

The Effects of Environmental Fiscal Reform in Germany: A Simulation Study

Bernd Meyer

University of Osnabrück and GWS mbH

GWS mbH

Weissenburger Str. 4

49076 Osnabrück

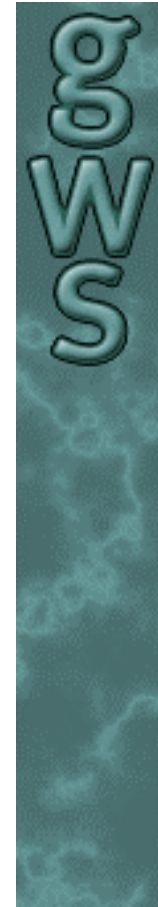
Tel.: +49/541/4093314

Fax: +49/541/4093311

email: meyer@gws-os.de

Presentation can be downloaded at

<http://www.gws-os.de>



GWS - Economic Structures Research Institute

Research activities:

- Multisectoral, multiregional macroeconomic forecasting models:
 - Germany and its federal states (INFORGE, PANTARHEI)
 - International (GLODYM)
- Co-operating with different national and international research institutes and working for governmental institutions and companies.

On 24 March 1999, the German Bundestag passed the
"Law Introducing the Environmental Fiscal Reform

- Taxes on energy use:
 - The first stage 1 April 1999, and the second and third stages: beginning of 2000 and 2001, two further stages in 2002 and 2003., each stage involving an increment in the tax rate.
- Use of the tax revenue:
 - Reduction of pension insurance contributions.
 - Funding for a program to promote renewable energy sources.

Hot debate since its introduction, becoming harder after oil-price shock, still going on...:

Project financed by the German Ministry of Finance,

coordination: Deutsches Institut für
Wirtschaftsforschung (DIW)

Publication

- Bach, St./Bork, C./Kohlhaas, M./Lutz, C./Meyer, B./Praetorius, B./Welsch, H.: (2001): Die ökologische Steuerreform in Deutschland. Physica-Verlag. Heidelberg.
- Bach, St./Kohlhaas, M./Meyer, B./Praetorius, B./Welsch, H.: Auswirkungen und Perspektiven der ökologischen Steuerreform in Deutschland. In: Perspektiven der Wirtschaftspolitik. Forthcoming.
- Bach, St./Kohlhaas, M./Meyer, B./Praetorius, B./Welsch: The Effects of the Environmental Tax Refom in Germany. In: Energy Policy. Forthcoming.

Three analytical tools:

- PANTA RHEI, GWS mbH Osnabrück: 58 sector Economy/Environment Model with econometrically estimated parameters
- LEAN, University of Oldenburg: 9 sector general equilibrium model with calibrated parameters.
- Income distribution effects: micro simulation model of the household sector, University of Potsdam

Results:

- Moderately positive and qualitatively robust
- There is a 'double dividend'
- No negative social effects

Environmental Fiscal Reform: Details

- very different from the textbook CO₂ - case
- different tax-rates for fuel oil, gasoline, diesel oil, electricity and natural gas
- No taxation for coal
- various exemptions

Tax rates

Table 1 Tax Rates of the Ecological Fiscal Reform in Germany

	Tax rate in 1999	Annual increase	Tax rate in 2003
Heavy fuel oil	0	0.25cent/l ^{a)}	0.25 cent/l (0.06 EURO/GJ)
Light fuel oil	2.00 cent/l	0	2.00 cent/l (0.56EURO/GJ)
Gasoline	3.00 cent/l	3.00 cent/l	15.00 cent/l (4.7 EURO/GJ)
Diesel	3.00 cent/l	3.00 cent/l	15.00 cent/l (4.19 EURO/GJ)/
Electricity	1.00 cent/kWh	0.25 cent/kWh	2.00 cent/kWh (5.60 EURO/GJ)
Natural gas	0.16 cent/kWh	0	0.16 cent/kWh (0.45 EURO/GJ)

a) One-time increase in 2000.

Exemptions

- for manufacturing, construction, agriculture, electricity, mining:
 - eco-tax greater than 500 € per year: Reduction of the rate for the exceeding amount to 20%.
 - eco-tax is maximally 20% higher than the reduction of the social security contributions.
- for special uses of energy carriers:
 - combined heat and power stations
 - no taxation of non energetic uses of energy carriers.

