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MODELLING, FORECASTING AND RESOLVING THE 2008
GLOBAL RECESSION: A COMPARISON OF ANNUAL
MACROECONOMIC GLOBAL PROJECTIONS 2009 TO 2012
(AND TO 2020 AND LATER).

**The global economic downturn and the potential of
green investment. Results from GINFORS**

by

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CONTENTS

1. **The model GINFORS**
2. The downturn scenario
3. Results
4. The potential of green investment
5. **Conclusions**

1. The model GINFORS

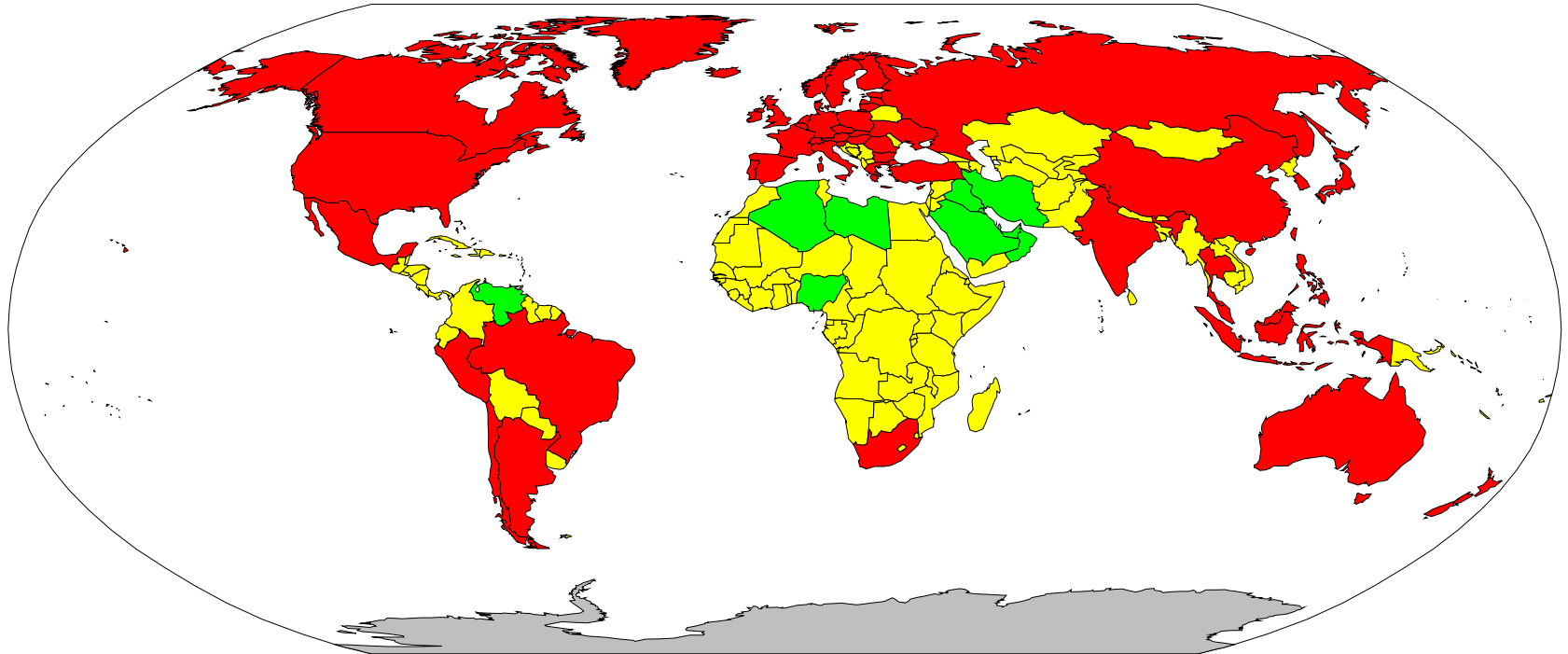
Detailed description:

- ⇒ Meyer et al. (2007), Economic Systems Research
- ⇒ Lutz et al. (2009), Energy Policy and International Journal of Global Environmental Issues (Special issue)
- ⇒ <http://www.petre.org.uk> (AGF project together with CE)

