

Entry Regulation and Entrepreneurship

A Natural Experiment in German Craftsmanship

Davud Rostam-Afschar (Universitaet Hohenheim)

How Can We Boost Competition in the Services Sector? 07/06/2016

Content

Introduction

How Does Entry Regulation Influence Entrepreneurship?

Empirical Specification

Linear Probability and Logit Models

Data and Descriptive Statistics:

Dataset and Subsamples

Graphical Analysis

Craftsmen in Weighted Averages

Results

Estimation Results of Self-Employment State and Transition Probabilities

Treatment Effects on Transition Probabilities

Treatment Effects on Self-Employment Probabilities

Heterogeneous Treatment Effects

Specification and Sensitivity Tests

Summary

More Male Craftsmen, Untrained Workers After Deregulation

How Does Entry Regulation Influence Entrepreneurship?

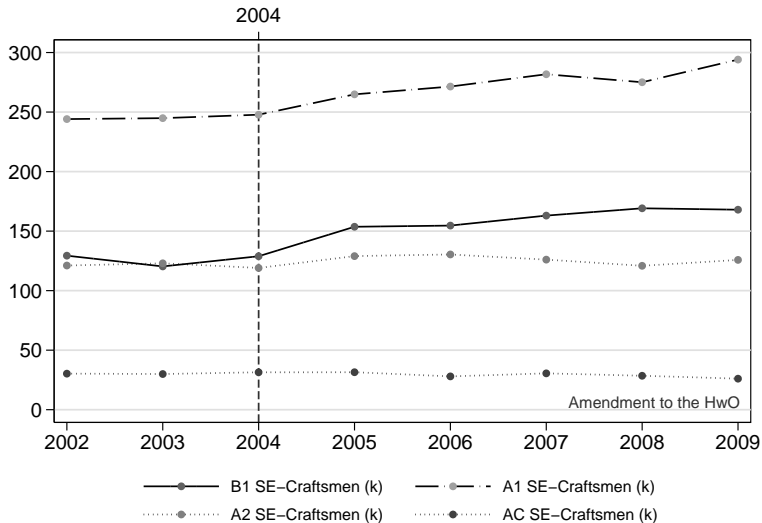


Table: Stock of businesses at the end of the year

	A	B1	B2	Total
2002	590,146	76,044	177,471	843,661
2003	587,762	74,940	183,886	846,588
2004	595,309	102,568	189,216	887,093
2005	600,287	129,591	192,805	922,683
2006	603,443	149,981	193,474	946,898
2007	603,757	166,015	191,434	961,206
2008	602,605	175,557	188,526	966,688

Notes: Müller (2006) argues that the actual stock of businesses is about 15% lower than the reported stock due to registered but non-active businesses.

Source: Own calculations based on Müller (2006) and data provided by the German Confederation of Skilled Crafts.

Table: Stock of businesses at the end of the year

	A	B1	B2	Total
2002	590,146	76,044	177,471	843,661
2003	587,762	74,940	183,886	846,588
2004	595,309	102,568	189,216	887,093
2005	600,287	129,591	192,805	922,683
2006	603,443	149,981	193,474	946,898
2007	603,757	166,015	191,434	961,206
2008	602,605	175,557	188,526	966,688

Notes: Müller (2006) argues that the actual stock of businesses is about 15% lower than the reported stock due to registered but non-active businesses.

Source: Own calculations based on Müller (2006) and data provided by the German Confederation of Skilled Crafts.

Table: Stock of businesses at the end of the year

	A	B1	B2	Total
2002	590,146	76,044	177,471	843,661
2003	587,762	74,940	183,886	846,588
2004	595,309	102,568	189,216	887,093
2005	600,287	129,591	192,805	922,683
2006	603,443	149,981	193,474	946,898
2007	603,757	166,015	191,434	961,206
2008	602,605	175,557	188,526	966,688

Notes: Müller (2006) argues that the actual stock of businesses is about 15% lower than the reported stock due to registered but non-active businesses.

