

Determinants of Employment Development in the Environmental Goods and Services Sector

New evidence from German linked establishment and regional data

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Definition

‘The environmental goods and services sector (EGSS) comprises products and services to prevent environmental damage in different fields such as air or water pollution.’

(Eurostat 2009, OECD/Eurostat 1999)

- Double dividend of the environmental goods and services sector (EGSS)
 - EGSS helps to tackle environmental challenges, e.g. climate change
 - EGSS contributes to the economic welfare, e.g. by creating and securing jobs
- Research questions
 - Do EGSS establishments show a better employment development than others?
 - Which determinants are promoting factors and which are restraints for employment growth?

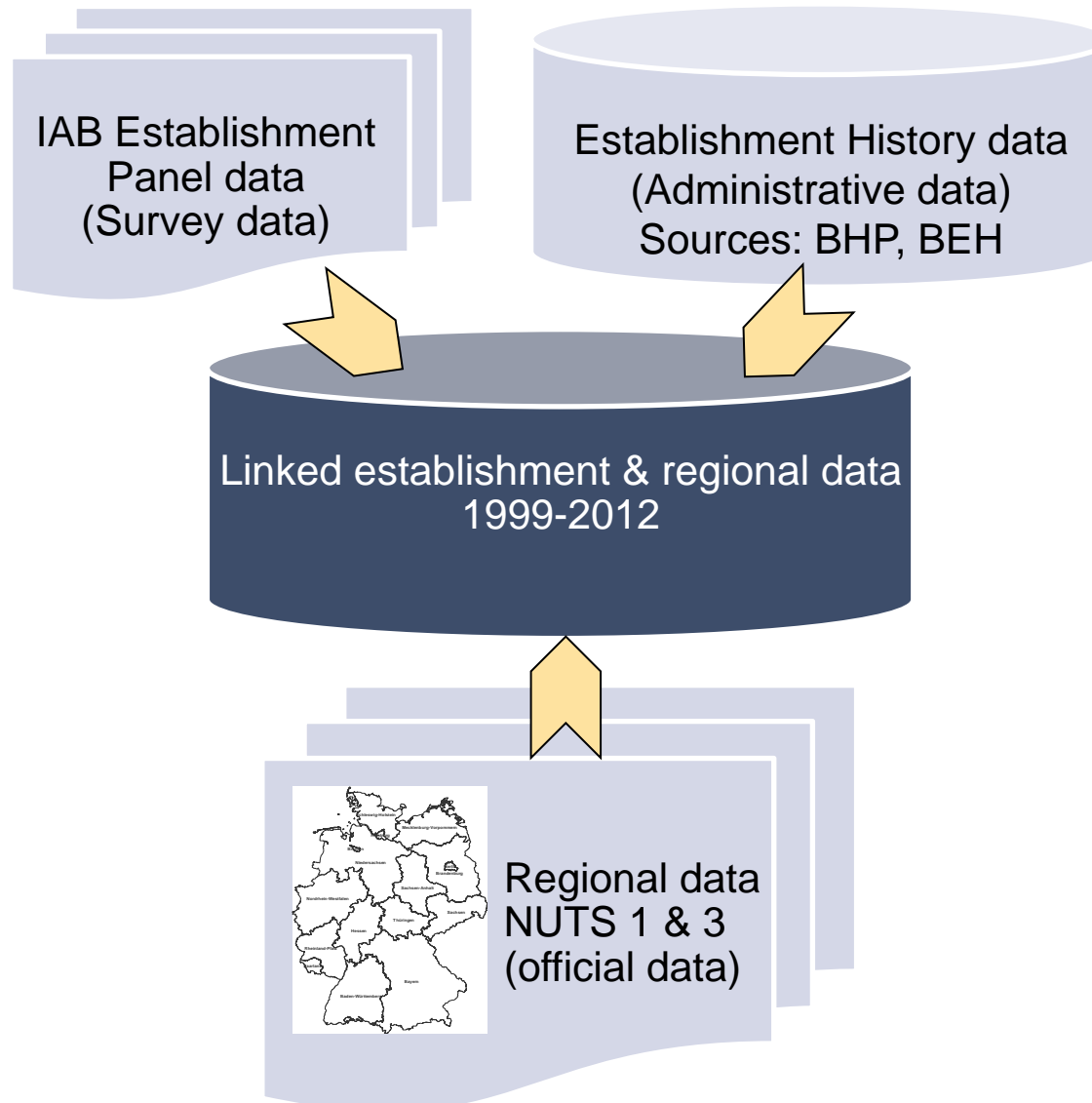
Important determinants of labor demand

- **Product Demand and Wages**
e.g. Hamermesh 1993, Davis/Haltiwanger 1999, Haltiwanger et al. 2013
- **Innovation**
e.g. Lachenmaier/Rottmann 2007 & 2011, Capello/Lenzi 2011, Buerger/Broekel/Coad 2012
- **Eco-Innovation**
e.g. Pfeiffer/Rennings 2001, Horbach 2010, Horbach/Rennings 2013, Licht/Peters 2013 /14
- **Regional Agglomeration**
e.g. Krugman 2011, Fujita/Thisse 2013, Dauth 2013, Moretti 2011

Hypotheses

- H1** Employment development differs between EGSS establishments and others:
EGSS has higher employment development.
- H2** The main drivers for employment development are (particular in the EGSS):
domestic product demand, wage development, innovation and regional
agglomeration effects.

