Construction of an Indicator Set Capturing Human Welfare and Sustainability

The **Joint Report** of the Conseil d'Analyse Économique and the German Council of Economic Experts

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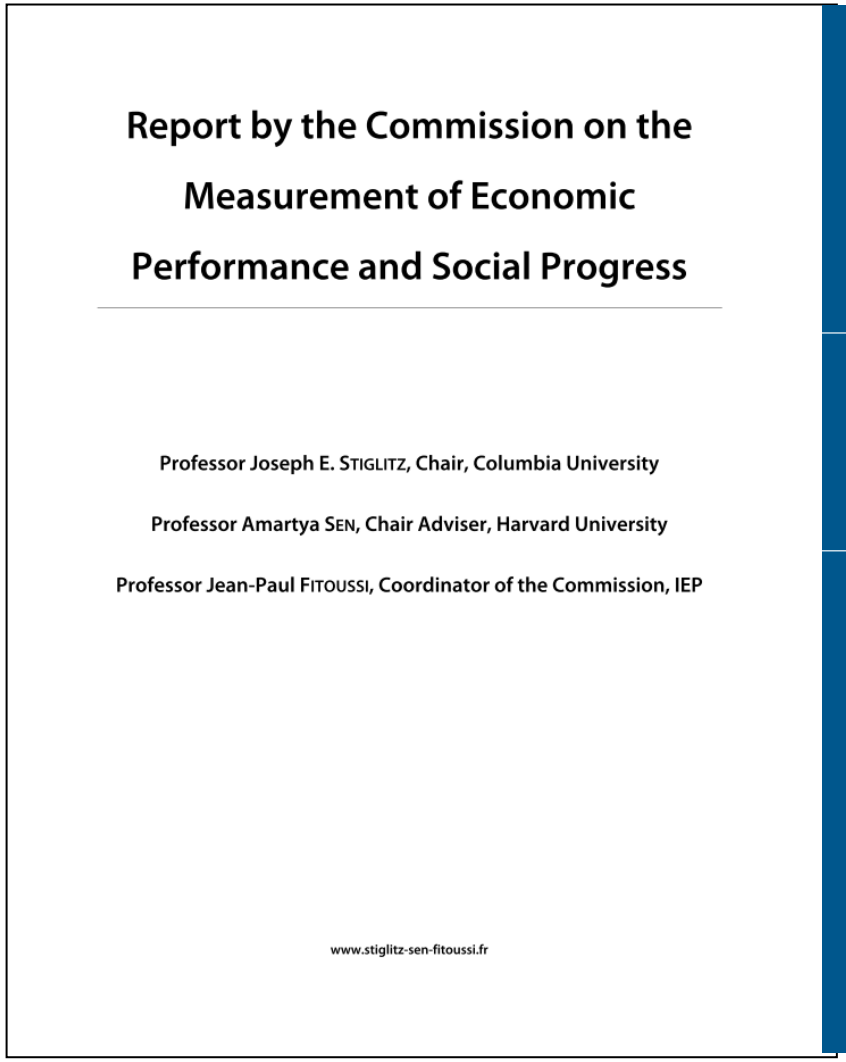
1. Key Studies ...



Principles …

… for measuring human welfare from the vantage point of statistics:

- careful **conceptual delineation** of the topic:
  - desired comparability: inter-temporal or even international?
  - information requirements: snapshot or extrapolation?

- discussion of **statistical possibilities** and **limitations**:
  - regular, timely, robust information base
  - trade-off contents vs. measurability: correlation with GDP

- utilization of **generous reservoir** of proposals:
  - avoiding redundant efforts
  - trade-off marginal benefit and cost: low hanging fruit

Concentration …

… on **positive**, not on normative questions:

- What is the true state of human welfare?
- What are the connections between material and non-material aspects of quality of life?
- What effects will policy measures exert in practice?

A sensible **normative** debate „What should been done about the state of affairs?“ can only be conducted after these questions have been answered …

This insight guided the work of both commissions (SSFC, CAE-GCEE).

Condensation …

… always requires using **weights**, explicitly or implicitly:

- … across persons
- … across (quantitative and qualitative) indicators

The combination of individual aspects is never an innocuous affair. Statistics is **information reduction**, but there are

- … conceptual obstacles (apples and oranges)
- … problems of manipulability (different scales)

An **enlightened** society has to be able to deal with a (limited) wealth of information, if the complex reality is to be captured adequately.

Distinct Sections …

… of the SSFC and CAE-GCEE reports:

- **economic performance** and material welfare
  - improving traditional „hard“ measures
  - retaining well-known strengths
- enhancing the indicator set regarding **quality of life**
  - additional attention given to non-material aspects
  - limits to measurability of emotions and preferences
- forward-looking aspects of **sustainability**
  - assumption of behavioral stability: projections vs. forecasts
  - importance of the international dimension

2. Economic Performance …

… is an important object of economic research:

- Classic measures of **economic performance**
  - as a gauge of the current state of the economy
  - as indicators of required monetary and fiscal policies
  - as the basis of reliable fiscal planning

- Well-known **weaknesses** of these measures
  - problems of observability (e.g. shadow economy)
  - problems of valuation and measurement (e.g. public services)

are not prohibitive for pursuing this line of research successfully.

