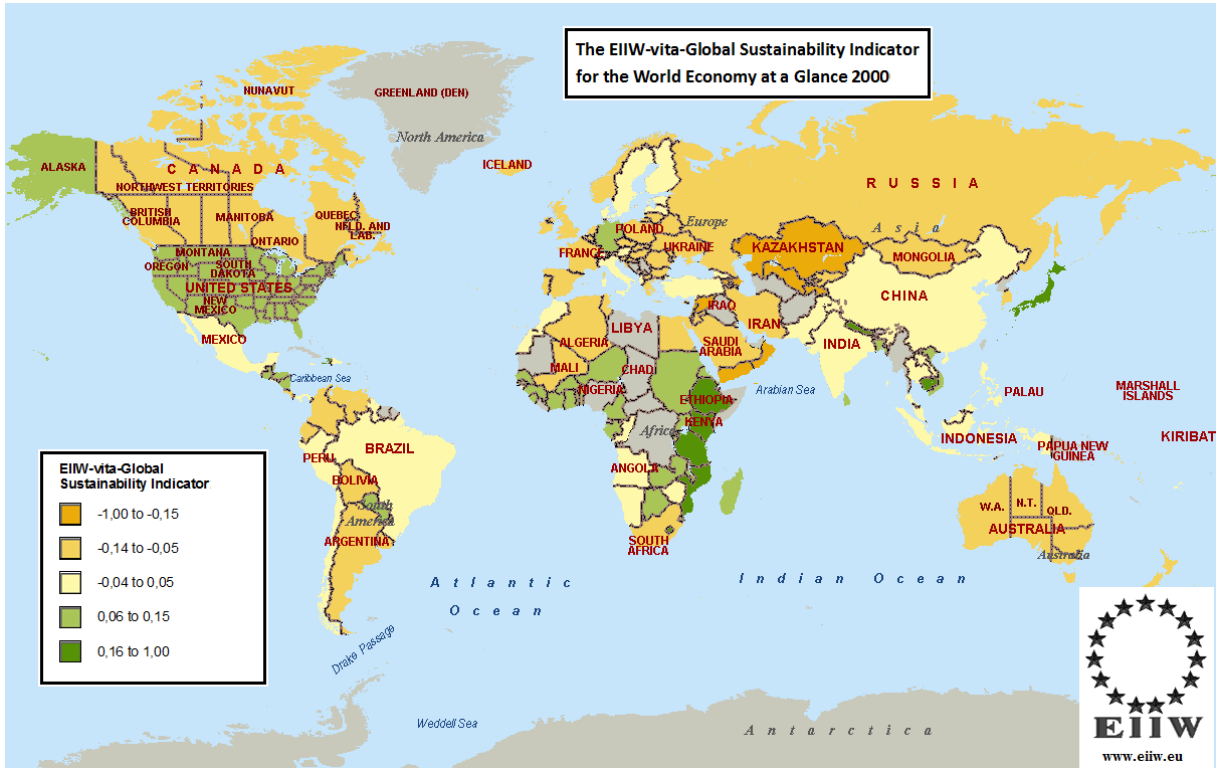
Composite Sustainability Indicator

1. Covering the **share of renewables** in energy: relative share for each country
2. Genuine **savings rate**: this is the official savings rate corrected by implicit additional savings for education minus depreciation of the natural capital stock & CO2 related environmental damages
3. „Green" international competitiveness = relative share of environmental-friendly products in total export/import balance: reflecting green innovations (**green RCA**; RCA = revealed comparative advantage)

- **Adding up these 3 indicators = EIIW vita Global Sustainability Indicator (GSI)**

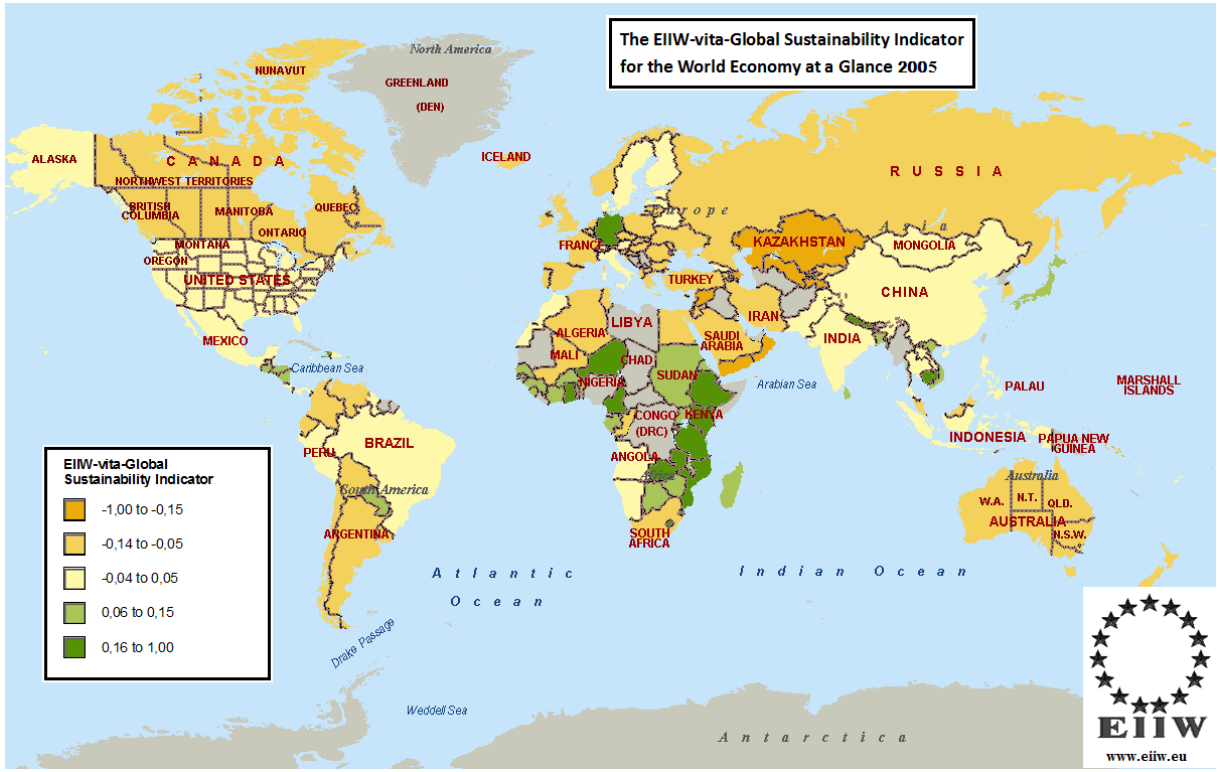
Sustainability Indicator = Share of Renewable+Genuine Savings Rate+Green RCA