Linked establishment and regional data



The environmental goods and services sector (EGSS) in Germany

EGSS employer and employees in 2012

EGSS share within 2012 (Sample): 15.4% (2,352 firms)

	Number of employees in 1,000			
	Sample		Extrapolation	
	2011	2012	2011	2012
Environmental Goods	43	44	503	521
Environmental Services	60	61	928	945
Total	103	105	1,431	1,466

Source: IAB Establishment Panel 2012

The environmental goods and services sector (EGSS) in Germany

EGSS subfields	employees in %		
	2012	2005	1999
Prevention of water pollution, waste water treatment	12.3	13.0	18.9
Waste management, recycling	19.0	29.8	27.4
Air purification <i>(1999/2005: plus climate protection)</i>	3.8	22.1	16.3
Climate protection, renewables, energy saving <i>(2012)</i>	35.2	-	-
Noise abatement	4.5	2.1	2.3
Environmental remediation, soil conservation	1.6	5.4	3.7
Nature conservation, landscape management <i>(2012)</i>	9.7	-	-
Measurement, analysis and control technology	3.9	6.5	6.6
Analytics, consultancy, project planning	2.9	5.4	4.7
Environmental research, development & monitoring	2.0	4.7	1.5
Others	5.1	11.0	18.6
Total	100.0	100.0	100.0

The environmental goods and services sector (EGSS) in Germany

EGSS subfield	Emp. Dev. 2009-2012
Prevention of water pollution, waste water treatm.	2.7
Waste management, recycling	0.6
Air purification	12.0
Climate protection, renewable energies, energy saving	6.2
Noise abatement	6.1
Environmental remediation, soil conservation	16.8
Nature conservation, landscape management	1.2
Measurement, analysis and control technology	9.5
Analytics, consultancy, project planning	16.3
Environmental research, development & monitoring	14.0
Others	11.7
Total	4.7

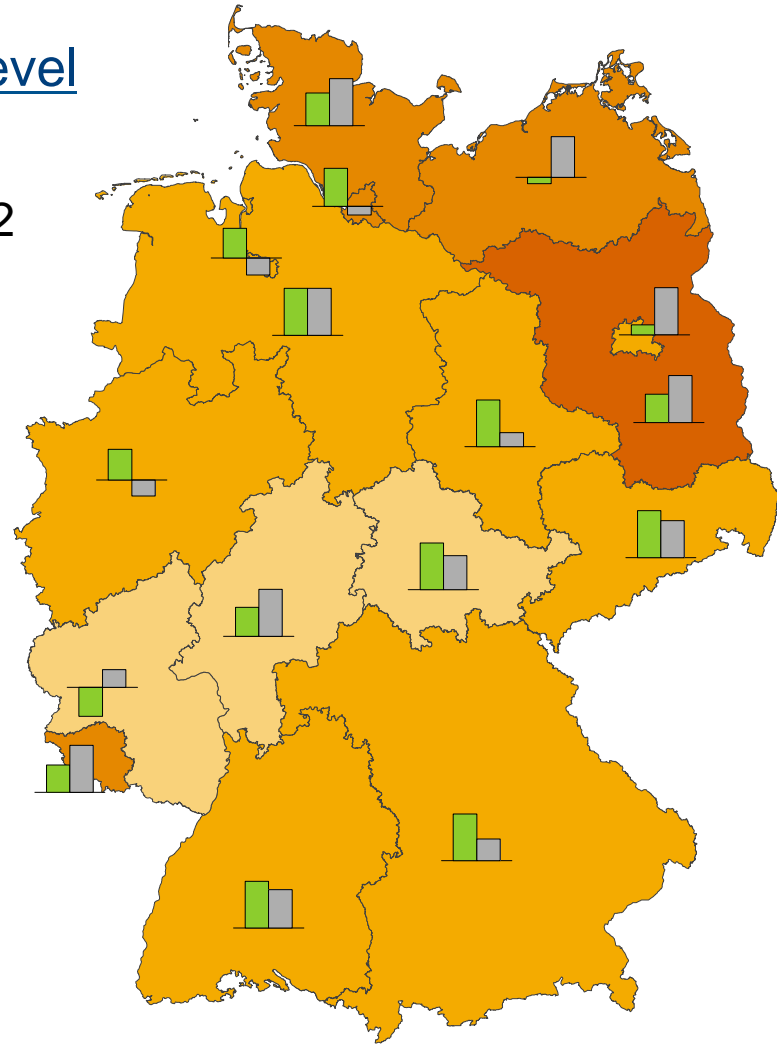
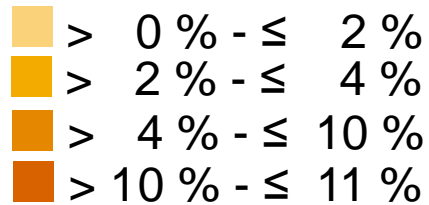
The environmental goods and services sector (EGSS) in Germany