◆ **Properties of GINFORS**

- ⇒ General modeling philosophy:
 - Behavior of the agents: bounded rationality
 - Markets: non perfect competition
- ⇒ parameter estimation by econometric methods (OLS) for 1980 – 2004
- ⇒ Multi-country model, focusing on countries rather than regions
- ⇒ Multi-sector model, disaggregation into 41 industries
- ⇒ Country linkage by trade at the sector level
- ⇒ “Real” economy annual model up to 2020 (2030)
- ⇒ Applications: labour market forecasts, scenario analysis like evaluation of post-2012 regimes, re-industrialization in Germany?, consulting,...

◆ Country Coverage



country models

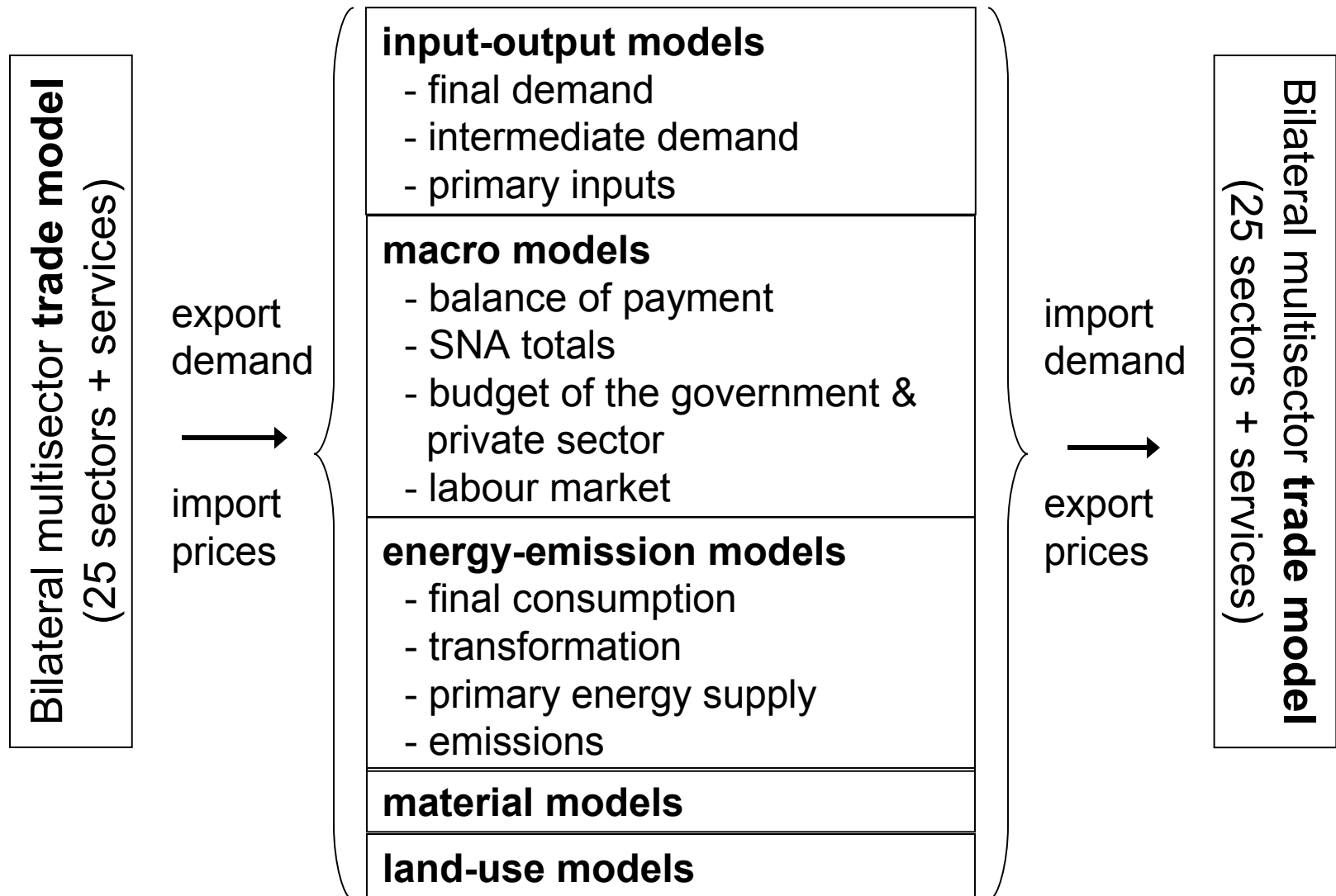
OPEC ex. Indonesia

ROW

◆ Data sources and coverage

model type		data sources	global coverage
trade		OECD (BTD, 25 sectors, Services)	50 countries (> 95% of world GDP, trade, energy consumption)
		UN COMTRADE	2 regions (OPEC, ROW)
country models	input-output and sector	OECD IO (41 sectors) OECD STAN, SNA DT National sources (CN, TW)	22 countries (more than 80% of world GDP)
	macro	OECD/IMF	52 countries
	energy/CO ₂	IEA	52 countries
	material	SERI	52 countries
	population	UN	52 countries