EIIW vita Global Sustainability Indicator



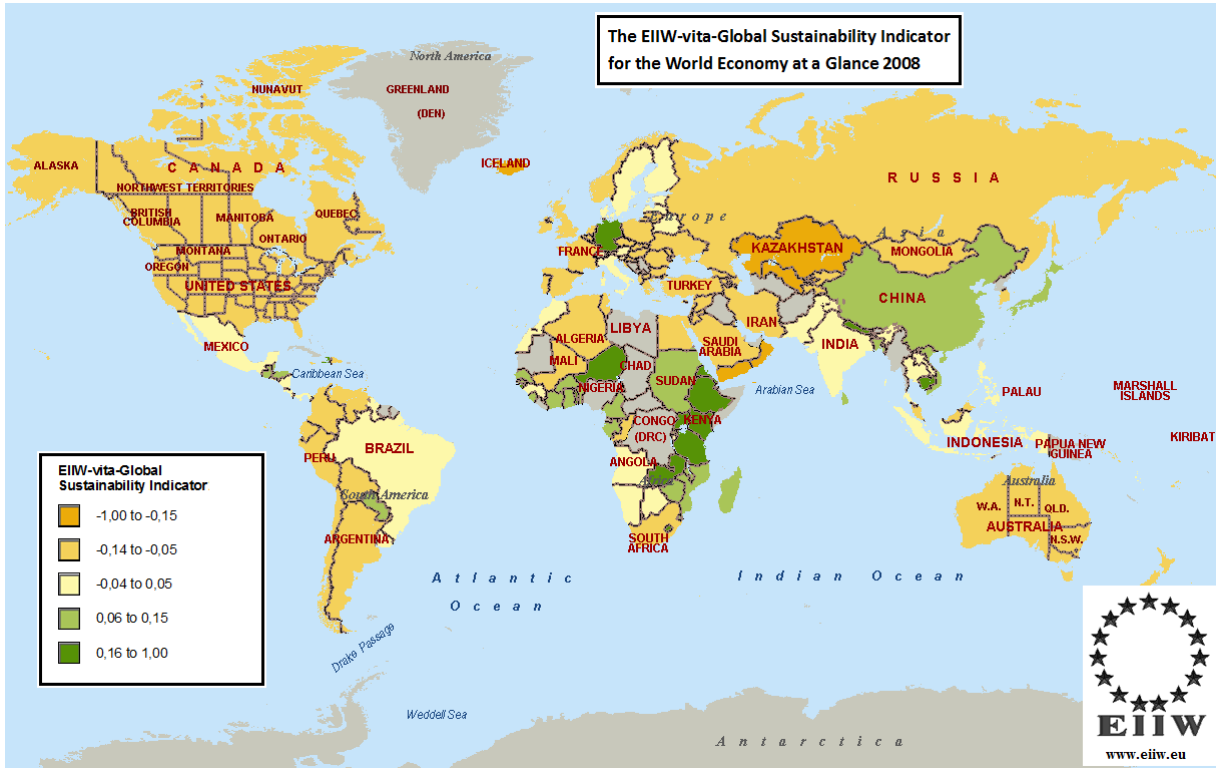
Sustainability Indicator = Share of Renewable+Genuine Savings Rate+Green RCA

EIIW vita Global Sustainability Indicator



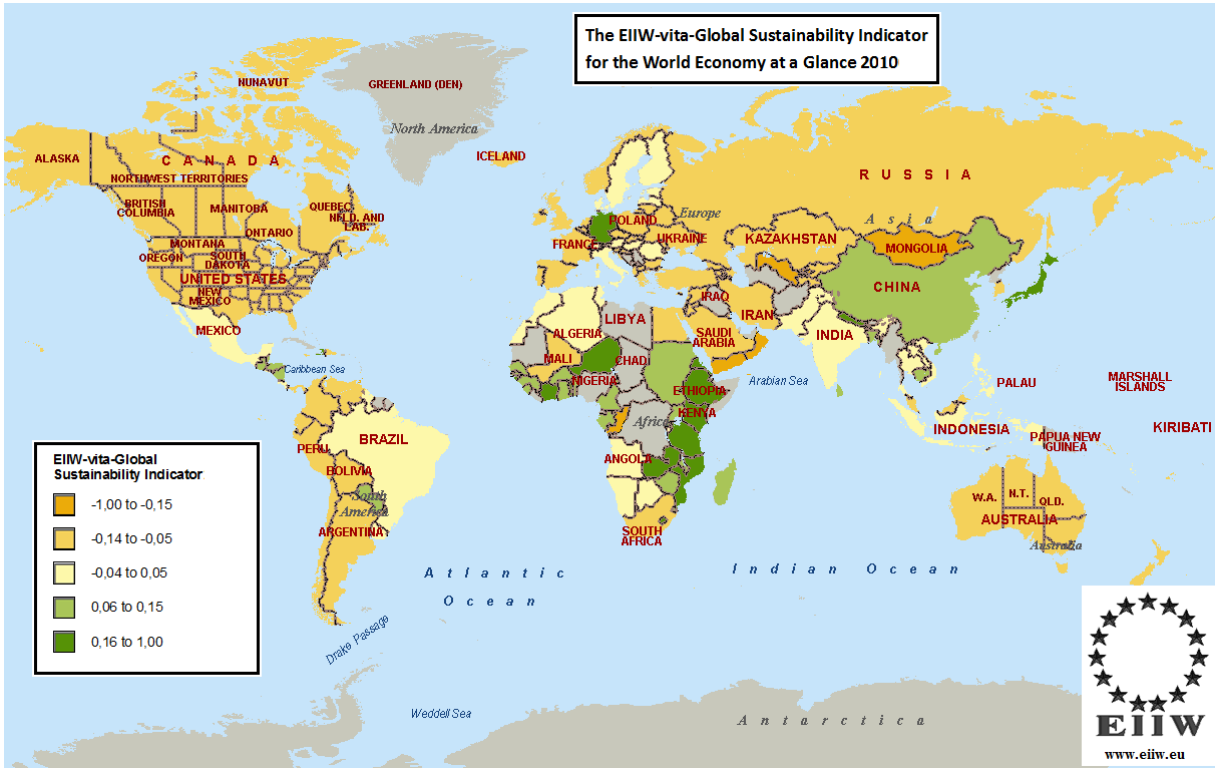
Sustainability Indicator = Share of Renewable+Genuine Savings Rate+Green RCA