Material Welfare …

… is a highly complex object of economic research:

- Measuring **economic performance** is at best an approximation to capturing the state of human welfare. Economists
  - have taken a far more balanced view of the state of affairs for a long time, reaching far beyond GDP, but unfortunately
  - have not rejected such a mistaken view of GDP in the public and political debate with sufficient fervor.

- But classic measures of economic performance can still be taken **seriously** as approximate welfare measures:
  - distortions might not be all too sizeable (?)
  - alternative indicators might not add new information

Distributional Questions …

… have not been addressed sufficiently in national accounting:

• All indicators of aggregate economic performance and welfare are condensations of individual information across populations – **frequency distributions** are characterized by

- means, but also
- variances and higher moments,

and economic variables tend to co-vary.

• It seems adequate to offer **distributional information**, whenever economic variables provide „hard“ information (income, wealth, …).

• There is little hope regarding the reporting of covariances, though.

5 Recommendations of the Stiglitz-Sen-Fitoussi Report

… were addressed in the derivation of the CAE-GCEE dashboard:

- Measure income or consumption in per capita terms …
- Emphasize the household over the individual perspective …
- Also analyze wealth, not only current income …
- Analyze the distributions of income, consumption and wealth …
- Give more emphasis to capturing non-market activities …

6 Indicators of material well-being

… instead of an overall „ultimate“ catch-all indicator:

- GDP per capita
- GDP per hour worked as a measure of productivity
- employment rate in the eligible population (15 to 64)
- net national income per capita
- private and public consumption expenditures per capita
- distribution measure S80/S20 regarding net equivalent income

Application to the Example of France and Germany

Table 1

An Indicator Set for Material Well-Being

Indicator	Unit	Last observation (2009)			Change over ten years (1999 - 2009)[1)]		
		Germany	France	EU 27	Germany	France	EU 27
GDP per capita	€	29.278	29.571	23.588	+ 1,8	+ 2,7	+ 2,8
GDP per hours worked[2)]	€	43,2	48,3	32,8	+ 2,4	+ 3,3	+ 3,2
Employment rate[3)]	%	70,9	64,2	64,6	+ 5,7	+ 3,3	+ 2,1
Net national income per capita	€	25.220	25.586	.	+ 2,0	+ 2,4	.
Final consumption expenditure per capita	€	23.001	24.538	19.017	+ 1,9	+ 3,3	+ 3,1
Income quintile share ratio (S80/S20)[1)4)]	.	4,8	4,2	5,0	+ 1,3	+ 0,0	+ 0,1

1) Annual average growth rate except employment rate and income quintile share ratio.– 2) Between 2000 and 2008.– 3) Population aged between 15 to 64 years.– 4) Ratio between income of the top quintile and the lowest quintile. EU 27 between 2005 and 2008.

Sources: EU, OECD

Is There Really a Difference?

Table 2

Growth in France and Germany measured by alternative indicators

Average annual growth rates between 1999 and 2009 (%)

Indicators	France	Germany	EU 27
Gross domestic product per capita	2,7	1,8	2,8
Gross domestic product per hours worked[1)]	3,3	2,4	3,2
Gross national income per capita	2,6	2,0	2,8
Net national income per capita	2,4	2,0	.
Private final consumption expenditure per capita[2)]	3,2	1,9	2,8
Net household disposable income per capita[3)]	3,3	2,0	2,9

1) Between 2000 and 2008.– 2) Private households and non-profit institutions serving households.– 3) Including non-profit institutions serving households.

Source: EU

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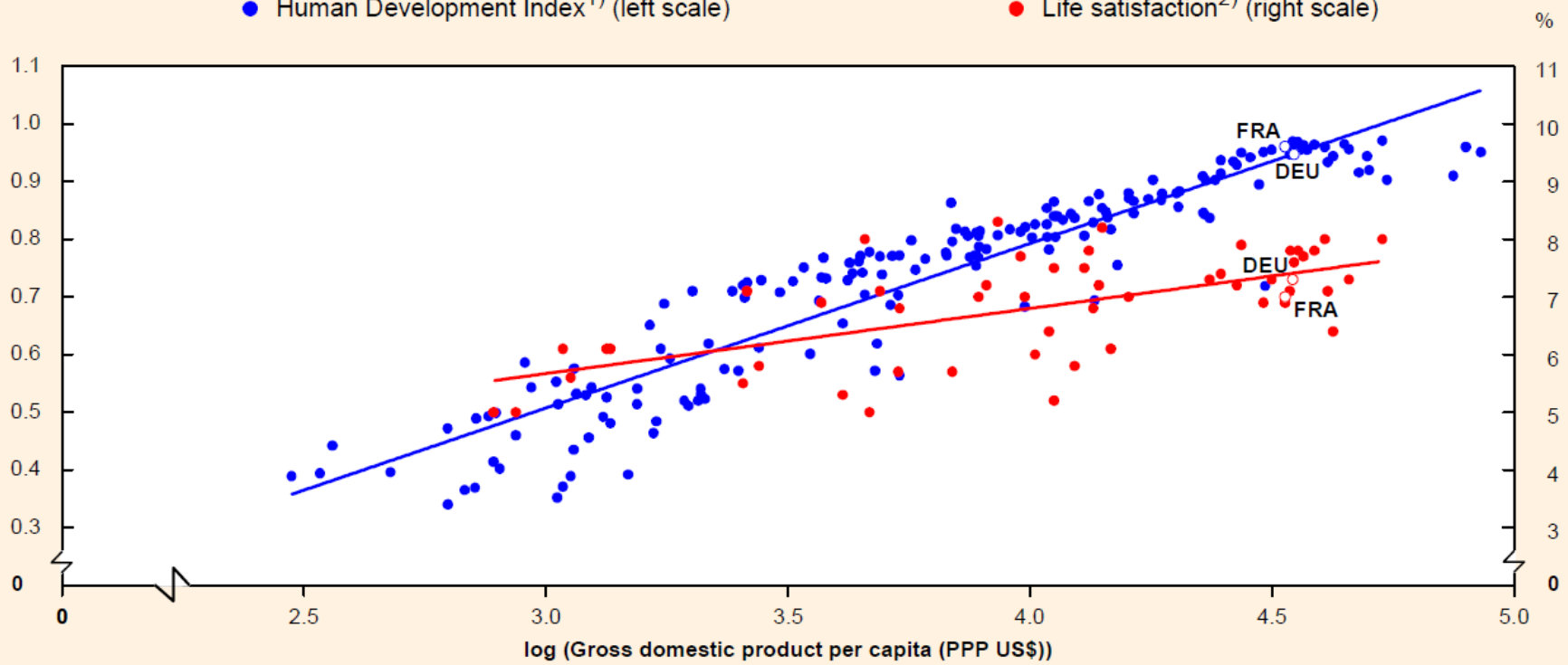
There's More to Well-Being ...