Regional Variations at NUTS-1-Level

Employment Development 2009-2012



Share of EGSS employees in 2012



- Econometric models (Multilevel Mixed Effects GLM and OLS)
 - short-term employment development (2009 – 2012)
 - long-term employment development (2002 – 2012)
 - all firms and separate analyses for the EGSS
 - lagged correlated variables to avoid endogeneity problems
- Robustness checks
 - treatment effects model
 - probit models
 - IV regression considering the endogeneity of the wage variable

Econometric model (Multilevel Mixed Effects GLM)

$$empdev_{ij} = \beta_{\downarrow 0} + \beta_{\downarrow 1} pdem_{ij} + \beta_{\downarrow 2} wagedev_{ij} + \beta_{\downarrow 3} inno_{ij} + \beta_{\downarrow 4} reg_{ij} + \beta_{\downarrow 5} \psi_{ij} + \mu_j + \varepsilon_{ij}$$

Dependent variable: Employment development

empdyn_{ij}: growth rate of establishment *i* in NUTS 3 unit *j*
(2009-2012 and 2002-2012)

Correlated variables

- ***pdem_{ij}***: product demand (lagged), proxies: profit situation, overtime
- ***wagedev_{ij}***: wage development (lagged)
- ***inno_{ij}***: innovation types (eco-innovations, other innovations)
- ***reg_{ij}***: regional variables: reg. agglomeration, firm location (Länder, NUTS 3)
- ***ψ_{ij}***: control variables: export shares, state of technical equipment, tariff agreements, firm size, firm age, competition pressure, qualification structure, sector dummies

Determinants of employment development from 2009 to 2012

Dependent variable: Empdev0912 - Employment growth rate from 2009 to 2012, in %				
Correlates	All firms		Only EGSS	
	Mixed GLM	OLS	Mixed GLM	OLS
<i>Innovations</i>				
Ecolnnolntens	7.10 (2.40)*	7.10 (2.10)*	6.64 (1.91)+	6.64 (1.71)+
Otherinno	3.04 (3.06)**	3.04 (3.00)**	-	-
Airclimateinno	3.88 (1.52)	3.88 (1.37)	3.38 (1.10)	3.38 (1.06)
Natureinno	-6.04 (-1.06)	-6.04 (-1.78)+	-4.72 (-0.78)	-4.72 (-1.13)
Recycinno	0.51 (0.15)	0.51 (0.17)	-0.91 (-0.23)	-0.91 (-0.25)
Waterinno	-0.96 (-0.22)	-0.96 (-0.35)	-1.67 (-0.35)	-1.67 (-0.51)
<i>Regional var.</i>				
PopDens	0.00 (0.46)	0.00 (0.41)	0.00 (1.05)	0.00 (1.11)
Secshare	0.16 (2.28)*	0.16 (2.56)**	0.58 (2.90)**	0.58 (2.98)**
<i>Control var.</i>				
Age	4.71 (4.97)**	4.71 (4.79)**	4.87 (1.94)*	4.87 (1.71)+
Capitalnew	3.03 (3.34)**	3.02 (3.40)**	3.79 (1.59)	3.79 (1.54)
Competition	-2.72 (-3.06)**	-2.72 (-3.09)**	-3.93 (-1.71)+	-3.93 (-1.68)+
Exportshare	-0.01 (-0.52)	-0.01 (-0.58)	0.05 (0.77)	0.05 (0.66)
Highqual	-0.03 (-0.98)	-0.03 (-1.00)	-0.09 (-1.40)	-0.09 (-1.28)
Overtime	5.88 (6.34)**	5.88 (6.25)**	5.27 (2.00)*	5.27 (2.06)*
Profitsituation	7.40 (8.45)**	7.40 (8.40)**	6.47 (2.89)**	6.47 (2.86)**
Size	-0.00 (-0.11)	-0.00 (-0.31)	-0.00 (-0.58)	-0.00 (-1.15)
Tarif	-1.11 (-1.19)	-1.11 (-1.15)	-2.57 (-1.09)	-2.57 (-1.10)
Wagedev0911	-0.00 (-0.11)	-0.00 (-0.06)	-0.05 (-2.15)*	-0.05 (-1.67)+

Determinants of employment development from 2009 to 2012 (cont.)