EIIW vita Global Sustainability Indicator



Sustainability Indicator = Share of Renewable+Genuine Savings Rate+Green RCA

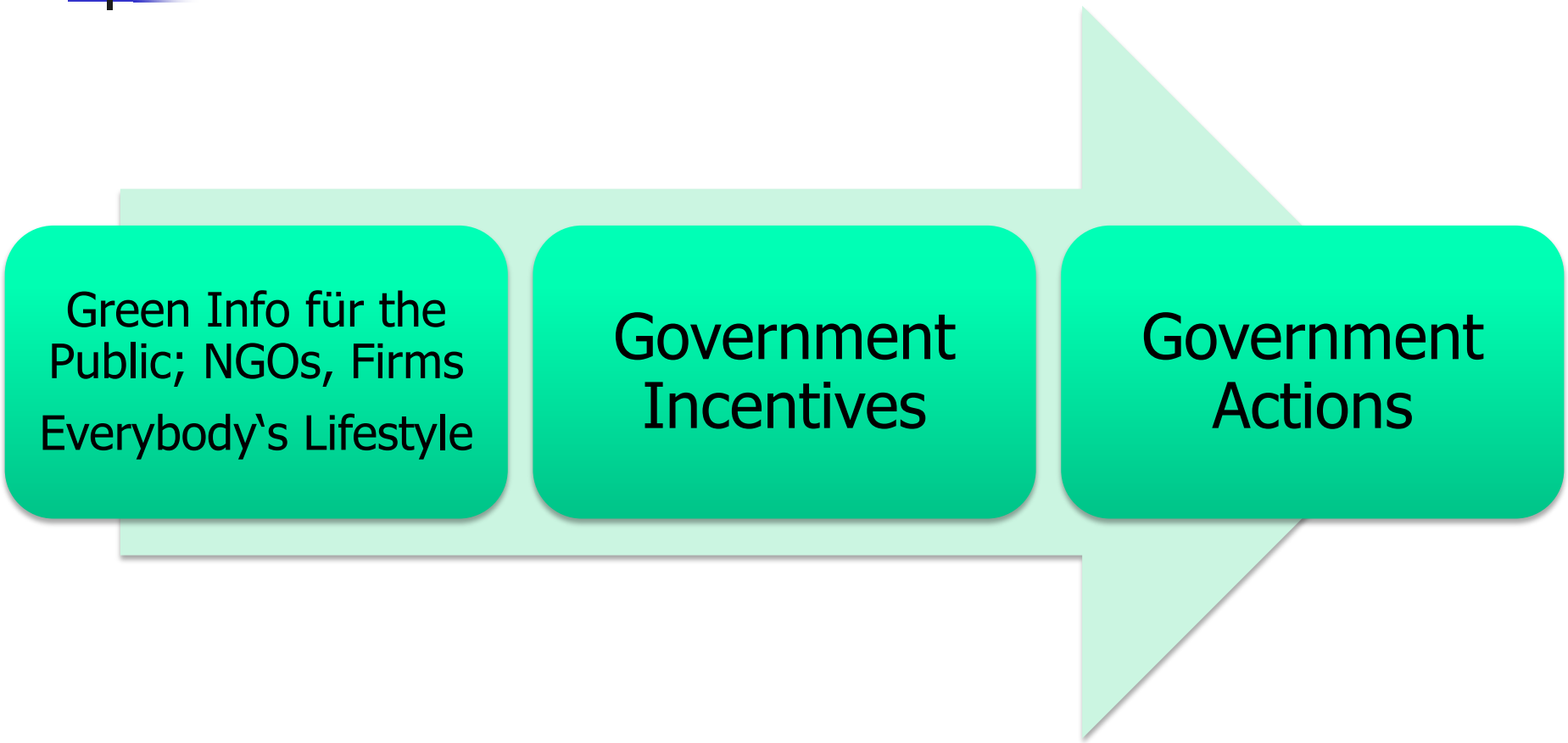
EIIW vita Global Sustainability Indicator



Global Perspective with FDI Inflows and FDI Outflows

- **Foreign direct investment inflows typically will increase progress rate,** but might reduce the level of the growth path; FDI inflows from strong green economies will bring *green international tech transfer*
- Effects of FDI outflows on source countries unclear – if intra-OECD a rise of the progress rate could result from this; FDI outflows from leading green economies will bring international technology transfer

6. Policy Perspectives



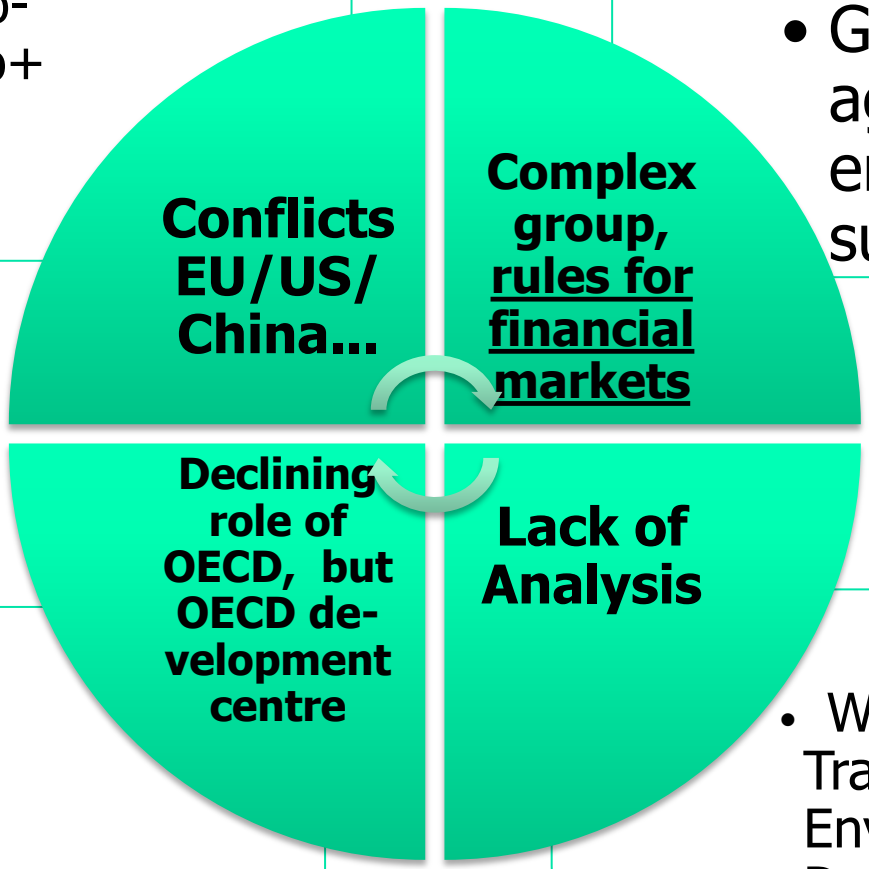
6. Double Sustainability and Financial Markets

- Considering both policy approaches and the key role of financial markets
  - **Much short-termism** in markets financing investment: Reform =**tax on volatility of banks' rate of return on equity banks** (Welfens, 2009)
  - **Venture capital for „green firms"**; e.g. green ICT firms
  - **Information for investors on degree** of sustainability projects/sustainability orientation of firms quoted in stock markets = rating issue

