Long-term effects of fiscal policy and economic convergence: Evidence from German bonus depreciation

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Durch eine gemeinsame Anstrengung wird es uns gelingen, Mecklenburg-Vorpommern und Sachsen-Anhalt, Brandenburg, Sachsen und Thüringen schon bald wieder in blühende Landschaften zu verwandeln, in denen es sich zu leben und zu arbeiten lohnt.

Helmut Kohl (1990)

Institutioneller Rahmen

Fiskalpolitik als Instrument für blühende Landschaften, d.h. wirtschaftliches Wachstum

1. **Fördergebietsgesetz** (FGG, 1991-1998) für neue Bundesländer: Sonderabschreibungen bis zu 50% der Investitionssumme im ersten Jahr als Steueranreiz für Investitionen

2. **Investitionszulagengesetz** (1991-2013): direkte Steuersubventionen für Anlageinvestitionen

Institutioneller Rahmen

Subsidy volume (present value in Mio. €)
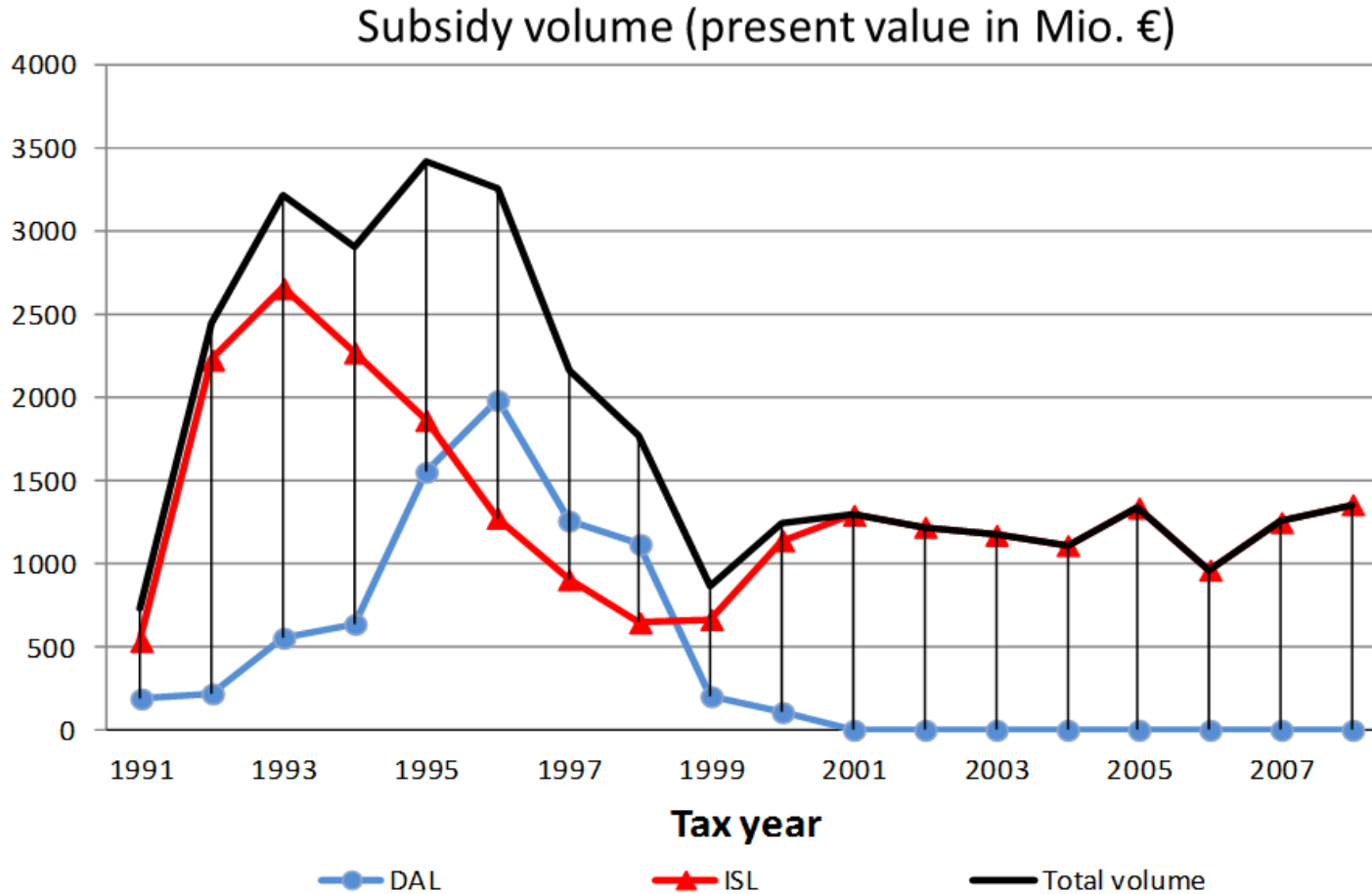
Datenquelle: Eichfelder und Schneider (2014)