Source: Own calculations based on Müller (2006) and data provided by the German Confederation of Skilled Crafts.

Related Literature

Entrepreneurship and entry regulation

- ▶ Aggregate data:
Djankov, La Porta, Lopez-De-Silanes, and Shleifer (2002) [85 countries], Klapper, Laeven, and Rajan (2006), Ciccone and Papaioannou (2007), van Stel, Storey, and Thurik (2007) [Global Entrepreneurship Monitor, World Bank Doing Business],
- ▶ Household data:
Bruhn (2011) [Mexican National Employment Survey], Ardagna and Lusardi (2010, 2009) [GEM and the Flash Eurobarometer Surveys on Entrepreneurship], Prantl and Spitz-Oener (2009) (analyze HwO¹)

The amendment to the HwO in January 2004

- ▶ Political and economical discussion
- ▶ First empirical evidence: Müller (2006)

¹German Trade and Crafts Code (Gesetz zur Ordnung des Handwerks (Handwerksordnung))

Contributions

This study contributes to the literature on entry regulation and entrepreneurship by

- ▶ being the first to exploit the policy change in 2004 as a **natural experiment**
- ▶ providing **causal evidence** with respect to the effects of entry regulation
- ▶ adding to the few studies that investigate entry regulation and entrepreneurship with **micro data**
- ▶ exploring a special kind of entry regulation: **educational requirement**
- ▶ focus on **craftsmanship**

Table: The Natural Experiment

Before	Qualification	After	Qualification
A	(Meister)	6	AC (Meister)
A	(Meister)	27	A1 (Altgeselle)
A	(Meister)	8	A2 (Altgeselle, no requirement*)
A	(Meister)	53	B1 (no requirement)
B2	(no requirement)	57	B2 (no requirement)

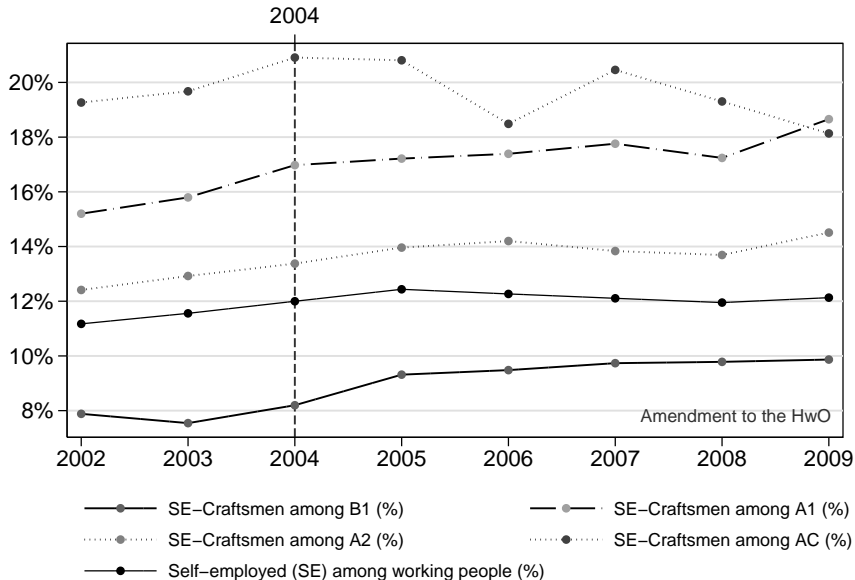
Notes: This table describes the minimum level of qualification required before and after the reform in descending order of a priori supposed intensity of entry regulation. The control group comprises before and after the reform occupations that turned out to belong to the AC-occupations. Each treatment group includes before and after the reform occupations that turned out to belong to the B1, A1, A2 occupations, respectively. The occupational groups B1, A1, A2, AC are defined to be mutually exclusive. However, non-craft occupations and B2-occupations within these groups are not always discriminable due to data protection, but excluded from the analysis where possible.