Government Policy & Sustainability: International Institutions

- Kyoto Pro-tocol; Rio+

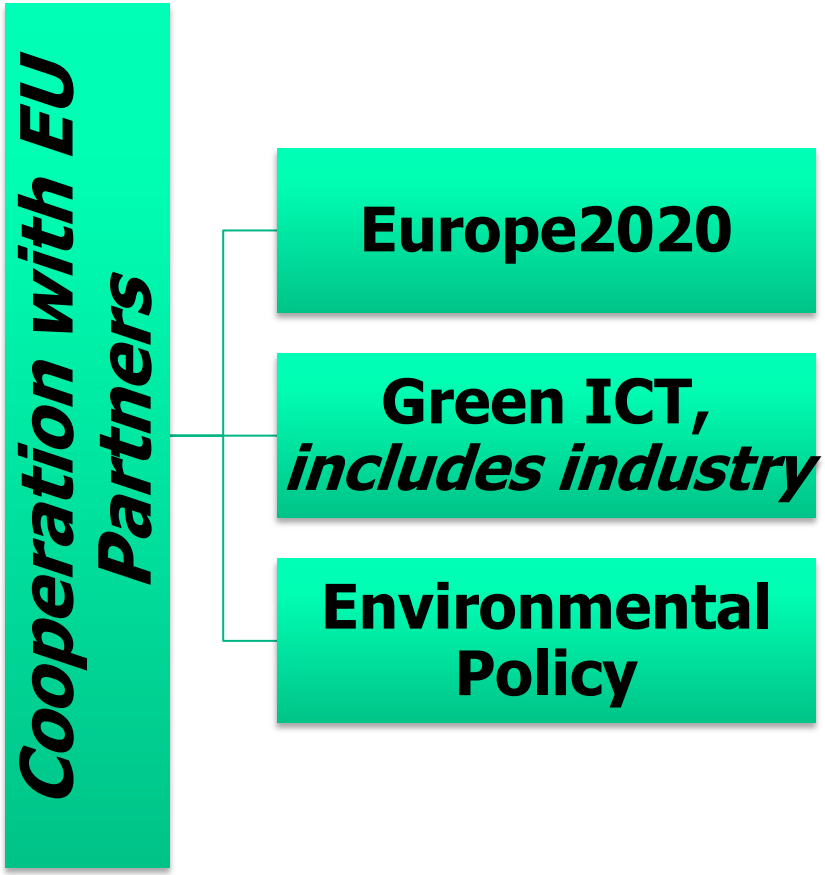
- G20: against energy subsidy



- OECD

- WTO: World Trade and the Environment; Doha Round?

National Sustainability Policy



Push for Double Sustainability through Policy Measures

Environmental Sustainability: Green Innovations = **Should Be a Strong Policy Field in the Future**

Financial market sustainability; **New Standards, Better Rules/Incentives; Allowing Insurance Companies to Invest 5% in Certified Green Bonds etc.**

Double Sustainability

- One will envisage different elements from a policy perspective:
  - Institutional changes and new law, respectively, should impose side-constraints for producers and consumers so that clear liability rules are imposed. The fact that nuclear energy producers for decades were allowed to produce without adequate insurance coverage for a potential nuclear accident is one important case where government has allowed price distortions in favor of a specific type of energy so that the expansion of renewable energies has been slowed down
  - Creating institutions which will give relevant information to producers and consumers/users so that environmental friendly choices are encouraged. Life cycle analysis of resource use and the provision of relevant info is important.
  - Investment financing and financing of innovations is crucial: To the extent that green product innovations have high benefits in the future there is the problem whether or not relevant investor groups – e.g. private equity groups, hedge funds and banks – take a long time horizon; there is much "short-termism" to be observed among many investor groups.

Double Sustainability

- We have two types of unwelcome shortening of maturities and time-horizons, respectively:
  - Short-termism of bankers and hedge funds were a problem in the economic and institutional environment of Western OECD countries prior to the crisis of 2008/09.
  - Shorter maturities of government financing are a by-product of the crisis of 2008/09.
- If governments are to encourage more long term investment on may consider the following policy options:
  - Government bonds should establish adequate standards in the sense that government should finance deficits and debt-refinancing mainly through long term bonds – this, however, requires that government has obtained a top rating by rating agencies.
  - Regulations for insurance companies and pension funds should be adjusted in such a way that long run green investment fund are not discriminated or even favored – largely reflecting implied positive external effects of the associated higher environmental-friendly investments.
  - Regulations for banks should be adjusted in a way (WELFENS, 2009) that not only profits are taxed but that the volatility of the rate of return on equity also is part of the tax basis; if high volatility – exceeding a benchmark of natural volatility - is taxed the incentive will be that managers will have a strong incentive to more carefully consider the prospects and opportunities for achieving long term rather stable realistic rates of return on equity. This in turn should stabilize economic development.