Chart 1

Correlation of gross domestic product and well-being



1) Human Development Report 2009.– 2) Mean of all answers; latest values between 2004 and 2008.

Sources: UN, The World Bank, World Values Survey

3. Quality of Life …

… has material and non-material aspects:

• Aspects of **material quality of life** are indispensible pieces of information when assessing the complete picture.

  • Thus, we need supplementary information.

  • This holds a fortiori when aiming at an encompassing indicator.

• **Non-material aspects** of quality of life need to be addressed as additional pieces of information, when deriving a complete portray of the state of affairs.

  • Top down: „happiness“ (on a scale from 0 to 10)

  • Bottom up: dashboards of indicators

Problems of aggregation …

… regarding the non-material aspects of quality of life:

- Conceptually we face a **twofold problem** of aggregation,
  - regarding the various facets of quality of life for any individual
  - regarding the standard problem of aggregating across people.

- Taking equal weights is not necessarily the best solution – pieces of information should receive **higher weights**, if
  - their contribution to quality of life is important, and
  - they can be measured / estimated relatively precisely.

Particularly problematic are variables measured on an ordinal scale.

Contrasts …

… can be utilized empirically with ease, but the issue is „levels“:

- Utilizing surveys on **happiness** seems to be the first choice:
  - conceptually this would end the search for indicators right away
  - and contrasts across life circumstances are highly informative,
  - but the issue is „levels of well-being“, making international comparisons as tempting as they are necessarily misleading.

- There are many problems of **measurement** and observability
  - long-term happiness and short-term affects
  - cognitive problems and strategic behavior
  - danger of political manipulability

Constructive Alternative …

… taken by the CAE-GCEE is a deliberate bottom up-approach:

- Non-material **dimensions** of quality of life
  - important facets of human existence
  - cannot be condensed further without serious loss of information

- **Individual perspective**: health, education, personal activities, personal and economic insecurity

- **Social perspective**: political influence and control, social contacts and relationships

- **General environment**: environmental aspects

A first stab:

Table 6

Quality of life – dimensions and its facets

Dimensions	Examples of contributing facets
Material well-being	Income, consumption, change in wealth, income distribution
Health	Life expectancy, diseases, disabilities, infant mortality, physical and mental illnesses, health distribution
Education	Basic reading and writing skills, knowledge of calculus, problem solution competence, information and communication technology, pupils and students performance, life-long learning, education distribution
Personal activities	Working, commuting, various kinds of recreational activities, distribution of personal activities
Political voice and governance	Citizens' voice, legislative guarantees, rule of law; possibility to participate in the political process, voter turnout, membership rates of parties, unions, non-governmental organisations, participation in protests, degree of democracy, independence of media, corruption, distribution of political voice
Social connections and relationshi	Family relationships, friends, intensity of friendships, social contacts, distribution of social connections
Environmental conditions	Availability of clean air, water and soil, reachability of pleasant environment next to one's home, climate, distribution of environmental conditions
Personal and economic insecurity	Risk of illnesses, injuries, damages, theft, robbery, murder, death, unemployment, social exclusion, becoming poor, distribution of personal and economic insecurity

More concretely …

Table 7

Proposed quality-of-life indicator

Dimensions	Proposed indicator
Material well-being	See chapter 2
Health	Potential years of life lost (PYLL, OECD), to be replaced by healthy life years (HLY, Eurostat)
Education	Students aged between 15 and 24 as a percentage of the tion of the same age group (Eurostat), possibly to be replaced by Programme for the ment of Adult Competencies (PIAAC, OECD)
Personal activities	Employees working on shift work (Labour Force Survey)
Political voice and governance	World Bank Institute Worldwide Governance Indicator "Voice and Accountability"
Social connections and relationships	Frequency of spending time with people at sport, culture, communal organization, World Values Survey 1999/2000
Environmental conditions	Urban population exposure to air pollution by particulate matter (Eurostat)
Personal and economic insecurity	Not-at-risk-of-poverty rate (SOEP, Eurostat), possibly to be replaced by Personal Security Index (Canadian Council on Social Development)

Condensation …

… within the dimensions:

- search for a single leading indicator
- presentation in their entirety, but no condensation into an overall catch-all indicator

Example: Health

Table 8

Health – Variables for the principal component analysis [1)]

	Germany		France	
	1996	2006	1993	2004
Vaccination rates against measles, % of children immunised	*86,6*	*94,5*	*78,0*	*87,1*
Vaccination rates against DTP, % of children immunised	*94,1*	*97,4*	*95,0*	*98,0*
Life expectancy at birth, females (in years)	80,1	82,4	81,4	83,8
Life expectancy at birth, males (in years)	73,6	77,2	73,3	76,7
Life expectancy at age 65, males (in years)	14,9	17,2	15,9	17,7
Potential years of life lost (PYLL), all causes, females, years [2)]	2.945	2.212	3.079	2.361
Potential years of life lost (PYLL), all causes, males, years [2)]	5.741	4.044	6.861	4.879
Suicides, deaths per 100,000 population	12,4	9,1	18,6	15,0

1) Source: OECD.– 2) PYLL is a summary measure of premature mortality which provides an explicit way of weighting deaths occurring at younger ages, which are, a priori, preventable. The PYLL in relation to 100,000 population are calculated by the OECD Secretariat based on age-specific death statistics provided by the World Health Organization.

Principal Component Analysis: Health

Table 9

Health – Weights of the first principal component[1)]

	Germany	France
Vaccination rates against measles, % of children immunised	*0,417*	*0,398*
Vaccination rates against DTP, % of children immunised	*0,410*	*0,378*
Life expectancy at birth, females (in years)	0,302	0,292
Life expectancy at birth, males (in years)	0,332	0,308
Life expectancy at age 65, males (in years)	0,343	0,314
Potential years of life lost (PYLL), all causes, females, years	– 0,325	– 0,361
Potential years of life lost (PYLL), all causes, males, years	– 0,332	– 0,373
Suicides, deaths per 100,000 population	– 0,351	– 0,388
Kaiser-Meyer-Olkin measure of sampling adequacy	0,613	0,743
Eigenvalue of first principal component	4,910	5,288
Proportion of variance explained by first principal component	0,930	0,880

1) Calculations based on OECD-Data.

Example: Education

Table 10

Education – Variables of the principal component analysis[1)]

	Germany		France	
	1999	2007	1998	2007
Students (ISCED 1-6) aged between 15 and 24 years[2)]	62,4	65,4	61,8	58,6
Students (ISCED 1-6) aged 30 years and over[2)]	3,3	2,4	1,4	1,8
Total graduates (ISCED 5-6) aged between 20 and 29 years per 1,000 people of the population	31,3	38,6	61,7	77,4
Population aged between 25 and 64 years having completed at least upper secondary education[2)]	79,9	84,4	59,9	68,5
Early school leavers[3)]	14,9	12,5	14,9	12,6

1) Source: EU.– 2) In relation to the population of the same age group.– 3) People aged between 18 and 24 in percent of the population of the same age group who are holding only a lower secondary school qualification and received no further education.