◆ General architecture

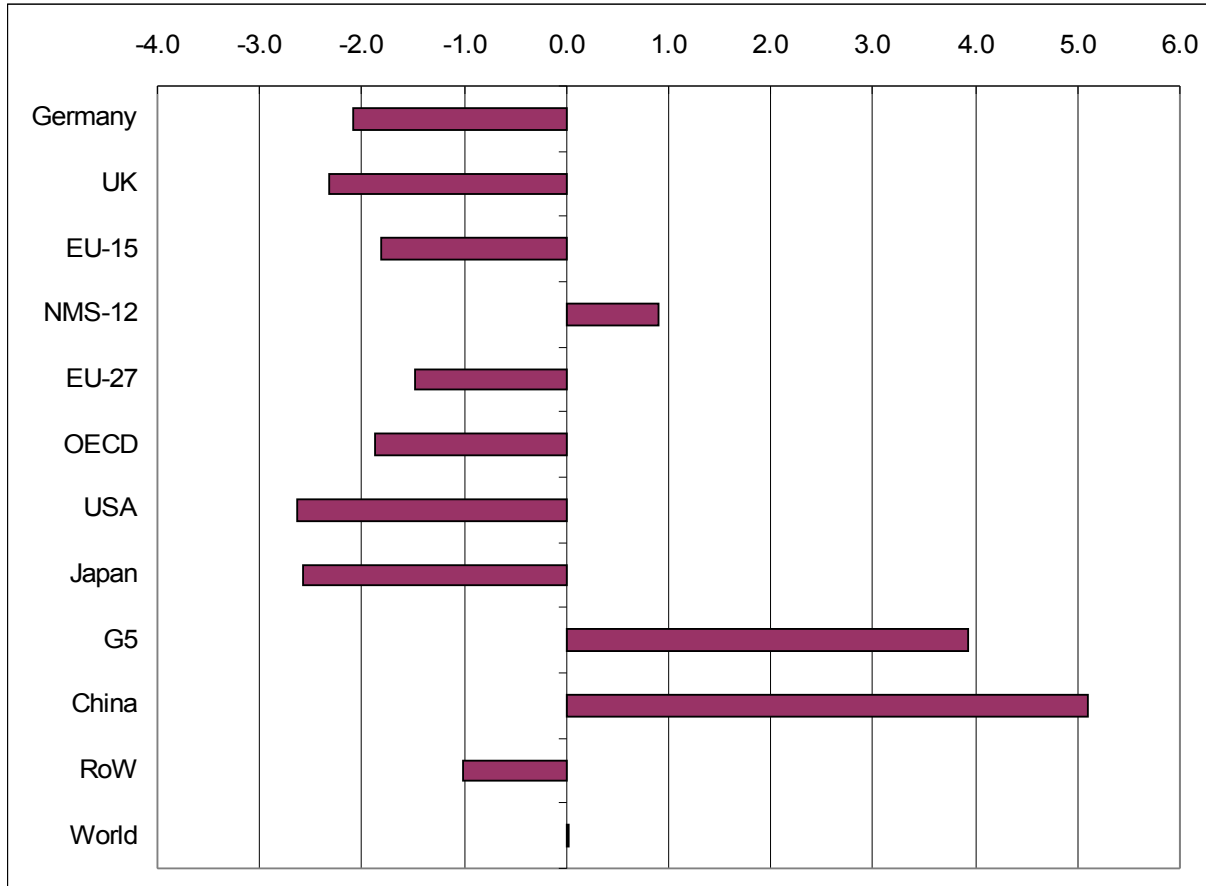


2. The downturn scenario

- ◆ **Long-term assumptions on basic exogenous variables following projections of international institutions:**
 - ⇒ Population: UN, medium variant, 8 billion in 2030.
 - ⇒ International energy prices: IEA WEO 2008
 - ⇒ Business-as-usual
- ◆ **Global downturn in 2009:**
 - ⇒ Lower investment (10-30%) in EU and OECD countries to meet current EU projection (around -2% GDP growth)