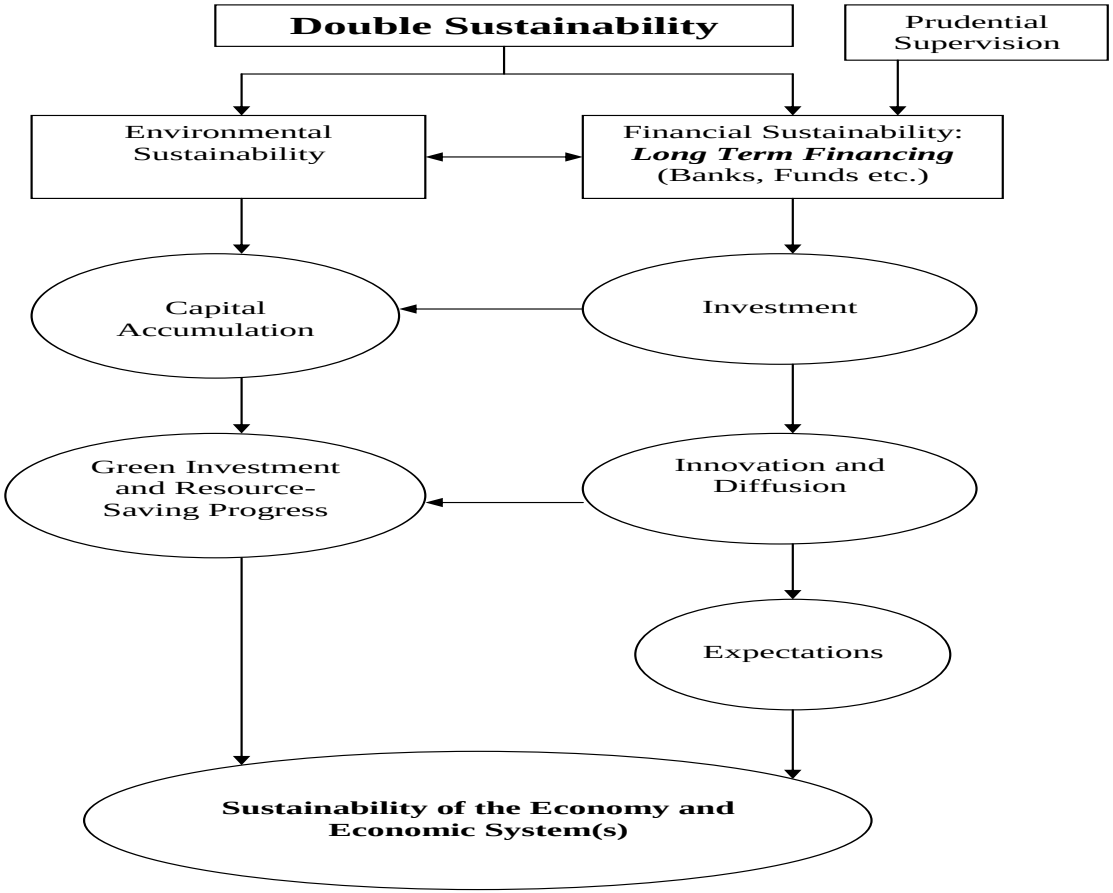
Double Sustainability

- It will be important to develop consistent sustainability indicators that take into account sustainable consumption and investment, respectively:
  - There are several indicators, including the global economic footprint from the WWF.
  - There EIIW has developed a new indicator based on the share of renewable energy, the genuine savings rate of the World Bank – taking into account not only depreciation of physical capital but also the depreciation rate of natural resources on the one hand (as a negative factor) and the expenditures on higher education by private households plus the relative international share of environmental-friendly exports; for an update on the EIIW vita global sustainability indicator see: WELFENS/PERRET/ERDEM, 2010b). Emphasizing the opportunities of green innovation could be one strategic element of reinforcing the global Copenhagen Dialogue in a useful way.

Individuals, Bankers, Managers

- Interest of relevant actors in many countries in long term investment financing and green innovation financing is rather limited
- Short-term orientation for long has been dominant in part of financial markets (OECD countries)
- Family businesses often are long term oriented; but so might also be firms quoted in stock markets – which create transparency for national/international investors

Double Sustainability



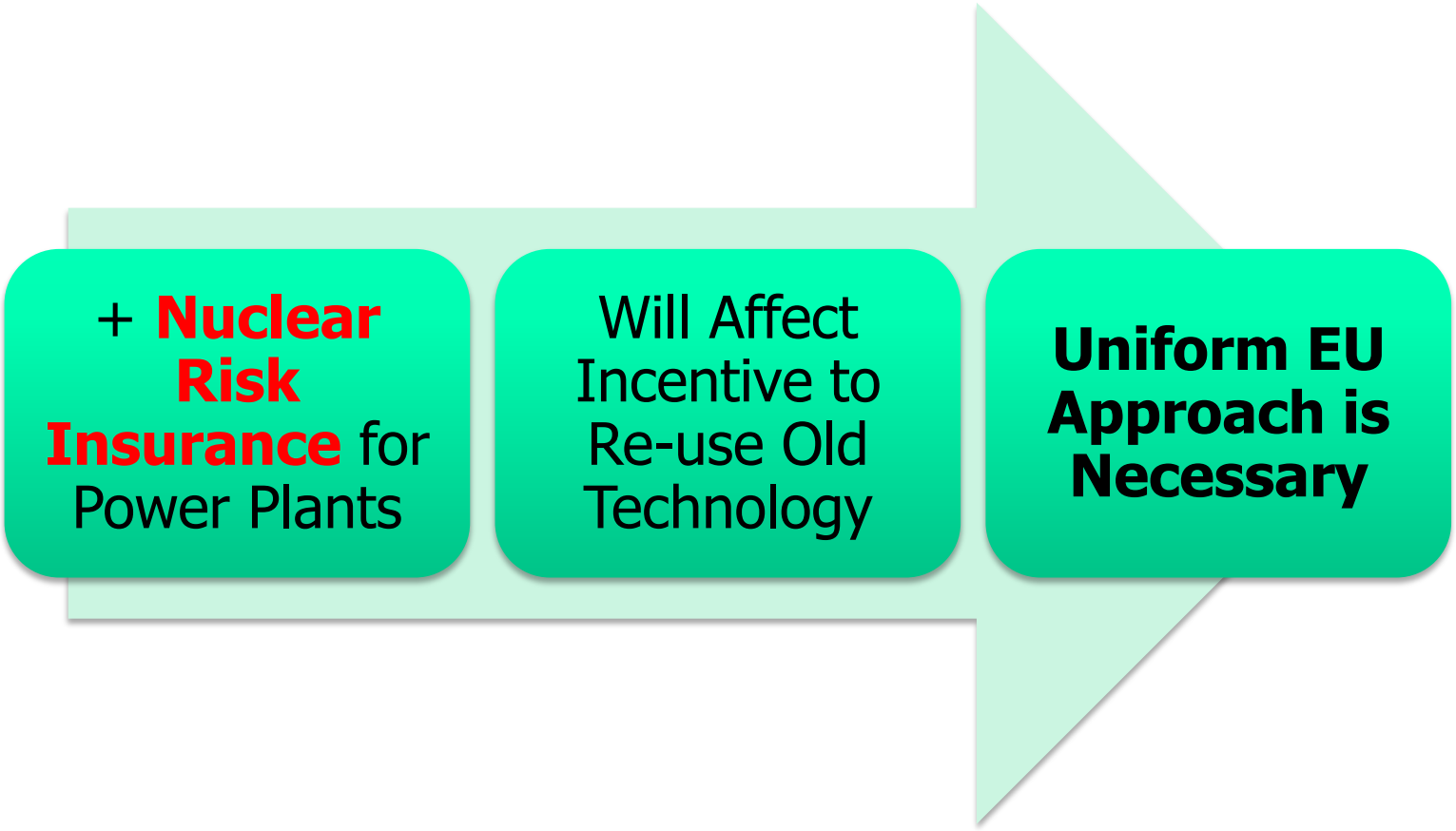
Potential Investment Field: Smart Grid Dynamics: Which Investments, Which Ownership of Data

Smart Grids

Smart Meters

Relevant Data = private property of users; exploited under competitive conditions