Principal Component Analysis: Education

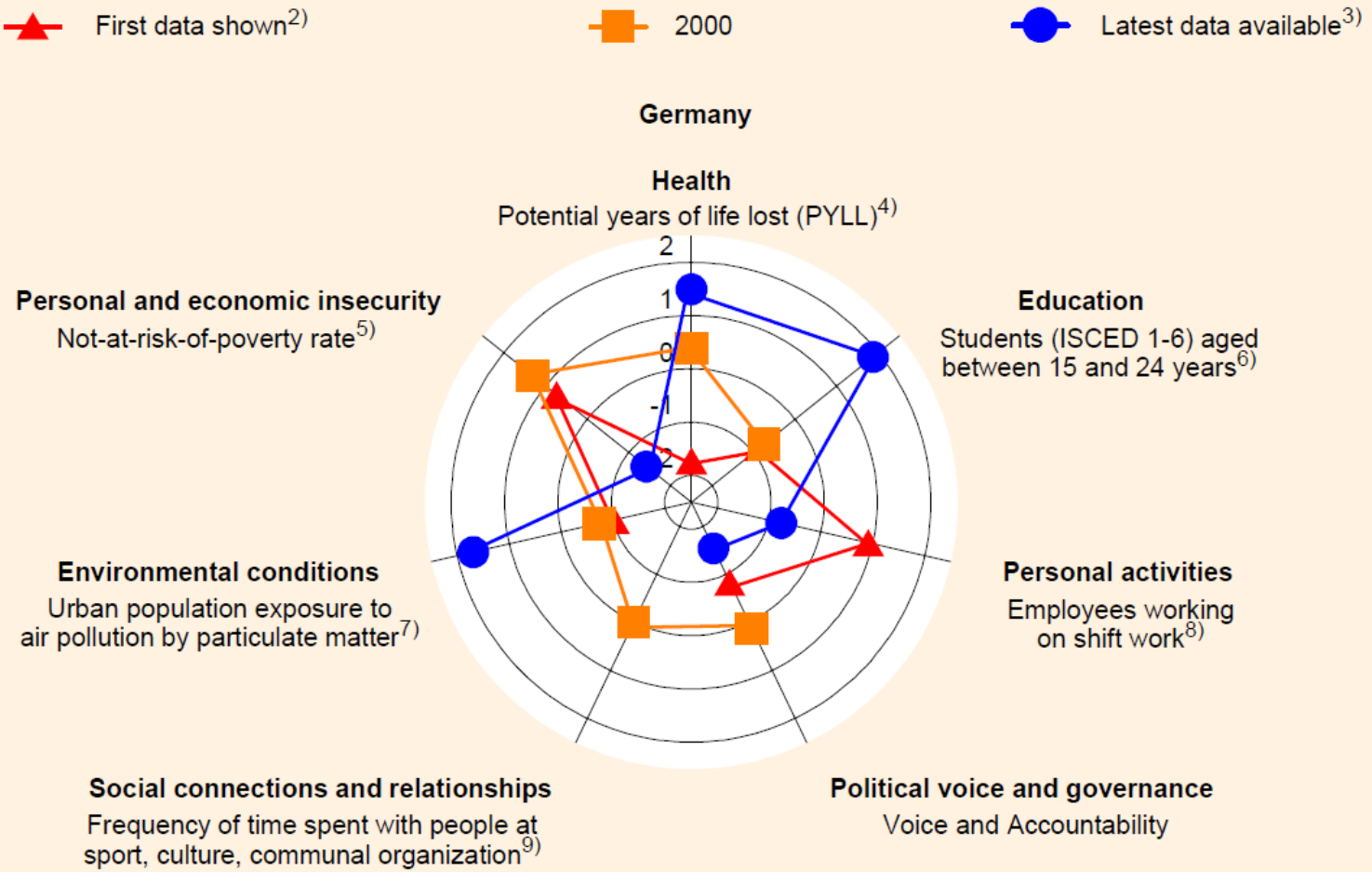
Table 11

Education – Weights of the first principal component[1)]

	Germany	France
Students (ISCED 1-6) aged between 15 and 24 years[2)]	0,497	0,552
Students (ISCED 1-6) aged 30 years and over[2)]	– 0,534	0,459
Total graduates (ISCED 5-6) aged between 20 and 29 years per 1,000 people of the population	0,542	0,505
Population aged between 25 and 64 years having completed at least upper secondary education[2)]	0,321	0,391
Early school leavers[3)]	– 0,266	– 0,277
Kaiser-Meyer-Olkin measure of sampling adequacy	0,653	0,673
Eigenvalue of first principal component	3,313	3,834
Proportion of variance explained by first principal component	0,701	0,930

1) Calculations based on EU-data.– 2) In relation to the population of the same age group.– 3) People aged between 18 and 24 in percent of the population of the same age group who are holding only a lower secondary school qualification and received no further education.

Non-material quality-of-life indicators[1)]



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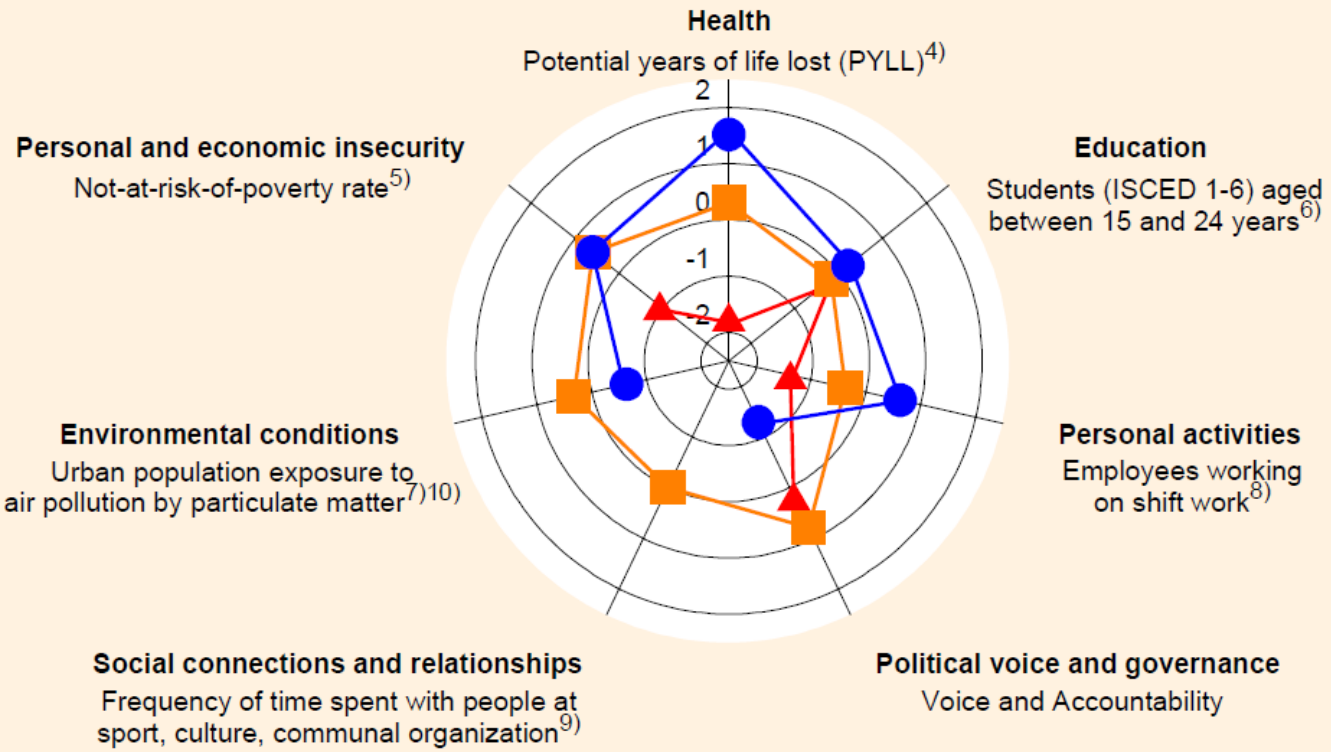
France