Institutioneller Rahmen
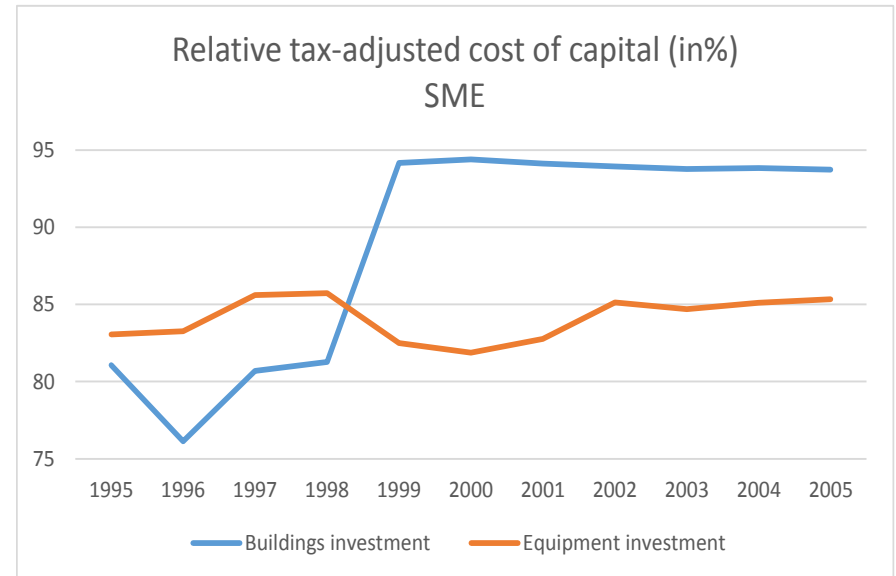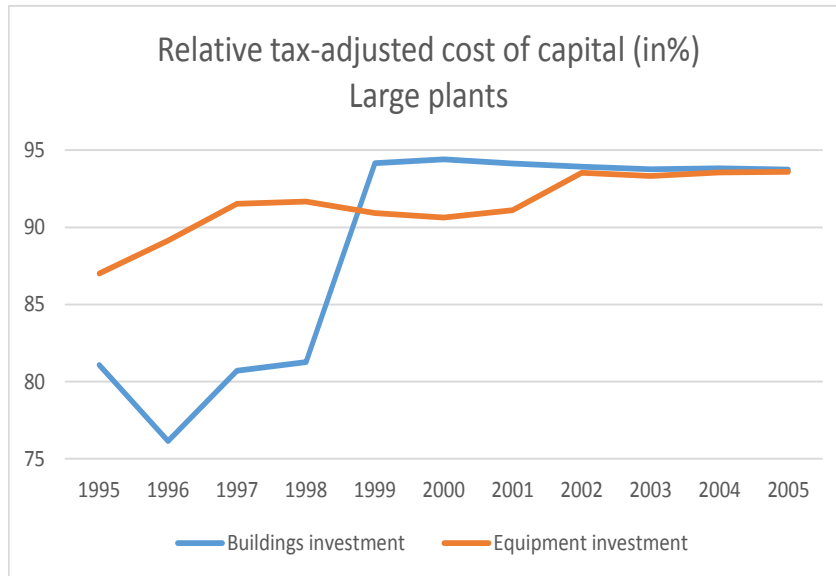
Average relative tax-adjusted costs of capital (in %, comparison Eastern vs. Western plants) of building and equipment investments for large plants and SMEs.
Source: based on Table 2 in Eichfelder and Schneider (2014)