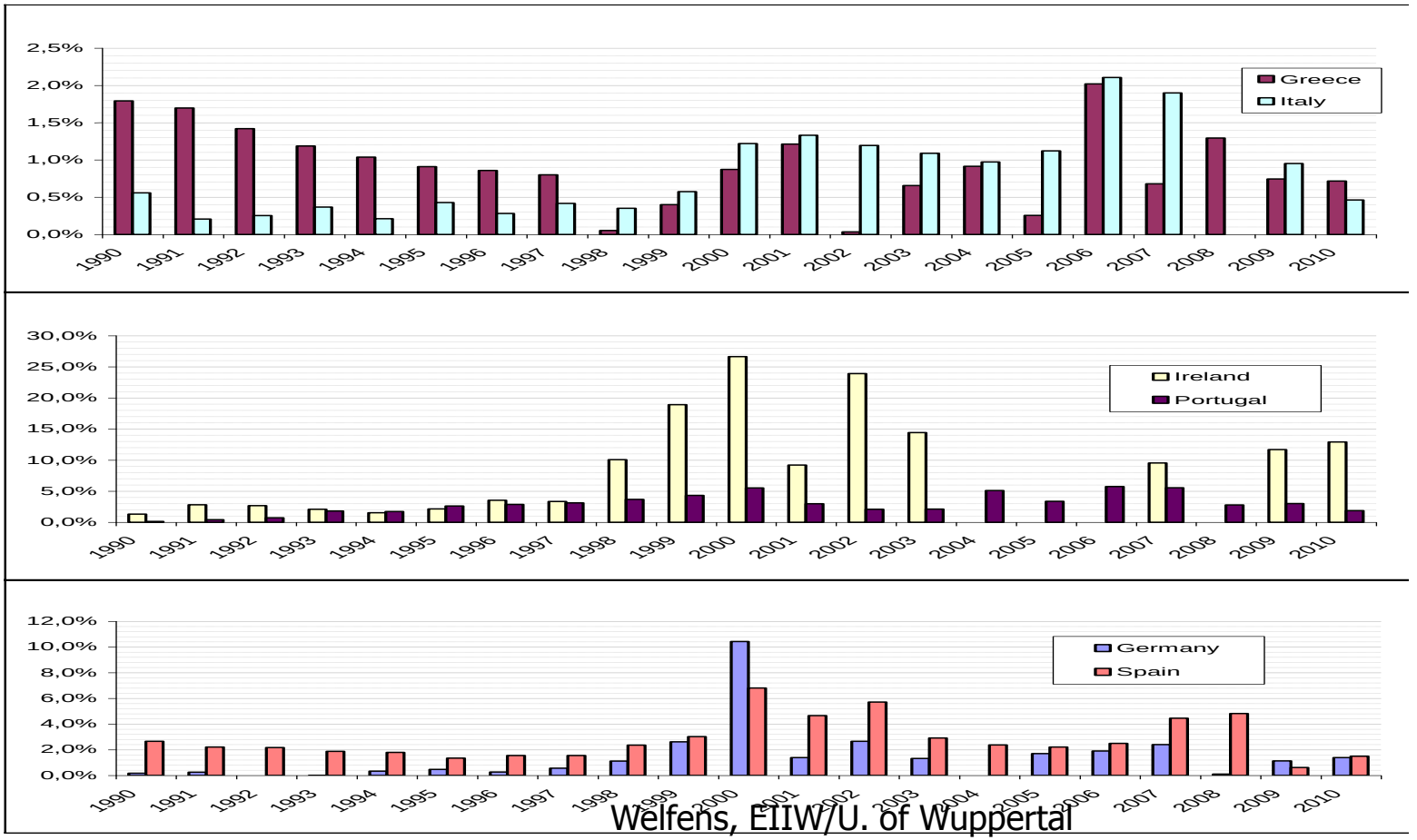
Adequate Risk Pricing in Energy Sector



www.eiiw.eu

Appendix: Foreign Direct Investment Inflows as a Percent of GDP

Abbildung 1: Ausländische Direktinvestitionszuflüsse (% des BIP, jährlich, Quelle: OECD)

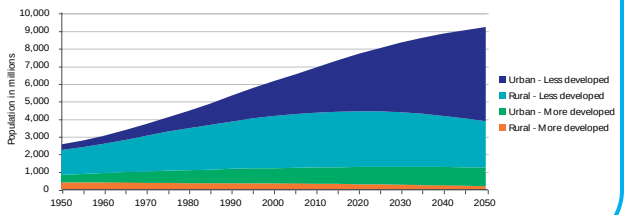


Growth and degradation

Growth

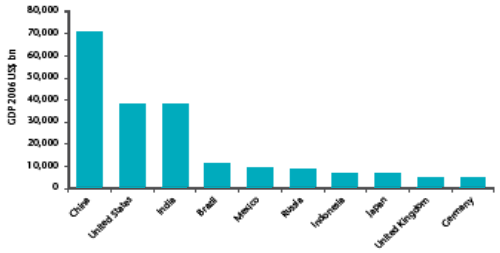
The world population is increasingly urban

Global population by type of area and by region – 1950-2050



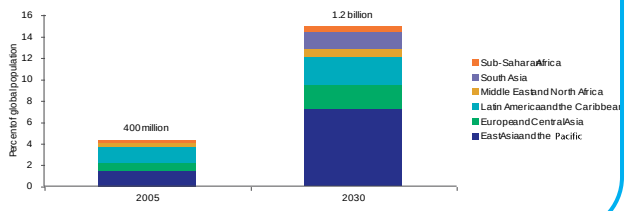
Global economic power is shifting

Top 10 economies by GDP in 2050



The global middle class is rapidly expanding

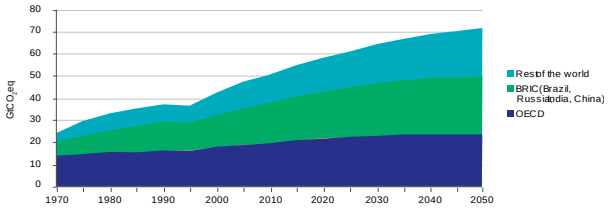
Population in low- and middle-income countries earning US$ 4,000-17,000 per capita (purchasing power parity)



Degradation

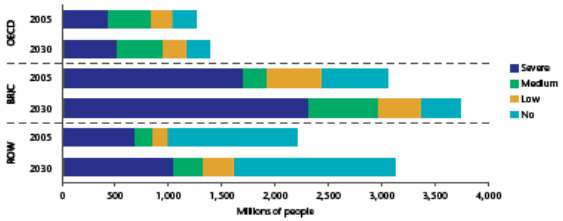
Greenhouse gas emissions keep rising

GHG emissions by regions



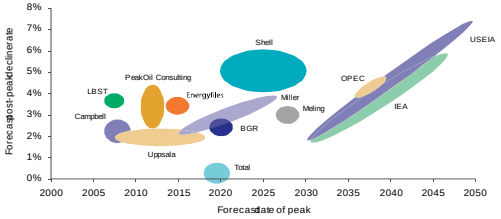
Environmental degradation jeopardizes people's quality of life