* For A2 occupations, no requirement is imposed after the reform if a prospective entrepreneur commits to limit the range of the activities of his firm to jobs that can be learned within three months.

Treatment and Control

- ▶ **Treatment Group 1: Exemption of entry requirement (B1)**
B1-occupations, Examples: Tile and Mosaic Layer, Coppersmith, Turner, Tailor, Miller, Photographer ...
- ▶ **Treatment Group 2: reduction of entry requirement (A1)**
A-occupations, Examples: Roofer, Surgical Instrument Maker, Gunsmith, Plumber, Gas and Water Fitter, Joiner, Pastry Cook ...
- ▶ **Treatment Group 3: A2**
A-occupations that frequently use Easyjobs Rule
Reduction and partial exemption of entry requirement
Mason and Concretor, Painter and Varnisher, Metalworker, Motor Vehicle Body and Vehicle Construction Mechanic, Bike Mechanic, Information Electronics Technician, Vehicle Technicians, Butcher
- ▶ **Control Group: AC**
A-occupations
Chimney Sweep, Optician, Hearing Aid Audiologist, Orthopaedic Technician, Dental Technician

B2-occupations excluded from analysis where possible



Empirical Specification

- ▶ Estimated equation:

$$\begin{aligned} \text{Prob}(Y_i = 1 | dPost_i, dO_i, X_i) &= \frac{1}{1 + e^{-z_i}} \text{ with} \\ z_i &= \beta_0 + \delta_0 dPost_i + \beta_{B1} dB1_i + \beta_{A1} dA1_i + \beta_{A2} dA2_i \\ &+ \delta_{B1} dB1_i \cdot dPost_i + \delta_{A1} dA1_i \cdot dPost_i + \delta_{A2} dA2_i \cdot dPost_i \\ &+ X_i \beta_4. \end{aligned} \tag{1}$$

- ▶ Estimated on repeated cross sections (RCS) 2002-2009 as logit models
- ▶ Controls: dummies for the years 2003, 2004, 2006, 2007, 2008, and 2009, age and its square and dummy variables indicating gender, type of secondary schooling and professional qualification, nationality, region of residence, the size of the respondent's residence city, marital status, the number of children, a constant, and the branch of craftsmanship: (i) building and construction trades, ii) electrical and metal-working trades, iii) woodwork trades, iv) clothing, textile and leather trades, v) foodstuffs trades, vi) trades related to health and hygiene, including chemical and cleaning trades, and vii) glass, paper, ceramic and other trades. Moreover, dEU and its interaction with the post-policy period.

Data

Scientific use file from the German microcensus by the Federal Statistical Office: 70% (selected at random) of the annual representative survey of 1% of all households in Germany.

- ▶ Large sample size (craftsmen less than 10% of the population)
- ▶ Low rate of item non-response
- ▶ Main analysis using waves 2002-2009
- ▶ 25,000 observations per year which \approx four million craftsmen in the German population

- ▶ B2 occupations not exactly discriminable
- ▶ No question for subsidies for entrepreneurs (Other policies)

Other Entrepreneurship Policies

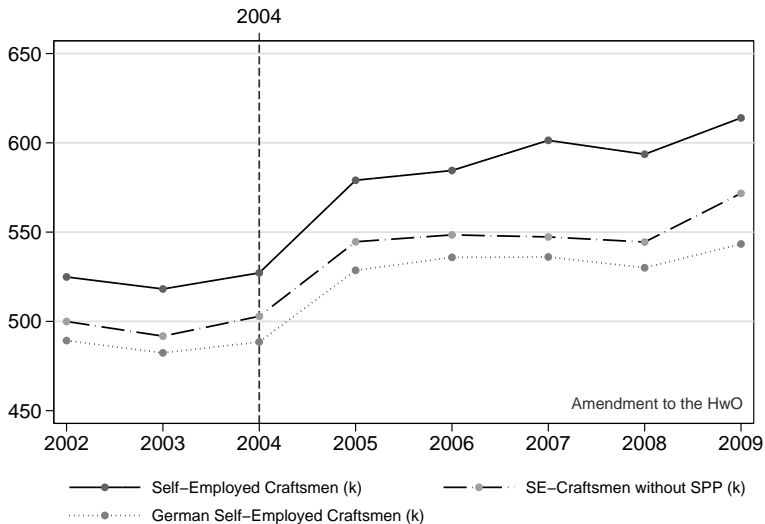


Table: Weighted averages by treatment and control groups in pre- and post-reform (2002-2004;2005-2009) samples