Effects of the environmental tax reform

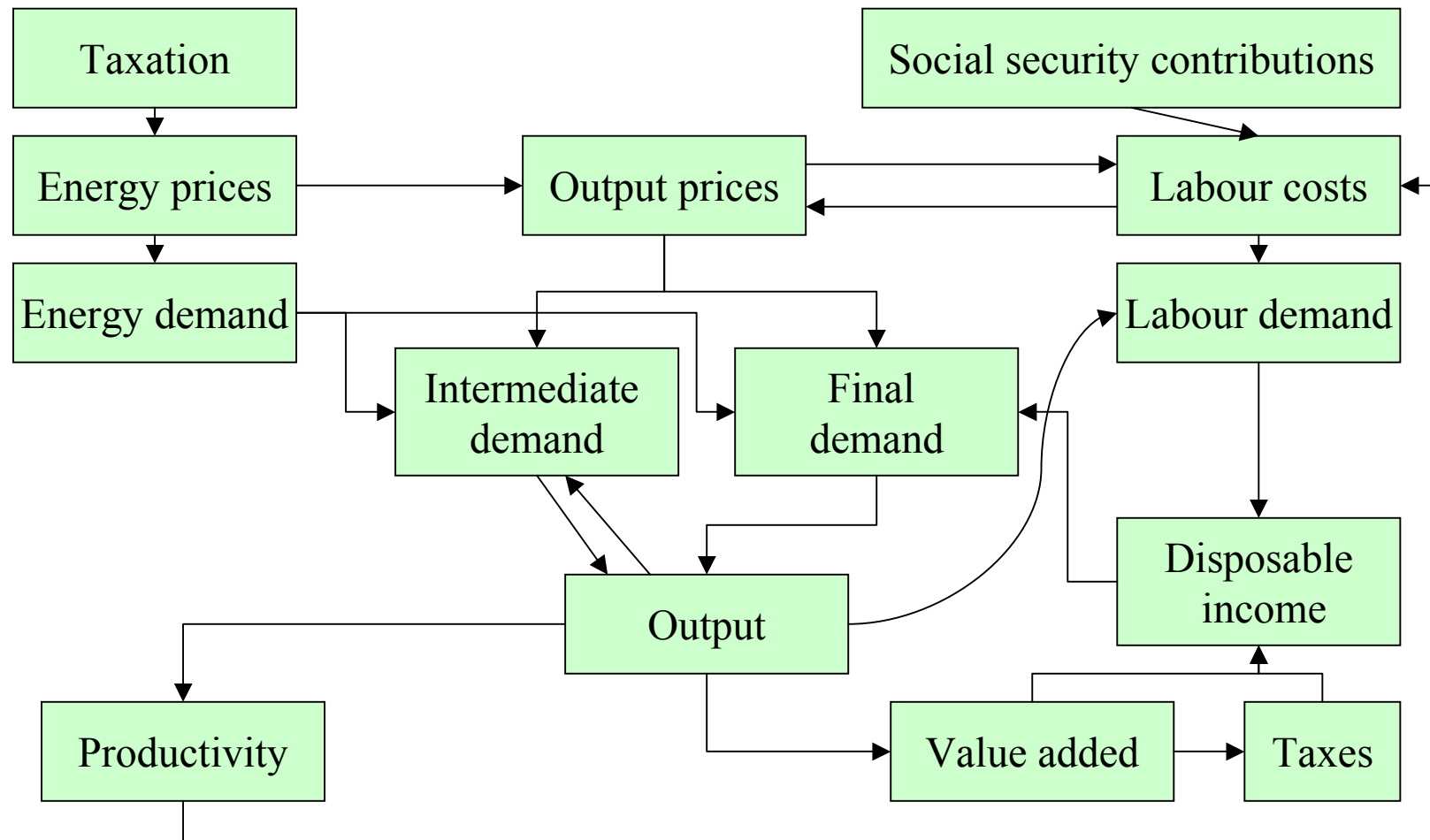


Figure 1:
CO₂ Emissions: Modelled Effects of the Ecological Fiscal Reform (% deviation from reference scenario)