Literatur

- Steuern mindern Investitionsanreize durch steigende **Kapitalnutzungskosten** (Hall und Jorgenson, 1967)

- **Steueranreize** haben einen **positiven Einfluss** auf private Investitionen (z.B. Auerbach und Summers, 1979; House und Shapiro, 2008; Eichfelder und Schneider, 2014)

Forschungsbeitrag

- Fokus auf **Langzeiteffekte** der Steueranreize auf Wachstum

- Identifikation des Einflusses von FGG-Investitionen

Amtliche Firmendaten in Deutschland

- Datengrundlage: Panel (1995 – 2008) (N = 691,822)

  - **Investitionserhebung** bei Betrieben des Verarbeitenden Gewerbes sowie der Gewinnung von Steinen und Erden

  - **Monatsbericht** bei Betrieben des Verarbeitenden Gewerbes sowie der Gewinnung von Steinen und Erden

  - **Kostenstrukturerhebung** bei Unternehmen des Verarbeitenden Gewerbes sowie der Gewinnung von Steinen und Erden

  - **Volkswirtschaftliche Kennzahlen** auf Kommunaler Ebene (BIP/Kopf, Einwohner, Arbeitslosenquote)

- Besonderheit: Unterscheidung zwischen Anlageninvestitionen und Gebäudeinvestitionen

- Abhängige Variablen: **Umsätze** und **Beschäftigung**

Empirische Strategie

1. Kernel-Matching-Verfahren: Durchschnittliche Effekte der Sonderabschreibung auf Betriebe, die vom FGG Gebrauch machen

   - Kontrollgruppe: Westen nicht von FGG betroffen
   - Treatmentgruppe: Osten profitiert bis Ende 1998 von FGG

$$\text{ATT} = E\left[Y_i \mid DAL_i = 1\right] = E\left[Y_{1i} \mid DAL_i = 1\right] - \underbrace{E\left[Y_{0i} \mid DAL_i = 1\right]}_{\text{unobserved counterfactual}}$$

$$\text{ATT} = \frac{1}{N^T} \sum_{i \in I_T} \left[Y_{1i} - \sum_{j \in I_C} w(i,j) Y_{0i} \right] \qquad w(i,j) = \frac{G(\frac{p_i - p_j}{h})}{\sum_{j \in \{DAL_i = 0\}} G(\frac{p_i - p_j}{h})}$$

Empirische Strategie

2. Match-paired regression: Langzeiteffekte von FGG-getriebenen Investitionen

$$y_{i,t} = \gamma_0 \cdot east + \beta_1 \cdot I_{i,t-1} + \beta_2 \cdot I_{i,t-1} \cdot east + \beta_3 \cdot X_{i,t}$$
$$+ \gamma_1 \cdot \sum I_{i,95-98} + \gamma_2 \cdot \sum I_{i,95-98} \cdot east$$
$$+ \Delta_{i,t} + \alpha_i + \delta_t + u_{i,t}.$$

Matching - Kontrollvariablen

Structural plant characteristics

Plant type	Dummies indicating whether the plant is a single business, a plant belonging to a nationally operating firm with multiple plants, a plant being part of a multinational enterprise or a plant owned by a foreign firm.
Industry sector	Dummies indicating the economic branch classified by WZ2003
Product category	Dummies indicating production of intermediate goods, investment goods, commodities, consumer goods or energy.
Legal form	Dummies indicating legal form, which is single business, partnerships or corporations.