People living in areas of water stress by level of stress

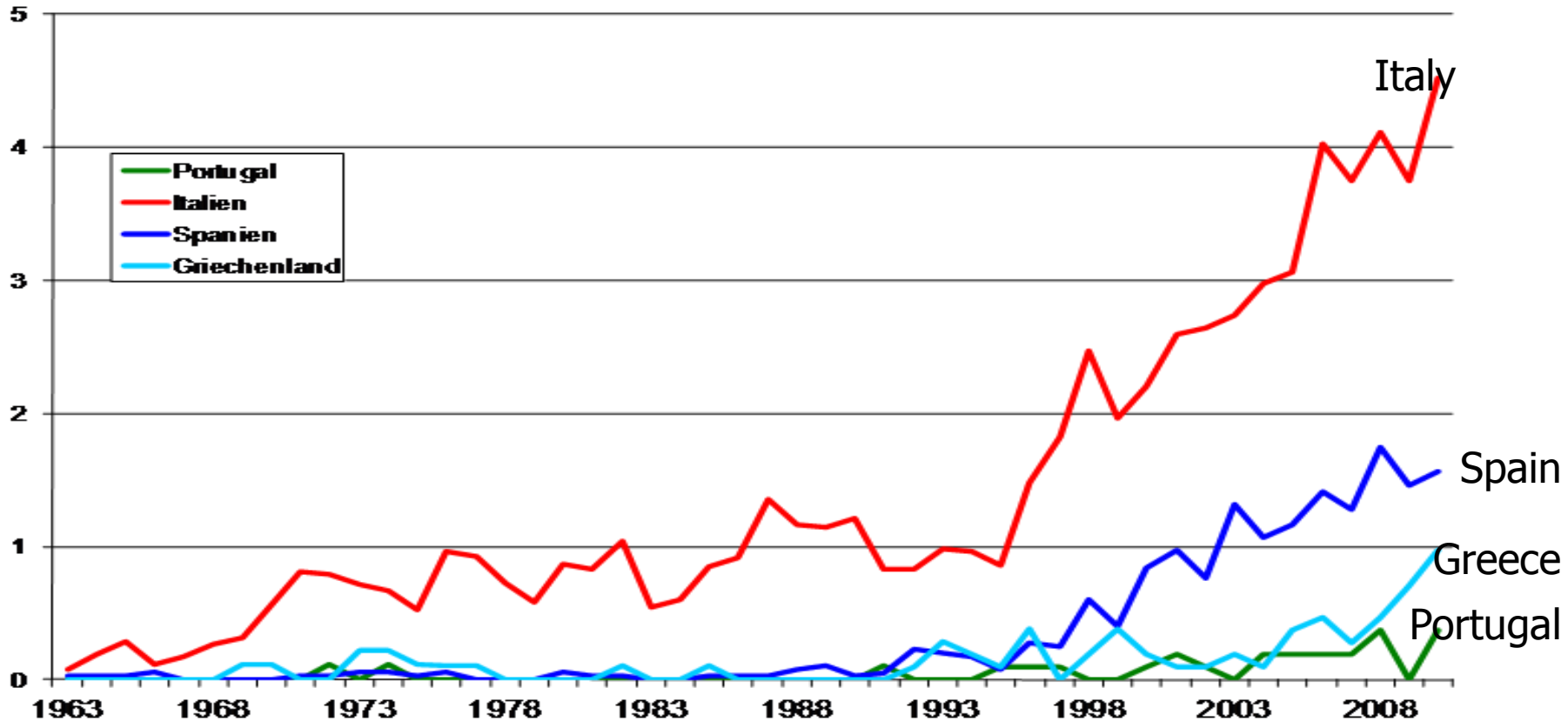


The world could be running out of some resources

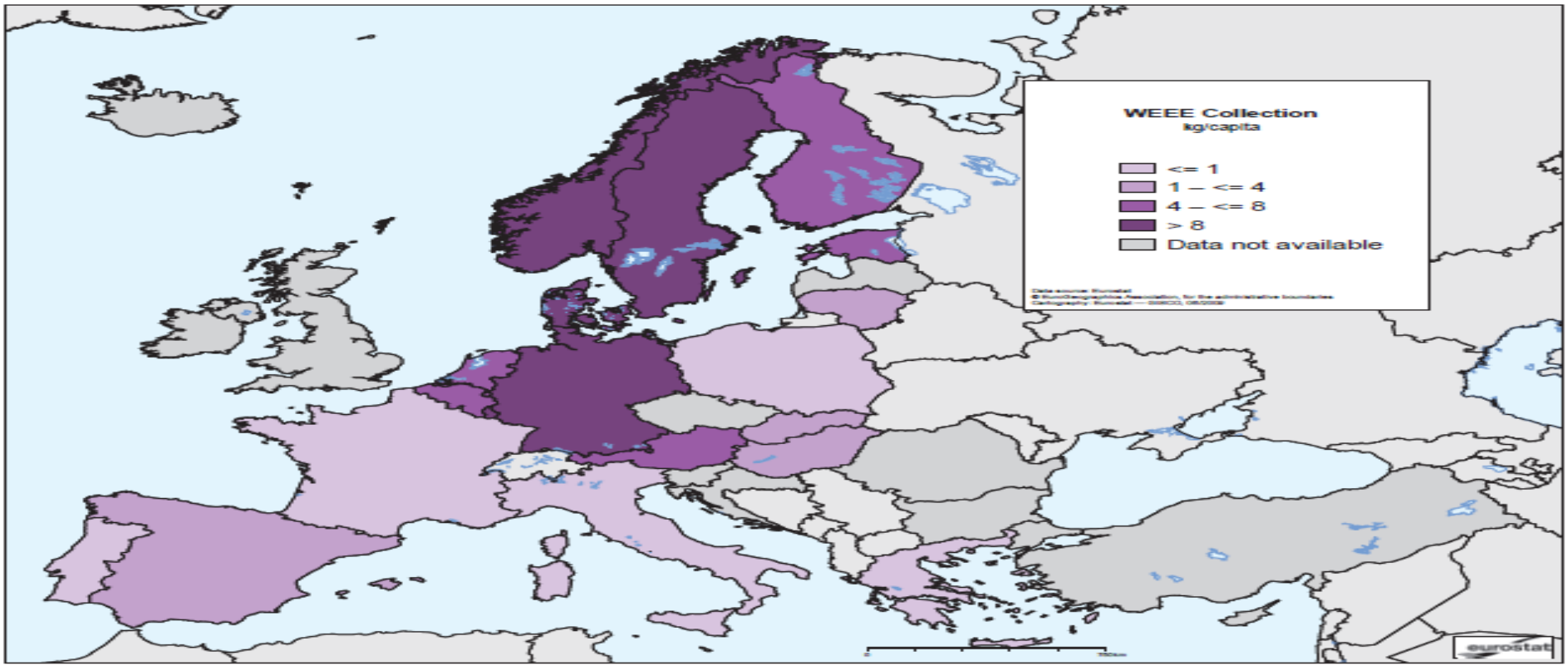
Global supply forecasts according to the implied ultimate recoverable resources of conventional oil, date of peak production and the post-peak aggregate decline rate



