Implications for Europe: results from the GINFORS model

by

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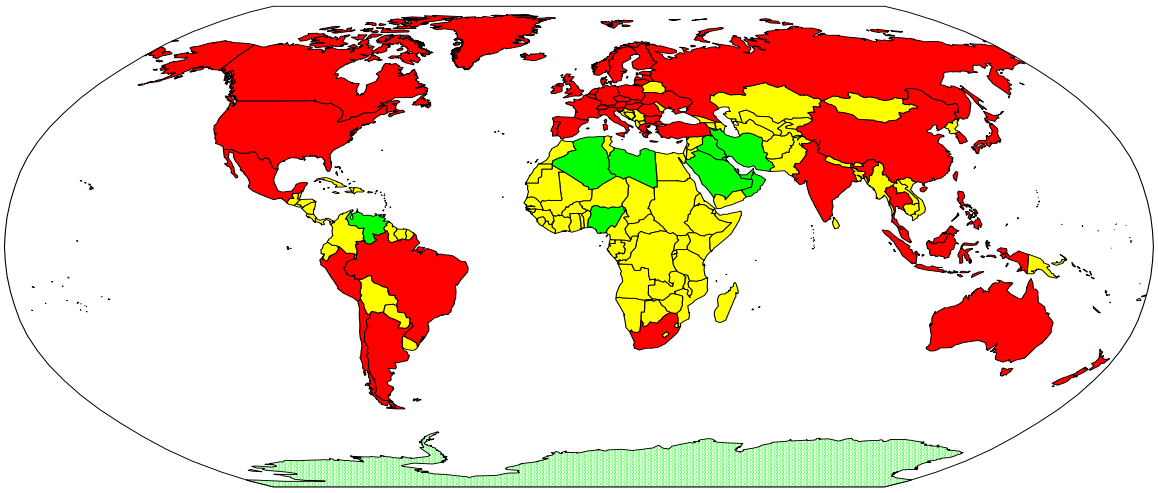
CONTENTS

1. The Model GINFORS

- **Global Interindustry Forecasting System:**
  - (1) Global multi-country approach: EU27 + major trade partners
  - (2) Based on international datasets: IMF, OECD, IEA, UN, SERI
  - (3) Multi-sector approach (41 sectors)
  - (4) Disaggregated bilateral international trade (26 sectors, trade shares price dependent)
  - (5) Endogenous explanation of economic development and its linkage with the environment
  - (6) Agents behave under conditions of bounded rationality: econometrically estimated parameters

- **Business as usual:**
  Socio-economic and economic-environmental relations of the past will continue in the future