	B1		A1		A2		AC	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Self-employed (%)	7.87	9.69	15.96	17.67	12.89	14.05	19.94	19.47
Female (%)	58.81	58.97	16.90	17.59	3.08	2.82	41.24	43.80
Age (a)	42.77	43.66	38.97	39.82	39.46	40.14	38.99	40.13
East (%)	16.47	17.77	21.50	21.70	23.44	23.28	17.71	17.41
Nationality								
German (%)	80.89	80.60	90.17	90.66	90.84	90.50	95.95	96.14
EU (%)	4.64	6.36	3.57	3.98	3.04	3.98	1.80	1.90
Non-EU (%)	14.46	13.03	6.26	5.36	6.12	5.52	2.25	1.96
Professional qualification								
University (%)	1.08	1.31	0.78	0.99	0.25	0.41	1.05	0.71
UAS ^a (%)	0.94	1.13	1.23	1.34	0.53	0.55	1.52	1.54
Meister ^b (%)	5.64	5.24	17.99	17.64	16.37	17.41	27.23	28.85
Geselle ^c (%)	54.32	59.21	65.67	70.15	69.96	72.70	62.46	65.11
None (%)	31.09	32.60	8.50	9.41	7.04	8.45	2.38	3.51
Non-response (%)	6.92	0.52	5.84	0.47	5.85	0.49	5.37	0.28
Secondary School								
Abitur ^d (%)	4.88	5.78	4.74	5.44	2.65	3.23	13.98	18.06
Other ^e (%)	84.00	85.73	89.58	91.78	91.47	93.92	82.02	81.39
None (%)	5.76	7.33	1.54	2.01	1.52	2.12	0.22	0.21
Non-response (%)	5.36	1.16	4.14	0.76	4.36	0.73	3.78	0.34
Children under 16 (#)	0.72	0.64	0.68	0.61	0.65	0.61	0.59	0.55
Married (%)	70.50	68.26	60.01	57.36	60.14	57.81	57.68	57.99
City size								
> 500,000 (%)	14.30	14.81	10.89	11.96	10.16	11.25	11.78	13.83
20,000—500,000 (%)	44.93	46.77	38.80	42.05	37.93	41.10	43.09	44.70
≤ 20,000 (%)	40.77	38.42	50.31	45.99	51.91	47.65	45.13	41.47
% of all self-employed craftsmen	24.11	27.20	46.92	46.67	23.13	21.27	5.84	4.86
Observations	28,188	47,002	27,424	44,675	16,733	25,553	2,792	4,302

Table: Weighted averages by treatment and control groups in pre- and post-reform (2002-2004;2005-2009) samples