Input

Material input use	Log material use
Energy use	Log energy use
R&D expenditure	Log expenditure for R&D
R&D wage payments	Log wage payments for R&D staff

Capital activity

Interest payments	Log interest payments
Capital stock	Estimated capital stock (see Eichfelder and Schneider, 2014 for detailed procedure)

Market participation

Share of exports	Share of exports on turnover in %
Share of manufacturing	Share of manufacturing on turnover in %

Regional macroeconomic variables

Unemployment rate	District-level unemployment rate in %
GDP per capita	District-level GDP per capita
Population	District-level population

Matching - Qualität

Overall statistics on covariate balance

Sample	Pseudo R^2	LR chi^2	p>chi^2	Mean bias	Median bias
Unmatched	0.624	26179.42	0.000	22.9	5.7
Matched	0.034	625.18	0.000	4.6	2.9

Source: Data from the AFiD enterprise panel (1995-2008), own calculations.

kernel = epanechnikov, bandwidth = 0.0600

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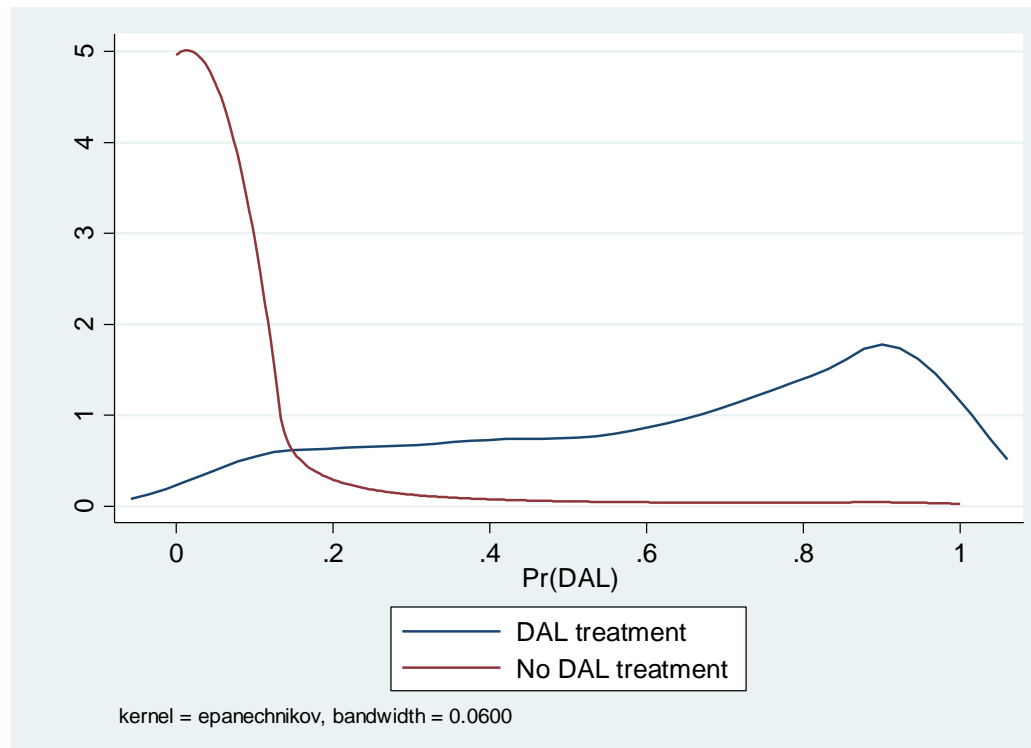
Matching - Average treatment effect on the treated