 - ⇒ Lower investment (5-10%) in other countries (especially large emerging economies)
 - ⇒ International energy prices halve against 2008
 - ⇒ All other variables endogenous: especially international trade, private and public consumption, labour market,...
 - ⇒ After 2009:
 - Quick recovery of investment: banking crisis solved (exceptions US, UK, ES, IC, IE)
 - Oil price remains low in 2010, will reach WEO2008 reference level in 2015

3. Results

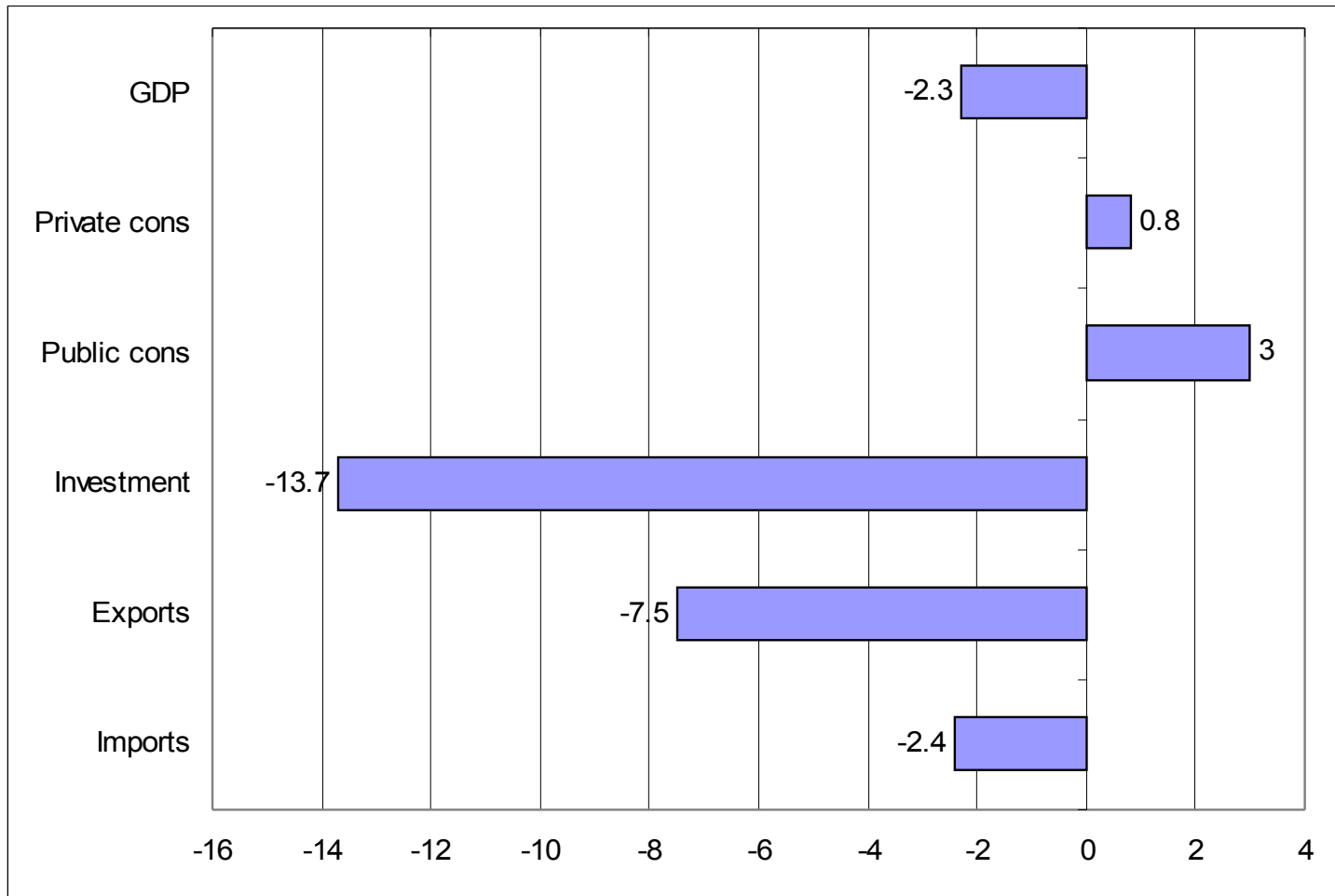
◆ Reference: GDP (const. prices) growth rates in 2009