	B1		A1		A2		AC	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Self-employed (%)	7.87	9.69	15.96	17.67	12.89	14.05	19.94	19.47
Female (%)	58.81	58.97	16.90	17.59	3.08	2.82	41.24	43.80
Age (a)	42.77	43.66	38.97	39.82	39.46	40.14	38.99	40.13
East (%)	16.47	17.77	21.50	21.70	23.44	23.28	17.71	17.41
Nationality								
German (%)	80.89	80.60	90.17	90.66	90.84	90.50	95.95	96.14
EU (%)	4.64	6.36	3.57	3.98	3.04	3.98	1.80	1.90
Non-EU (%)	14.46	13.03	6.26	5.36	6.12	5.52	2.25	1.96
Professional qualification								
University (%)	1.08	1.31	0.78	0.99	0.25	0.41	1.05	0.71
UAS ^a (%)	0.94	1.13	1.23	1.34	0.53	0.55	1.52	1.54
Meister ^b (%)	5.64	5.24	17.99	17.64	16.37	17.41	27.23	28.85
Geselle ^c (%)	54.32	59.21	65.67	70.15	69.96	72.70	62.46	65.11
None (%)	31.09	32.60	8.50	9.41	7.04	8.45	2.38	3.51
Non-response (%)	6.92	0.52	5.84	0.47	5.85	0.49	5.37	0.28
Secondary School								
Abitur ^d (%)	4.88	5.78	4.74	5.44	2.65	3.23	13.98	18.06
Other ^e (%)	84.00	85.73	89.58	91.78	91.47	93.92	82.02	81.39
None (%)	5.76	7.33	1.54	2.01	1.52	2.12	0.22	0.21
Non-response (%)	5.36	1.16	4.14	0.76	4.36	0.73	3.78	0.34
Children under 16 (#)	0.72	0.64	0.68	0.61	0.65	0.61	0.59	0.55
Married (%)	70.50	68.26	60.01	57.36	60.14	57.81	57.68	57.99
City size								
> 500,000 (%)	14.30	14.81	10.89	11.96	10.16	11.25	11.78	13.83
20,000—500,000 (%)	44.93	46.77	38.80	42.05	37.93	41.10	43.09	44.70
≤ 20,000 (%)	40.77	38.42	50.31	45.99	51.91	47.65	45.13	41.47
% of all self-employed craftsmen	24.11	27.20	46.92	46.67	23.13	21.27	5.84	4.86
Observations	28,188	47,002	27,424	44,675	16,733	25,553	2,792	4,302

Table: Weighted averages by treatment and control groups in pre- and post-reform (2002-2004;2005-2009) samples

	B1		A1		A2		AC	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Self-employed (%)	7.87	9.69	15.96	17.67	12.89	14.05	19.94	19.47
Female (%)	58.81	58.97	16.90	17.59	3.08	2.82	41.24	43.80
Age (a)	42.77	43.66	38.97	39.82	39.46	40.14	38.99	40.13
East (%)	16.47	17.77	21.50	21.70	23.44	23.28	17.71	17.41
Nationality								
German (%)	80.89	80.60	90.17	90.66	90.84	90.50	95.95	96.14
EU (%)	4.64	6.36	3.57	3.98	3.04	3.98	1.80	1.90
Non-EU (%)	14.46	13.03	6.26	5.36	6.12	5.52	2.25	1.96
Professional qualification								
University (%)	1.08	1.31	0.78	0.99	0.25	0.41	1.05	0.71
UAS ^a (%)	0.94	1.13	1.23	1.34	0.53	0.55	1.52	1.54
Meister ^b (%)	5.64	5.24	17.99	17.64	16.37	17.41	27.23	28.85
Geselle ^c (%)	54.32	59.21	65.67	70.15	69.96	72.70	62.46	65.11
None (%)	31.09	32.60	8.50	9.41	7.04	8.45	2.38	3.51
Non-response (%)	6.92	0.52	5.84	0.47	5.85	0.49	5.37	0.28
Secondary School								
Abitur ^d (%)	4.88	5.78	4.74	5.44	2.65	3.23	13.98	18.06
Other ^e (%)	84.00	85.73	89.58	91.78	91.47	93.92	82.02	81.39
None (%)	5.76	7.33	1.54	2.01	1.52	2.12	0.22	0.21
Non-response (%)	5.36	1.16	4.14	0.76	4.36	0.73	3.78	0.34
Children under 16 (#)	0.72	0.64	0.68	0.61	0.65	0.61	0.59	0.55
Married (%)	70.50	68.26	60.01	57.36	60.14	57.81	57.68	57.99
City size								
> 500,000 (%)	14.30	14.81	10.89	11.96	10.16	11.25	11.78	13.83
20,000—500,000 (%)	44.93	46.77	38.80	42.05	37.93	41.10	43.09	44.70
≤ 20,000 (%)	40.77	38.42	50.31	45.99	51.91	47.65	45.13	41.47
% of all self-employed craftsmen	24.11	27.20	46.92	46.67	23.13	21.27	5.84	4.86
Observations	28,188	47,002	27,424	44,675	16,733	25,553	2,792	4,302