	Turnover	Turnover growth	N° employees	N° employees growth
	(1)	(2)	(3)	(4)
ATT	0.1966***	-0.0503***	0.2326***	-0.0240***
	(0.0308)	(0.0088)	(0.024)	(0.0051)
t-stat	6.39	-5.72	9.36	-4.70
N treatment	6,698	6,698	6,698	6,698
N control	28,980	28,980	28,980	28,980
N off-support	23,995	23,995	23,995	23,995
Median bias (%)	2.9	2.9	2.9	2.9

Standard errors in parentheses. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.
Notes: Kernel matching estimation with bandwidth 0.06. The outcome variables are log turnover, log number of employees, and their growth rates respectively. Treatment dummy is DAL bonus depreciation. The propensity score is estimated via probit (in Table A.1).
Source: AFiD enterprise panel (1995-2008), own calculations.

Kernergebnisse

VARIABLES	Turnover		N° of employees	
	(1)	(2)	(3)	(4)
Eastern plants	-0.493***	-0.498***	-0.232***	-0.234***
	(0.0443)	(0.0440)	(0.0242)	(0.0240)
$\Sigma I_{95\text{-}98}^{Build}$	0.0138***	0.0132***	0.00661***	0.00643***
	(0.00149)	(0.00148)	(0.000916)	(0.000911)
$\Sigma I_{95\text{-}98}^{Build} \cdot east$	0.00799**	0.00797**	0.00805***	0.00803***
	(0.00355)	(0.00352)	(0.00197)	(0.00196)
$\Sigma I_{95\text{-}98}^{Equip}$	0.00828***	0.00793***	0.0113***	0.0111***
	(0.00181)	(0.00180)	(0.00105)	(0.00105)
$\Sigma I_{95\text{-}98}^{Equip} \cdot east$	-0.00345	-0.00309	-0.00569***	-0.00554***
	(0.00384)	(0.00381)	(0.00213)	(0.00212)
Δ^{Build}		0.00152***		0.000285
		(0.000388)		(0.000204)
Δ^{Equip}		0.00739***		0.00339***
		(0.000900)		(0.000415)
Observations	30,744	30,744	30,744	30,744

Bemerkungen: basierend auf Tabellen 3.9 und 3.10
Robuste Standardfehler in Klammern *** p<0.01, ** p<0.05, * p<0.1.
Kontrollvariablen: Verzögerte Investmentitionen (& Ostinteraktion), Kapitalstock, Kontrollvariablen auf
Betriebsebene, Makroökonomische Kontrollvariablen, Jahreseffekte, Industrieeffekte

Schlussbemerkung

- Relevanter Einfluss auf die Langzeitentwicklung von Betrieben: FGG führt zu ineffizientem Investitionsverhalten

- Goldgräberstimmung von Unternehmen aus Westdeutschland nach der Wiedervereinigung

- Ostdeutschland, als ehemalige Planwirtschaft, mit defizitären Infrastruktur- und Marktbedingungen

Vielen Dank für Ihre Aufmerksamkeit!

Institutioneller Rahmen

	Development Area Law (DAL)	Investment Subsidy Law (ISL)
Period	01.01.1991 to 31.12.1998 with amendments and revisions	01.01.1991 to 31.12.2013 with amendments and revisions
General rates	50% (1991-1996); 40% (1997-1998)	12% (1991 to June 1992); 8% (July 1992 to June 1994); 5% (July 1994 to 1998) [c]; 10% (1999); 12.5% (2000-2009); 10% (2010); 7.5% (2011); 5% (2012); 2.5% (2013) [b]
Increased rates	N.A.	+ 5% (SME; 1995 to 1998); double of general rate for equipment investment (SME; 1999 to 2013); + 2.5% (border areas; 2001 to 2009)
Regional specifications	N.A.	Berlin: reduced periods (Berlin West); Reduced subsidy rates under certain conditions (1996 to 2012)
Assessment base	Movable assets (excluding aircrafts); immovable assets; modernization of buildings	New and movable assets (excluding aircrafts, cars, low-value assets[d]); new and immovable assets (since 1999); restriction to initial investments (since 1999)
Formal requirements	Tax return	Formal application