Dependent variable: Empdev0912 - Employment growth rate from 2009 to 2012, in %				
Correlates	All firms		Only EGSS	
	Mixed GLM	OLS	Mixed GLM	OLS
<i>German Länder</i>				
Baden	5.04 (2.37)*	5.04 (2.36)*	9.15 (1.61)	9.15 (1.52)
Bavaria	5.23 (2.42)*	5.23 (2.42)*	6.62 (1.20)	6.62 (1.51)
Berlin	3.06 (0.87)	3.06 (0.80)	-0.22 (-0.02)	-0.22 (-0.02)
Brandenburg	3.00 (1.42)	3.00 (1.52)	9.50 (1.68)+	9.50 (1.86)+
Bremen	3.99 (1.54)	3.99 (1.47)	10.5 (1.56)+	10.5 (1.89)+
Hamburg	4.29 (1.06)	4.29 (1.16)	10.3 (0.85)	10.3 (0.94)
Hesse	3.41 (1.44)	3.41 (1.51)	10.2 (1.68)+	10.2 (1.40)
LowSax	5.80 (2.60)**	5.80 (2.49)**	19.6 (3.55)**	19.6 (2.50)**
MeckPom	1.79 (0.79)	1.79 (0.82)	11.2 (1.80)+	11.2 (1.90)+
NorthWestf	3.64 (1.75)+	3.64 (1.89)+	5.88 (1.10)	5.88 (1.31)
Rhineland	6.55 (2.69)**	6.55 (2.63)**	15.7 (2.42)*	15.7 (2.04)*
Saarland	3.69 (1.42)	3.69 (1.52)	7.45 (1.16)	7.45 (1.06)
Saxonia	3.34 (1.67)+	3.34 (1.78)+	7.20 (1.43)	7.20 (1.72)+
SaxonyAnh.	1.69 (0.81)	1.69 (0.92)	12.7 (2.54)**	12.7 (2.74)**
Schleswig	8.57 (3.17)**	8.57 (3.09)**	14.3 (2.14)*	14.3 (2.68)**
	No. obs.: 6677	No. obs.: 6677	No. obs.: 1035	No. obs.: 1035
	Wald χ^2 (50) = 297**	F (50, 6626) = 5.4**	Wald χ^2 (49) = 84**	F (49, 985) = 1.5*
Z-statistics are given in parentheses; +, * and ** denote significance at the 10%, 5% and 1% level, respectively. Sector dummies and constants are included but not reported.				

Eco-Innovation and employment development from 2009 to 2012 – Results of a treatment effects models

Dependent variable: Empdev0912 - Employment growth rate from 2009 to 2012, in %

Treatment variable	Propensity Score Matching, treatment model: probit
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EcoInnoIntens	9,87 (2.37)* Number of observations: 10,138
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For the other eco-innovation fields, there are no observable significant treatment effects.

Model for all firms:

- Localisation effects support a positive employment development supporting H1
- Innovation activities and product demand are positively correlated to employment development confirming H1
- A high competition pressure is negatively correlated to employment development
- No significant influence of wage development on employment
- Except Bremen, Hamburg, Hessen and Saarland, the West German Länder show a better employment development compared to East Germany

Model for all firms (continued...)

- The comparison between non-EGSS and EGSS establishments shows significant differences:
 - Eco-innovative firms operating in technology fields such as measurement technologies, analytics or environmental research are characterized by a higher employment growth (this result is also confirmed by a treatment effects model) confirming H2
 - Already “established” eco-fields such as innovations in air pollution or waste water treatment do not show an over-proportionally dynamic employment development
 - Innovations in non-EGSS establishments also trigger employment but the coefficient is lower compared to innovation intensive EGSS establishments

Specificities of the EGSS:

- The importance of localisation effects seem to be higher for the EGSS compared to all firms
- Higher wages lead to a decreasing employment whereas this variable was not significant in the whole sample
- EGSS seems to offer employment opportunities for East German Länder, especially for Saxony-Anhalt but also for Brandenburg and Mecklenburg-Vorpommern

Specificities of the long-term models (2002-2012):

- The long-term models corroborate our finding presented above
- The coefficients of important determinants such as innovation intensity, regional agglomeration and product demand are higher in the long-term model

Summary and future research

- The EGSS shows a more dynamic employment development compared to the whole economy but this is only true for highly innovative firms
- Innovations in non-EGSS establishments also trigger employment but the coefficient is lower compared to innovation intensive EGSS establishments
- EGSS seems to offer employment opportunities for East German Länder – an enforcement of positive localisation effects in these regions may be advantageous
- An enlargement of the analysis for different qualification levels of the EGSS employees is planned

Thank you for your attention!

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