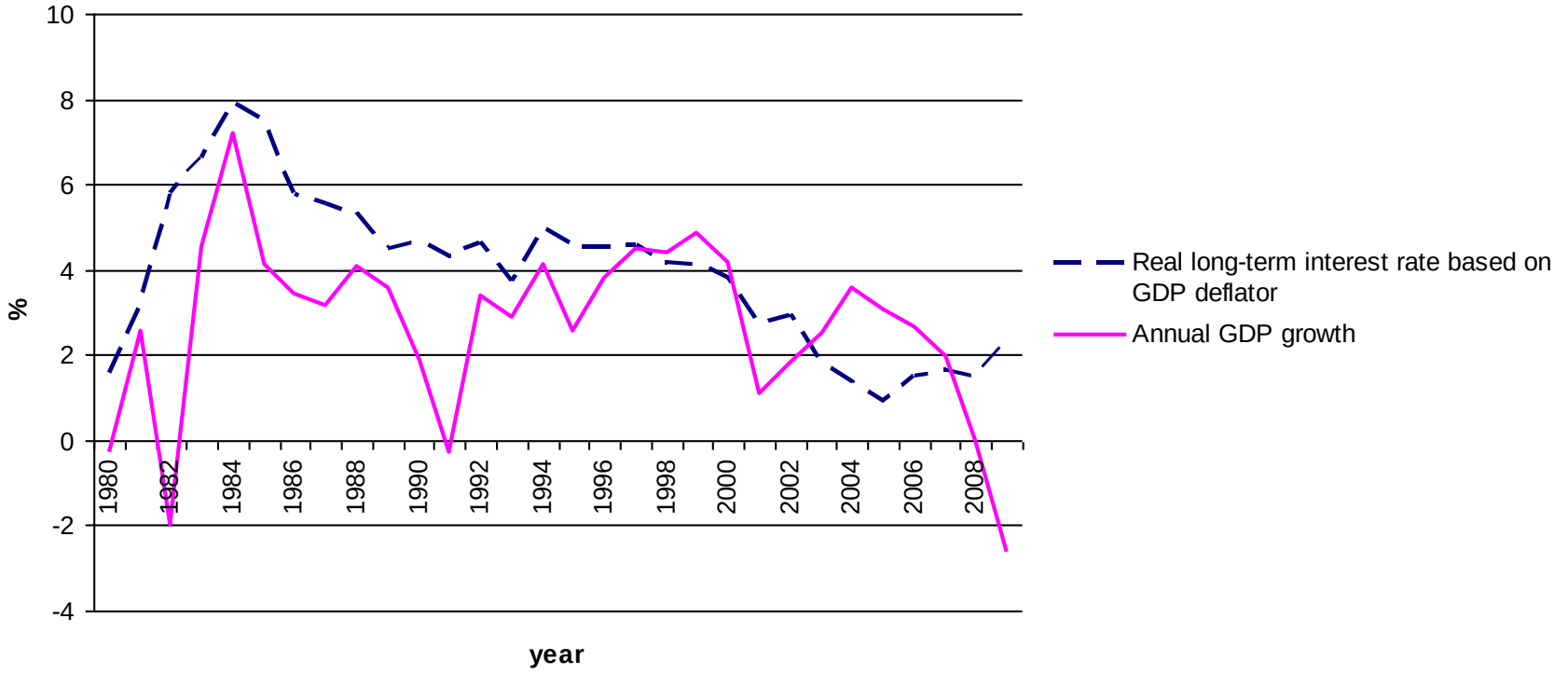
ICT Patents per 1 Mill. Inhabitants at the USPTO



Electronic Waste in Europe

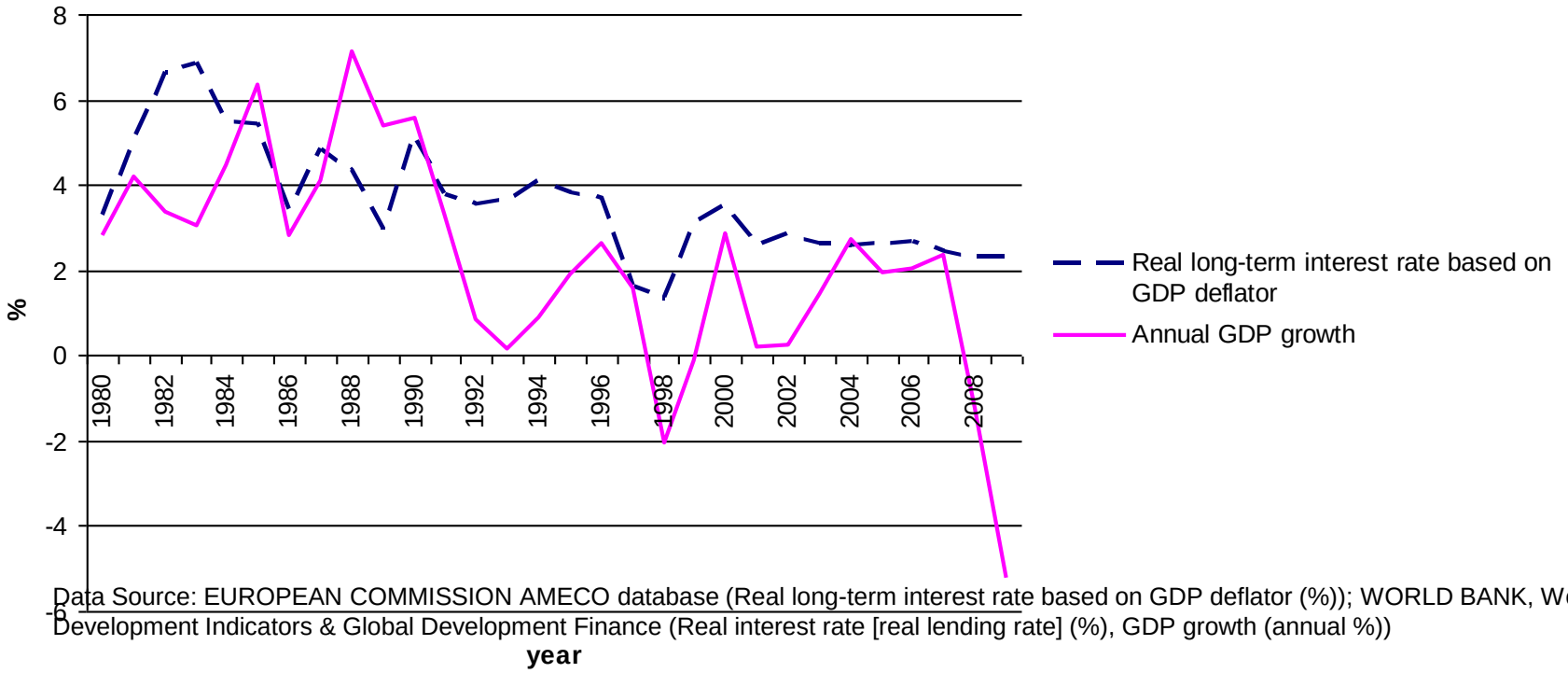


Golden Rule Aspects in an Economy with Technological Progress: USA



Data Source: EUROPEAN COMMISSION AMECO database (Real long-term interest rate based on GDP deflator (%)); WORLD BANK, World Development Indicators & Global Development Finance (Real interest rate [real lending rate] (%), GDP growth (annual %))

Golden Rule Aspects in an Economy with Technological Progress: JAPAN



Data Source: EUROPEAN COMMISSION AMECO database (Real long-term interest rate based on GDP deflator (%)); WORLD BANK, World Development Indicators & Global Development Finance (Real interest rate [real lending rate] (%), GDP growth (annual %))