Country coverage

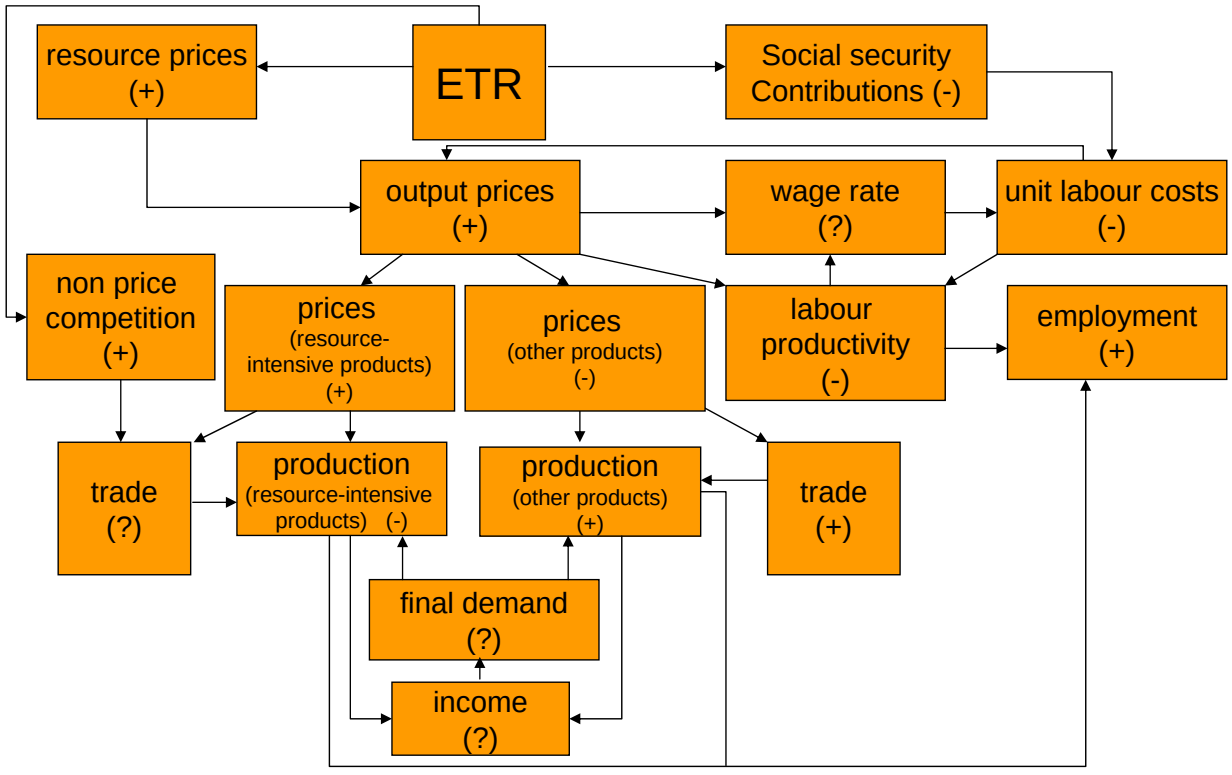


country models | OPEC ex. Indonesia | ROW

Scenarios (as in E3ME)

- **Baseline derived from 'Energy and Transport: Trends to 2030 (2007 update)'**
- **An alternative was set up with higher oil prices**
- **Scenario 1L: 2020 EU 20% GHG emissions target is met (domestically)**
- **Scenario 1H: 2020 EU GHG emissions target is met in a world with higher energy prices**
- **Scenario 2H: Same target with 10% investment in energy-efficient technologies**
- **Scenario 3H: As S1H but with international cooperation and a 30% EU target**
- **Other scenario inputs**
  - All scenarios include a materials tax (minerals and biomass)
  - Revenues are recycled through reductions in income taxes and employers' social security contributions

Likely ETR effects in GINFORS



2. Overview of results:

- **EU-27 overview (S1L: against baseline with low energy prices)**

Scenario	Target in 2020	CO_2 price	GDP		Employment	CO_2 reduction	
		Euro2008/t	pc against baseline		pc against baseline	pc against 1990	pc against baseline
	in year	2020	2015	2020	2020	2020	2020
BH		18				-7.2	0.0
S1H	20% GHG	68	-0.2	-0.6	0.36	-15.1	-8.4
S2H	20% GHG	61	-0.1	-0.3	0.41	-15.2	-8.5
S3H	30% GHG	184	-1.2	-1.9	0.77	-25.0	-19.1
BL		18				2.8	10.9
S1L	20% GHG	120	-1.2	-3.0	0.02	-14.9	-17.2

- **Productivity changes against baseline in %: GDP (in 2004 PPPs) in relation to material extraction, total primary energy supply, CO2 emissions and labour input (per capita) for EU-27 in 2020 against baseline**