Notes: [a] The latest amendment of the law (ISL 2010) is supposed to run out in 2014. [b] Subsidy might be restricted for sensible sectors like the steel industry, ship building, automotive industry, agriculture. [c] The investment subsidy rate was up to 8% until the end of 1996 if the investment has been started in before July 1994. [d] As excluded by § 6 (2) S.1 of the German Income Tax Act. Source: Eichfelder and Schneider (2014)

Robustheit - Matching

	Kernel matching		Nearest neighbor matching, caliper 0.001	
	0.03	0.01	one neighbor	five neighbors
	(1)	(2)	(3)	(4)
Turnover				
ATT	0.2126***	0.2191***	0.1909***	0.2077***
	(0.0311)	(0.0313)	(0.0451)	(0.0375)
t-stat	6.84	7.00	4.23	5.54
Turnover growth				
ATT	-0.0512***	-0.0516***	-0.0370***	-0.0532***
	(0.0089)	(0.0090)	(0.0159)	(0.0115)
t-stat	-5.74	-5.75	-2.32	-4.61
N° employees				
ATT	0.2425***	0.2463***	0.2395***	0.2341***
	(0.025)	(0.0253)	(0.0355)	(0.0299)
t-stat	9.65	9.73	6.74	7.82
N° employees growth				
ATT	-0.0251***	-0.0257***	-0.02383***	-0.0284***
	(0.0052)	(0.0052)	(0.0098)	(0.0075)
t-stat	-4.85	-4.92	-2.43	-3.79
N treatment	6,698	6,698	6,625	6,625
N control	28,980	28,980	28,060	28,060
N off-support	23,995	23,995	24,988	24,988
Median bias (%)	3.0	3.0	2.9	2.9

Daten

Full sample

Summary statistics	Overall N~654.000 Mean	West N~548.000 Mean	East N~106.000 Mean
Dependent Variables			
Turnover (1,000,000 Euro)	28.46	31.31	13.78
Number of employees	130.00	139.81	79.39
Log turnover	15.68	15.78	15.19
Log staff	4.01	4.06	3.78
Real Investments (1,000 Euro)			
Gross investment (1,000 Euro)	1130.05	1144.69	1054.58
Building investment (1,000 Euro)	132.42	127.01	160.32
Equipment investment (1,000 Euro)	989.77	1009.55	887.82
Relative predicted difference in building investments	0.13	0.04	0.59
Relative predicted difference in equipment investments	0.24	0.28	0.06
Control variables			
Capital stock (1,000 Euro)	4932.61	5033.59	4411.65
Share of exports (%)	16.22	17.53	9.58
Share of manufacturing (%)	94.28	94.10	95.23
GDP per capita (1,000 Euro)	25.30	26.80	17.58
Population (1,000)	278.34	302.60	153.07
Unemployment rate (%)	10.38	8.89	18.08

Daten

Matched sample

Summary statistics	Overall N~178000 Mean	West N~89000 Mean	East N~89000 Mean
Dependent Variables			
Turnover (1,000,000 Euro)	19.89	24.84	14.95
Number of employees	104.67	124.60	84.74
Log turnover	15.49	15.63	15.36
Log staff	3.96	4.02	3.90
Real Investments			
Gross investment (1,000 Euro)	969.59	950.53	988.65
Building investment (1,000 Euro)	132.05	113.86	150.23
Equipment investment (1,000 Euro)	831.63	831.01	832.25
Control variables			
Capital stock (1,000 Euro)	4700.79	4953.59	4447.99
Share of exports (%)	12.32	14.45	10.18
Share of manufacturing (%)	95.10	94.91	95.28
GDP per capita (1,000 Euro)	19.96	22.06	17.86
Population (1,000)	198.47	239.64	157.29
Unemployment rate (%)	15.09	12.58	17.60