1) Own calculations; values are not comparable across countries. Average = 0; value higher than 0 implies better conditions and vice versa.– 2) Health: 1991, Personal activities: 1992, Political voice and governance: 1996, Education: Germany: 1992, France: 1993, Enviromental conditions: Germany: 1999, France: 2001, Personal and economic insecurity: Germany: 1992, France: 1995 .– 3) Health: 2006, Education and Personal activities: 2009, Political voice and governance and Enviromental conditions: 2008; Personal and economic insecurity: Germany: 2009, France: 2008.– 4) PYLL is a summary measure of premature mortality which provides an explicit way of weighting deaths occuring at younger ages, which are, a priori, preventable. In relation to 100,000 population are calculated by the OECD Secretariat based on age-specific death statistics provided by the World Health Organization.– 5) One minus share of persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers.– 6) In relation to the population in the same age group.– 7) The indicator shows the population weighted annual mean concentration of particulate matter at urban background stations in agglomerations.– 8) As a percentage of total employees.– 9) Only data available: 1999.– 10) For 2000: 2001 data.

Sources for calculations: EU, OECD, SOEP, The World Bank, World Values Survey

4. Sustainability …

… is a concept regarding long-term developments:

• In terms of sustainability, aspects of material and non-material **quality of life** are both indispensable pieces of information.

  • Again we require supplementary information.

  • The SSFC report exclusively discussed environmental aspects, while the CAE-GCEE report also addresses economic facets.

• Statements regarding future developments can never be deterministic – their construction requires **identification assumptions** on the future development of paths of behavior.

  • Here we are not talking at all about forecasts, though …

  • Our projections are „What would happen, if …“ statements instead.

Economic Sustainability: Individual Aspects …

… emphasize both the requirement to build up productive capacities and the intertemporal budget restrictions of governments:

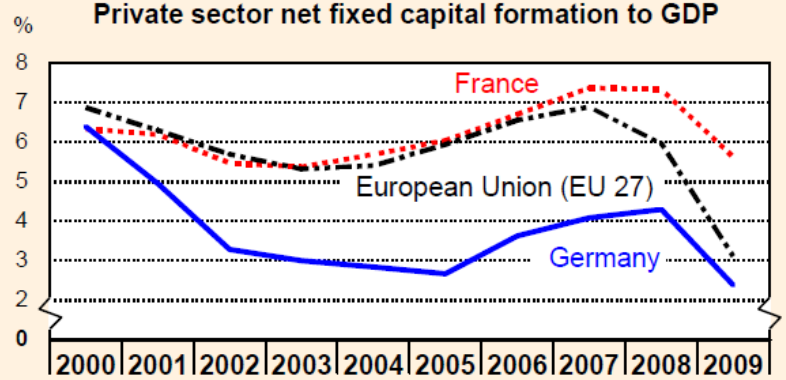
- Sustainability of economic growth …
  - net private investments relative to GDP …
  - R&D investments relative to GDP …
- Fiscal Sustainability …
  - cyclically adjusted budget deficit …
  - fiscal sustainability gap „S2“ …

Economic Sustainability …

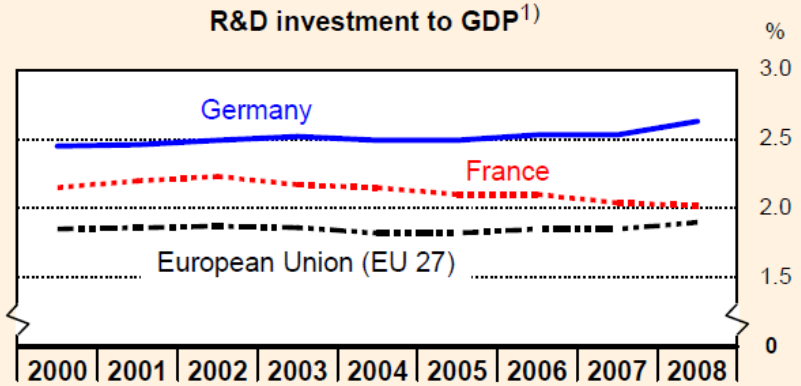
Chart 4

Sustainability indicators

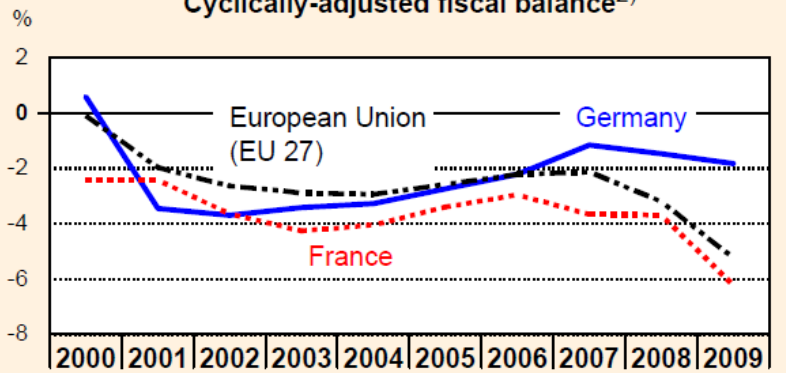
Private sector net fixed capital formation to GDP