◆ **Annual GDP growth rates: 2008-2012**

	2008	2009	2010	2011	2012
Germany	1.4	-2.1	1.6	0.0	0.8
UK	0.6	-2.3	0.4	1.7	1.7
EU-15	1.2	-1.8	1.8	0.5	1.2
NMS-12	4.6	0.9	2.7	2.1	3.2
EU-27	1.6	-1.5	1.9	0.7	1.5
OECD	1.3	-1.9	1.8	1.2	1.8
<i>USA</i>	0.3	-2.6	2.2	1.5	1.8
<i>Japan</i>	1.2	-2.6	0.6	0.2	0.7
G5	8.6	3.9	6.6	5.0	5.4
<i>China</i>	9.8	5.1	9.1	6.3	5.8
RoW	4.5	-1.0	3.2	3.1	3.4
World	3.9	0.0	3.5	2.7	3.2

◆ **UK 2009: GDP and main components**
– annual % change

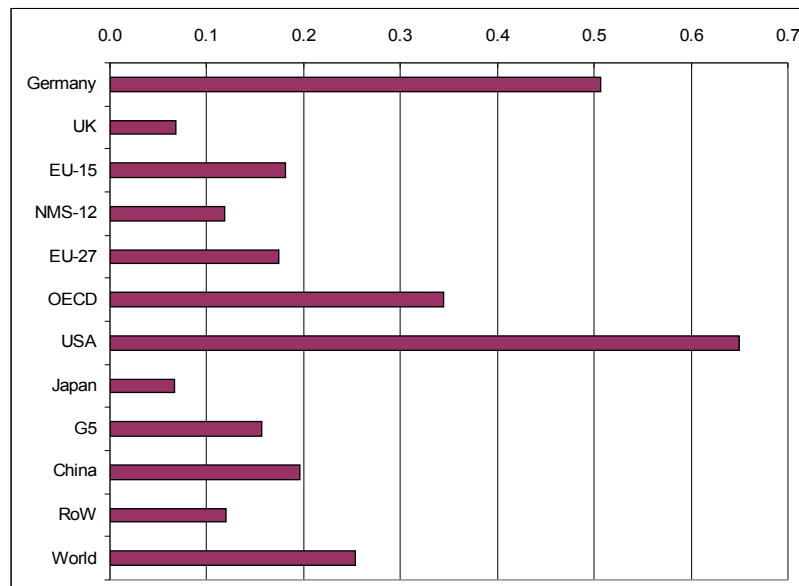


- ◆ **Sharp global recession in 2009:**
 - ⇒ Economic downturn in most economies (including oil exporting countries)
- ◆ **Quick recovery in 2010**
 - ⇒ if financial sector is stabilized
- ◆ **But only slower growth in 2011**
 - ⇒ Partly driven by increase in energy prices
 - ⇒ Some economies will not reach 2008 GDP levels before 2011/2012
 - ⇒ Even without trying to reduce budget deficits
- ◆ **Global economy may need new projects/public spending in times of high debt levels**