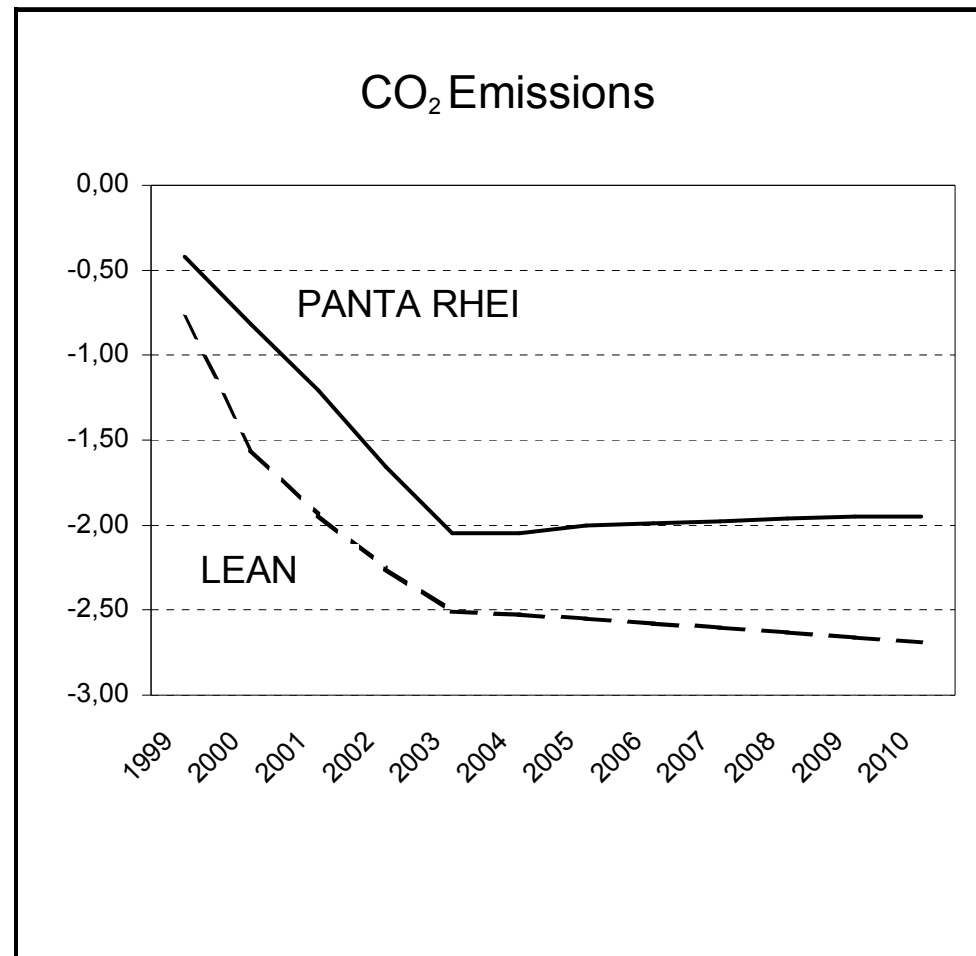
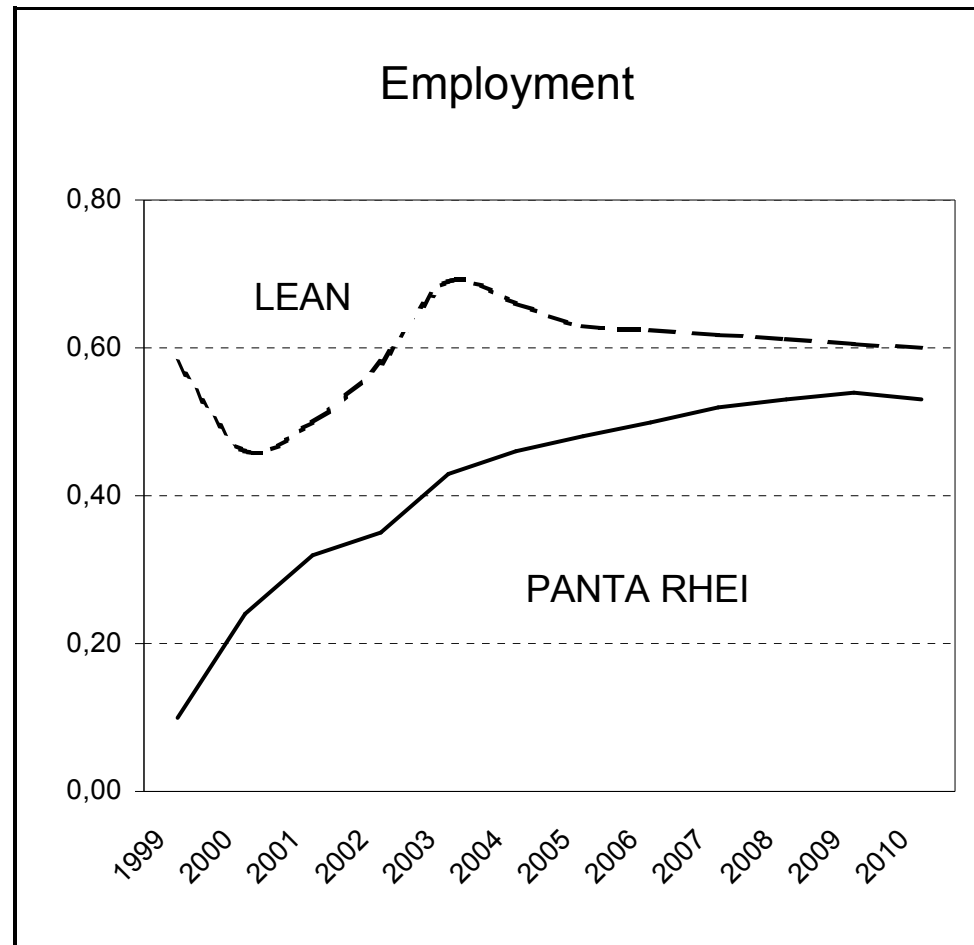