R&D investment to GDP[1)]



Cyclically-adjusted fiscal balance[2)]



Fiscal sustainability gap[3)]

Percent of GDP

	S2 indicator[4)]	
	2005	2009
Germany	4.4	4.2
France	4.0	5.6
EU 27 (EU 25)	3.4	6.5

1) The indicator provided is GERD (Gross domestic expenditure on R&D) as a percentage of GDP.– 2) Source: EU. Percent of potential GDP.– 3) Source: European Commission „Sustainability Report 2009" and „ Long-term sustainability of public finances in the European Union" (2006).– 4) Necessary adjustment of structural primary balance required to close sustainability gap.- …

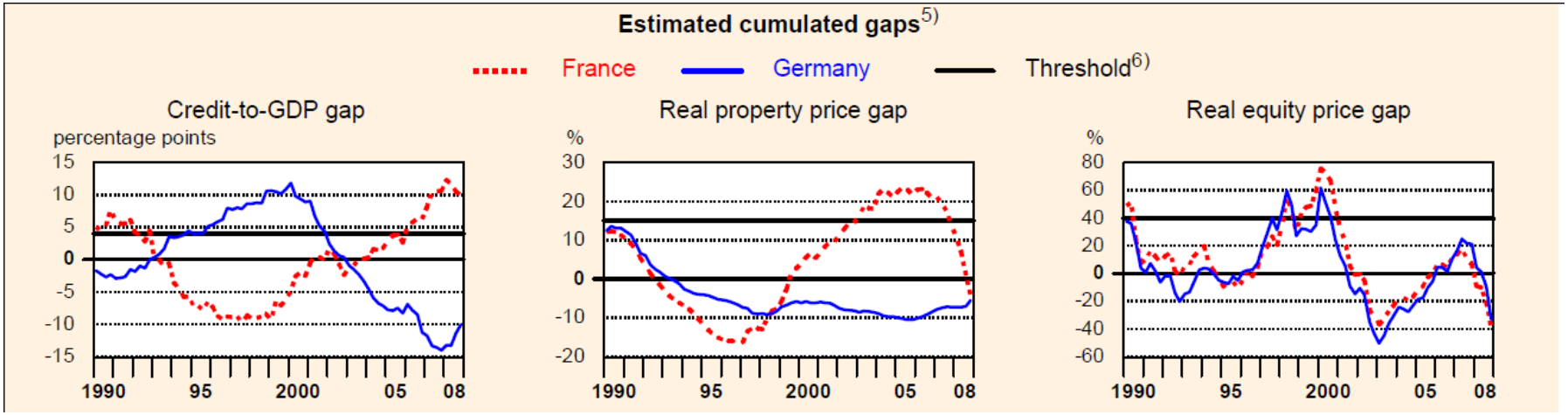
Financial Sustainability: Individual Aspects …

… emphasize the build up of excessive developments, using early alert indicators (false positives & false negatives):

- Private credit disbursement relative to GDP…
- deflated real estate prices …
- deflated equity prices …

We are looking at „cumulative gaps“ (cumulative deviations from the respective trends).

Sustainability of Private Finances …



… 5) For details on methodology see Borio and Drehmann (2009a).– 6) The threshold is 4 percentage points for credit-to-GDP gap; 15% for real property price gap and 40% for real equity price gap. …

Environmental Sustainability: Individual Aspects …

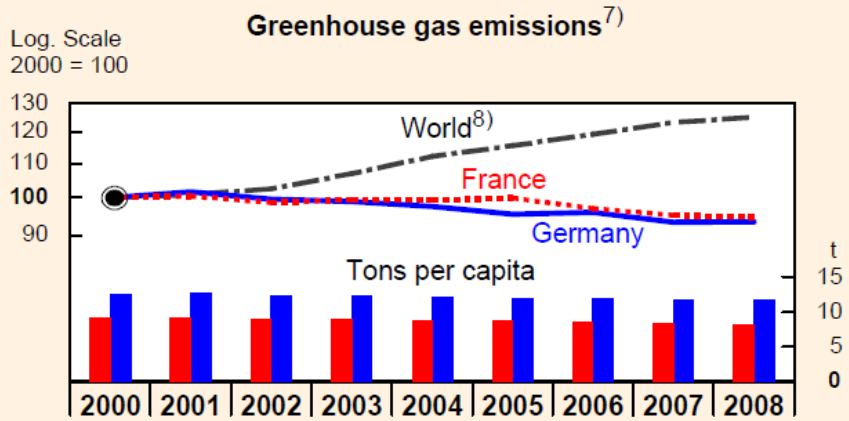
… such as climate gas emissions, resource productivity and biodiversity can only be appreciated in an international context:

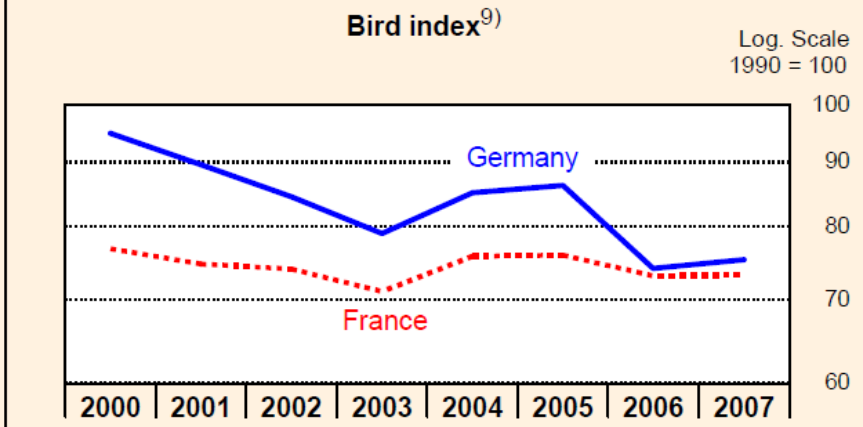
- Climate gas emissions …
- Climate gas emissions per capita …

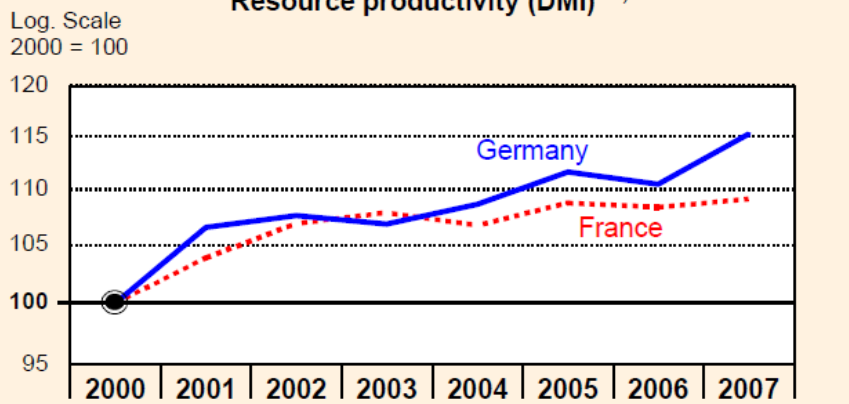
- Resource productivity (GDP / DMI – direct material input) …
- Resource consumption (DMC – domestic material cons.) per capita

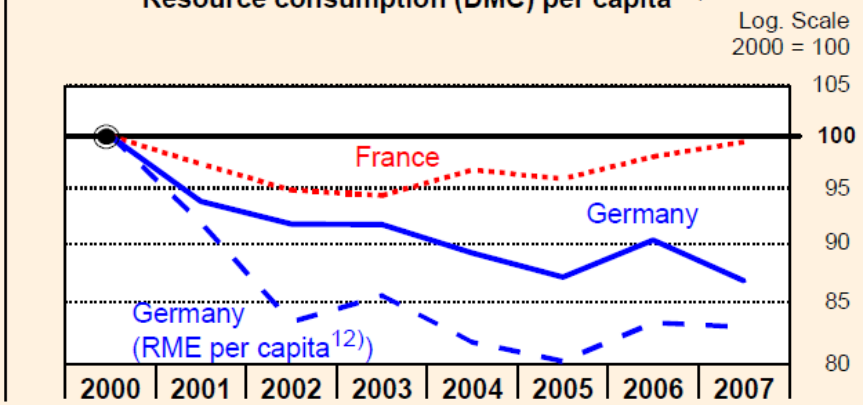
- Bird index (preliminary)

Environmental Sustainability …









… 7) The annual greenhouse gas (GHG) emissions are estimated and reported under the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Decision 280/2004/EC.– 8) Source: IEA and OECD. Only CO_2 emission from fuel combustion.– 9) Source: EU. Only farmland birds.– 10) Ratio of Gross Domestic Product to DMI; DMI: Direct Material Input (abiotic materials which are directly used in the economy; materials used domestic extraction and physical imports).– 11) DMC: Domestic Material Consumption (total of all abiotic materials used up domestically; DMC = DMI – exports).– 12) DMC in raw material equivalents (RME).

5. An encompassing concept ...

- Three areas delineate the research strictly according to **statistical** requirements und criteria.

- In terms of contents, the discussion fully **encompasses** all three areas with an eye on ascertaining a socially inclusive and sustainable society.

Chart 5

Dashboard for Monitoring Economic Performance, Quality of Life and Sustainability

Economic Performance (A)	Quality of Life (B)	Sustainability (C)
GDP per capita	Health: Potential years of life lost	Private sector net fixed capitel formation (% of GDP)
GDP per hours worked	Education: Students (ISCED 1-6) aged between 15 and 24 years	R&D investment (% of GDP)
Employment rate (15 - 64 age group)	Personal activities: Employees working on shift work	Cyclically adjusted fiscal balance (% of GDP)
Net national income per capita	Political voice and governance: Voice and Accountability	Fiscal sustainability gap S2
Final consumption expenditure per capita (including government consumption)	Social connections and relationships: Frequency of time spent with people at sport, culture, communal organization	Total private credit to GDP gap
Distribution measure of net income per consumption unit (income quintile share ratio (S80/S20); internationally harmonized)	Environmental conditions: Urban population exposure to air pollution by particulate matter	Real equity price gap
	Personal and economic insecurity: Not-at-risk-of-poverty rate	Real property price gap
		Level of greenhouse gas emissions
		Greenhouse gas emissions per capita
		Resource productivity (GDP relative to non-renewable Domestic Material Input, DMI)
		Resource consumption (non-renewable Domestic Material Consumption - DMC, per capita)
		Biodiversity: (preliminary indicator bird index)