4. The potential of green investment

- ◆ **Governments (will have to) search for additional economic stimulus (and one day for higher revenues)**
- ◆ **Energy prices may sharply increase again after the economic crisis due to supply constraints**
 - ⇒ Low investment
 - ⇒ Peak of current oil fields
- ◆ **The climate crisis will remain (high) on the agenda**
- ◆ **The ETS (and additional carbon taxes) will deliver high revenues after 2012 (at least half of ETS revenues has to be spent against climate change)**
- ◆ **Part of these revenues could be spent until 2012 to built a green infrastructure (filling stations for electric cars, international grids for renewable integration, insulation of public buildings, CCS,...) as early action**

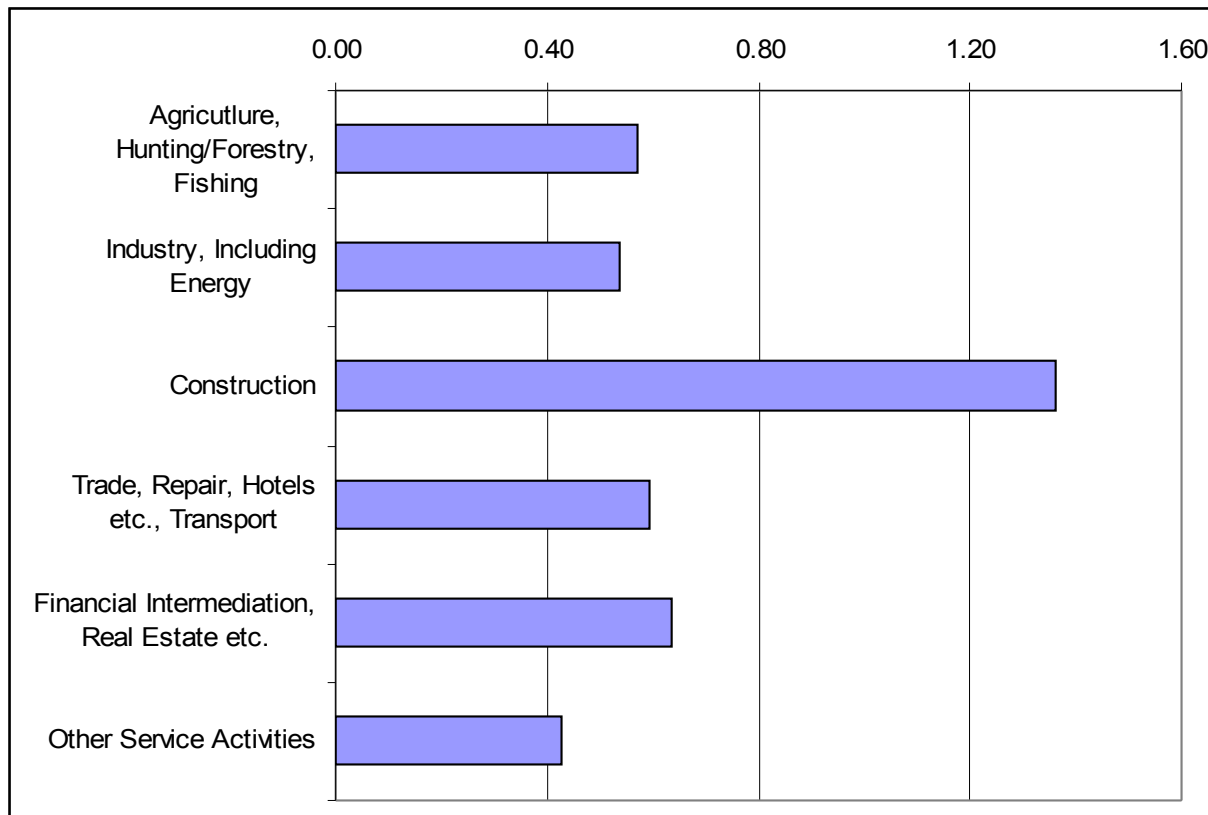
- ◆ **Simulation for USA and Germany:**
 - ⇒ Additional investment of .5% of GDP in green infrastructure from 2009 to 2012 as early action of a post-2012 climate regime
 - ⇒ Will stimulate global GDP and reduce carbon emissions
- ◆ **Impacts of additional green investment in **US** and **DE** on GDP in 2009 – Deviations from downturn sce. in %**