Figure 2

Employment: Modelled Effects of the Ecological Fiscal Reform

% deviation from reference scenario



The double dividend in absolute terms
deviations from the bau-scenario
Simualtions with PANTA RHEI

	2003	2010	
Employment	+ 140 000	+ 176 000	persons
CO2 - Emissions	- 17.5	- 17.2	Million tons

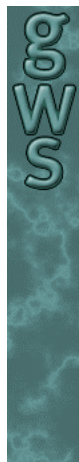


Table 2
The impact on real gdp and its components in the year 2003
 Differences from the bau-Szenario

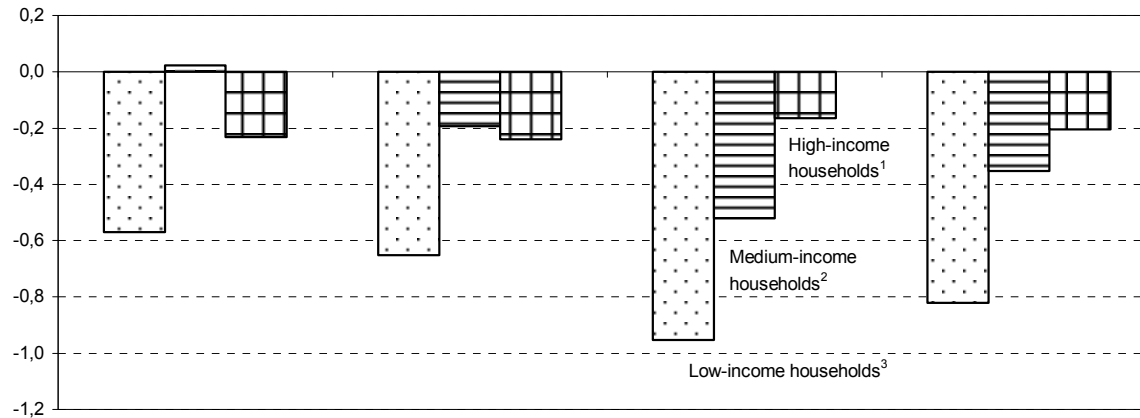
	moderate energy prices		high energy prices	
	PANTA RHEI	LEAN	PANTA RHEI	LEAN
gdp	-0,56	0,10	-0,56	0,11
private consumption	-0,83	0,42	-0,65	0,41
public consumption	-0,70	0,20	-0,89	0,25
investment	-0,80	-0,06	-0,64	0,27
exports	-0,03	-0,57	-0,01	-0,55
imports	-0,74	0,07	-0,36	0,22