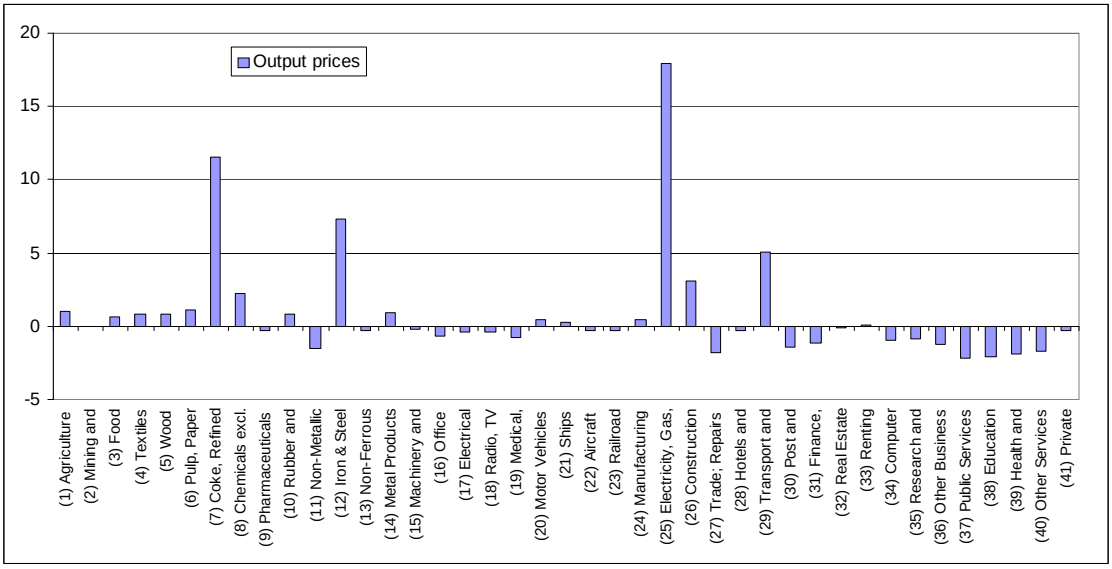
Scenario	Material Productivity	Energy Productivity	Labour Productivity	Carbon Productivity
S1H	0.91	6.04	-0.93	8.59
S2H	0.84	7.15	-0.71	8.99
S3H	1.78	15.48	-2.61	21.35
S1L	1.97	12.21	-3.02	17.17

First conclusions:

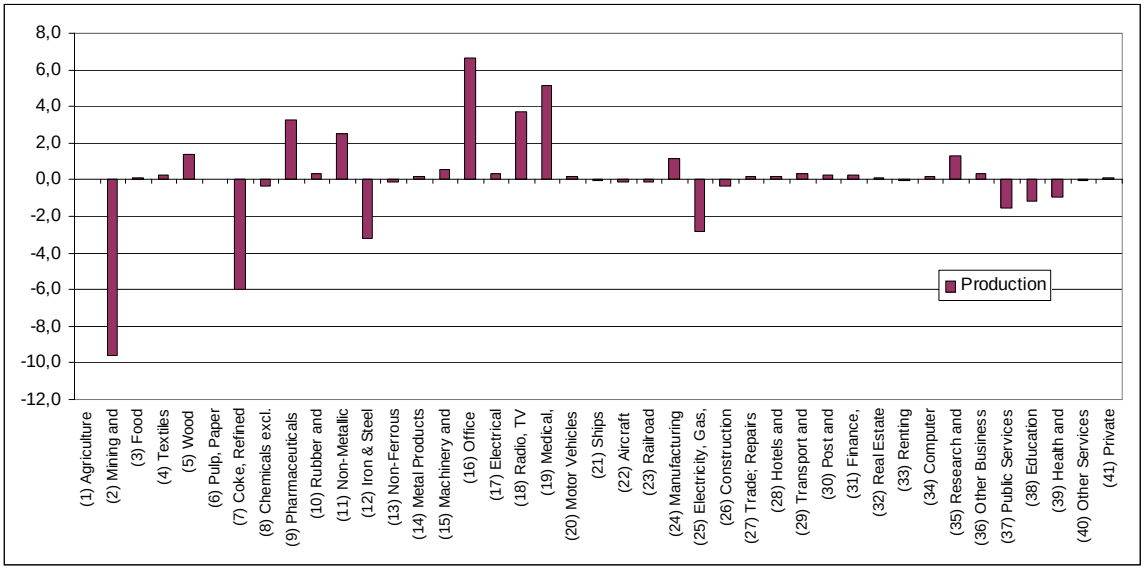
- ⇨ EU 20% target reached at a CO2 price of 68 Euro2008/t (S1H)
- ⇨ Revenue recycling (ETS/industry part of ETR) into social security contributions increases employment
- ⇨ The impact on production (GDP) is slightly negative
- ⇨ Level of international energy prices important
- ⇨ Investment in low carbon technologies reduces the CO2 price (S2H) and is positive for GDP and employment
  [CO2 price of 61 Euro2008/t then not so far from EU 2008 impact assessment; 39-45 Euro in const. prices]
- ⇨ Domestic EU 30% target with high energy prices (S3H) needs about the same % reduction against the corresponding baseline as 20% target with low energy prices (S1L)
- ⇨ International cooperation improves EU competitiveness, but global GDP and trade volume are reduced