◆ **Impacts of additional green investment in US and DE on GDP – Deviations from downturn scenario in %**

	2009	2010	2011	2012
Germany	0.5	0.6	0.7	0.6
UK	0.1	0.1	0.2	0.3
EU-15	0.2	0.2	0.3	0.3
NMS-12	0.1	0.1	0.3	0.3
EU-27	0.2	0.2	0.3	0.3
OECD	0.3	0.5	0.6	0.6
<i>USA</i>	0.7	0.8	0.9	0.9
<i>Japan</i>	0.1	0.2	0.2	0.3
G5	0.2	0.3	0.4	0.5
<i>China</i>	0.2	0.4	0.5	0.6
RoW	0.1	0.1	0.1	0.1
World	0.3	0.4	0.5	0.5

◆ **Impacts of additional green investment in US and DE on German production in 2010 – Deviations from downturn scenario in %**



5. Conclusions

- ◆ **Global recession in 2009 will hit all countries**
- ◆ **Quick recovery in 2010, if financial sector is stable**
- ◆ **Slower growth again in 2011**
- ◆ **Investment in green infrastructure could deliver an additional economic stimulus in times of enormous deficits**
 - ⇒ Can partly be pre-financed by auctioning revenues of post-2012
 - ⇒ Is a measure against the upcoming energy and climate crisis
 - ⇒ Multipliers (economic impacts) will even be higher, if the global economic crisis continues beyond 2009

2. The Model GINFORS

Trade model:

- ⇒ Bilateral trade model on the sector level that links all 50 countries and the two regions. Directly for 25 commodities and one service sector.
- ⇒ All 70 304 trade shares of the exporting countries in the imports of the importing countries are price dependent.
- ⇒ Calculates by definition: exports and prices of imports

2. The Model GINFORS

◆ **Input-Output Models:**

- ⇒ Prices and production for 41 product groups
- ⇒ Employment, wages, capital input for 6 aggregated product groups.

◆ **Macro Models:**

- ⇒ Balance of payments
- ⇒ Final demand: GDP and components
- ⇒ SNA
- ⇒ Labor market

2. The Model GINFORS

◆ **Energy and Environment:**

- ⇒ Energy in physical units:
- ⇒ Final demand for households and about 30 industries and 12 energy carriers,
- ⇒ Conversion, input of primary energy,
- ⇒ Import, export and domestic production for 12 energy carriers.
- ⇒ CO₂ emissions for households and about 30 industries. Resources in physical units:
- ⇒ Material extraction, import and export for 6 resources.

2. The Model GINFORS

◆ **Technical Progress:**

- ⇒ Technical progress is modeled implicitly
- ⇒ Two stage approach:
 - First stage: Capital, labor, energy, materials: limitational factors. Price dependency of input coefficients is interpreted as the result of cost push driven technical progress.
 - Second stage: Substitution of the different energy carriers.

◆ **Structure of consumption:**

- ⇒ two stage approach:
 - aggregates for energy demand and non energy demand price elastic
 - constant structures inside the two groups

2. The Model GINFORS

◇ **Parameterization**

- ⇒ econometric estimation of parameters by OLS. More adequate estimators could not be used by two reasons:
 - In many countries time series are too short,
 - Nonlinearity of the model does not allow to estimate the reduced form,
 - The model is huge. Example: Already the 70304 price elasticities of the trade shares have to be estimated automatically by a simple and robust technique.