Table 3
Effects of environmental fiscal reform on output and employment by sectoral aggregates, 2003
 Deviation compared to reference scenario in per cent

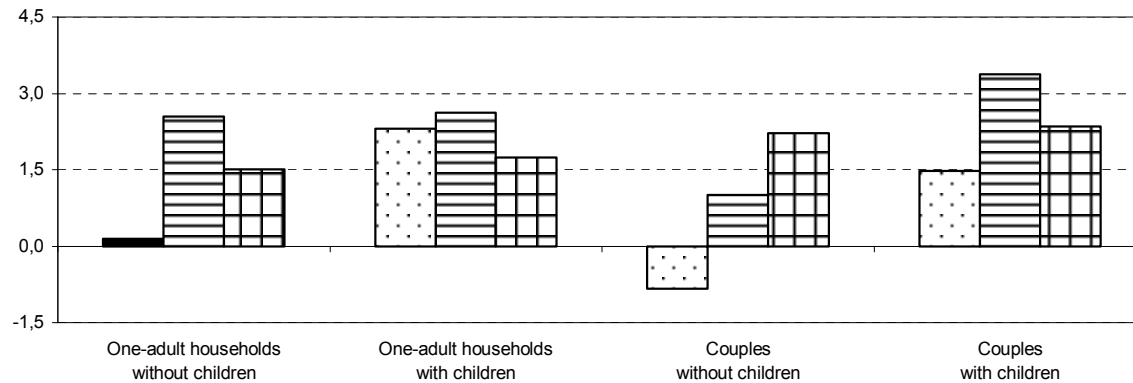
	Scenario with low energy prices				Scenario with high energy prices			
	PANTA RHEI		LEAN		PANTA RHEI		LEAN	
	Output	Employment	Output	Employment	Output	Employment	Output	Employment
Agriculture	-1,28	0,80	-0,33	0,10	-1,13	0,89	-0,31	-
Energy sector	-3,29	-0,53	-2,18	-1,72	-2,36	-0,50	-1,89	-
Basic/chemical goods	-0,38	0,49	-0,56	-0,21	-0,31	0,51	-0,50	-
Investment goods	-0,47	0,33	-0,43	-0,03	-0,35	0,39	-0,34	-
Consumer goods	-0,72	0,38	-0,22	0,21	-0,59	0,47	-0,21	-
Construction	-0,08	1,19	0,13	0,66	-0,08	1,27	0,31	-
Transport	-0,42	-0,21	-0,04	0,63	-0,28	-0,16	-0,04	-
Services	-0,57	0,46	0,27	1,29	-0,43	0,49	0,26	-
State	-0,80	0,67	0,20	0,78	-0,92	0,59	0,25	-

Income Effects of Ecological Tax Reform in 2003
by Type of Private Households
in % of disposable income

Ecological tax reform alone



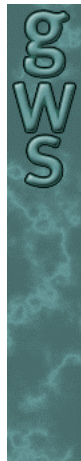
Ecological tax reform plus income tax reform⁴



¹ Households with an annual gross income (earned income and income transfers) of DM 100 000 or more.- ² Households with an annual gross income of DM 50 000 to under DM 100 000.- ³ Households with an annual gross income of under DM 50 000.- ⁴ Including increase in children's allowance and family taxation reform.

Source: Calculated using Potsdam micro-simulation model.

Figure 4 Income Effects of the Ecological Tax Reform in 2003 by Social Status of Private Households In % of disposable income



Conclusions

- German ETR has a double dividend in terms of rising employment and falling CO2 emissions.
- The effects on gdp and the distribution of income are neglectable.
- Elimination of exemptions: Further simulations with PANTA RHEI show, that this has positive effects on employment, but only small effects on CO2 emissions.
- Dynamization past 2003: Further simulations with PANTA RHEI show, that the positive effects can be enlarged.