3. Detailed results of scenario S1H:

- ◈ **Scenario S1H: % deviation of German sector prices from baseline in 2020**



◈ Scenario S1H: % deviation of German sector output from base in 2020



S1H: Macroeconomic impacts for Germany and the UK

- ⇨ Both economies react by and large as expected
- ⇨ Labour productivity (-), energy and material productivity (+)
- ⇨ Employment (+)
- ⇨ Impacts on GDP, trade, wage rate rather small

DE 2020	Deviation from base	Deviation from base
	in %	absolute
GDP (Bill. € in 1995 prices)	-0,14	-3,7
Household Consumption Expenditures	0,16	1,8
Government Consumption Expenditures	-1,66	-7,2
Gross Fixed Capital Formation	0,00	0,0
Exports	-0,23	-4,5
Imports	-0,48	-6,1
Employment (in 1000)	0,69	263,5
CPI (1995 = 100)	0,36	0,5
Average wage rate per hour (Euro)	0,06	0,1

GB 2020	Deviation from base	Deviation from base
	in %	absolute
GDP (Bill. P. in 1995 prices)	-0.56	-6.8
Household Consumption Expenditures	-0.16	-1.3
Government Consumption Expenditures	-1.39	-2.5
Gross Fixed Capital Formation	-0.23	-0.6
Exports	-1.37	-6.5
Imports	-0.73	-4.1
Employment (in 1000)	0.30	102.8
CPI (1995 = 100)	1.34	2.7
Average wage rate per hour (P)	0.73	1.8

4. Model comparison and conclusions

- **Main differences between the two models**
  - International competition explicitly covered in GINFORS – high energy prices can indirectly increase exports in E3ME
  - E3ME includes specialised model of power generation
  - Differences in labour market specification (labour supply, price-wage mechanism)
  - government consumption endogenous in GINFORS – exogenous in E3ME (ETR not budget-neutral in both models)
- **Model results very similar concerning**
  - Carbon prices, productivity impacts
  - E3ME more optimistic about GDP (and employment)
  - GDP impacts in GINFORS slightly negative
    - Improve with RES and efficiency investment
    - Employment effect also positive

Conclusions:

- Carbon price and productivity impacts very robust
- Price instruments (ETS, ETR) are key to reach the EU GHG targets
- ETS and ETR should be part of a policy mix including RES policies, efficiency policies, development and deployment of new technologies (CCS, carbon storage, new transport…)
  - Price differentiation?
- Part of the revenues should be used for technology development and deployment, not delivered by markets
- In reality, (part of) ETS and ETR revenues will be used for
  - Adaptation and mitigation in developing countries (10 to 15 €/t)
  - General budget
  - Distributional corrections
- ETR should be enlarged to material, land, water

Thank you for your attention!!!

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