Table: Weighted averages by treatment and control groups in pre- and post-reform (2002-2004;2005-2009) samples

	B1		A1		A2		AC	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Self-employed (%)	7.87	9.69	15.96	17.67	12.89	14.05	19.94	19.47
Female (%)	58.81	58.97	16.90	17.59	3.08	2.82	41.24	43.80
Age (a)	42.77	43.66	38.97	39.82	39.46	40.14	38.99	40.13
East (%)	16.47	17.77	21.50	21.70	23.44	23.28	17.71	17.41
Nationality								
German (%)	80.89	80.60	90.17	90.66	90.84	90.50	95.95	96.14
EU (%)	4.64	6.36	3.57	3.98	3.04	3.98	1.80	1.90
Non-EU (%)	14.46	13.03	6.26	5.36	6.12	5.52	2.25	1.96
Professional qualification								
University (%)	1.08	1.31	0.78	0.99	0.25	0.41	1.05	0.71
UAS ^a (%)	0.94	1.13	1.23	1.34	0.53	0.55	1.52	1.54
Meister ^b (%)	5.64	5.24	17.99	17.64	16.37	17.41	27.23	28.85
Geselle ^c (%)	54.32	59.21	65.67	70.15	69.96	72.70	62.46	65.11
None (%)	31.09	32.60	8.50	9.41	7.04	8.45	2.38	3.51
Non-response (%)	6.92	0.52	5.84	0.47	5.85	0.49	5.37	0.28
Secondary School								
Abitur ^d (%)	4.88	5.78	4.74	5.44	2.65	3.23	13.98	18.06
Other ^e (%)	84.00	85.73	89.58	91.78	91.47	93.92	82.02	81.39
None (%)	5.76	7.33	1.54	2.01	1.52	2.12	0.22	0.21
Non-response (%)	5.36	1.16	4.14	0.76	4.36	0.73	3.78	0.34
Children under 16 (#)	0.72	0.64	0.68	0.61	0.65	0.61	0.59	0.55
Married (%)	70.50	68.26	60.01	57.36	60.14	57.81	57.68	57.99
City size								
> 500,000 (%)	14.30	14.81	10.89	11.96	10.16	11.25	11.78	13.83
20,000—500,000 (%)	44.93	46.77	38.80	42.05	37.93	41.10	43.09	44.70
≤ 20,000 (%)	40.77	38.42	50.31	45.99	51.91	47.65	45.13	41.47
% of all self-employed craftsmen	24.11	27.20	46.92	46.67	23.13	21.27	5.84	4.86
Observations	28,188	47,002	27,424	44,675	16,733	25,553	2,792	4,302

Table: Weighted averages by treatment and control groups in pre- and post-reform (2002-2004;2005-2009) samples

	B1		A1		A2		AC	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Self-employed (%)	7.87	9.69	15.96	17.67	12.89	14.05	19.94	19.47
Female (%)	58.81	58.97	16.90	17.59	3.08	2.82	41.24	43.80
Age (a)	42.77	43.66	38.97	39.82	39.46	40.14	38.99	40.13
East (%)	16.47	17.77	21.50	21.70	23.44	23.28	17.71	17.41
Nationality								
German (%)	80.89	80.60	90.17	90.66	90.84	90.50	95.95	96.14
EU (%)	4.64	6.36	3.57	3.98	3.04	3.98	1.80	1.90
Non-EU (%)	14.46	13.03	6.26	5.36	6.12	5.52	2.25	1.96
Professional qualification								
University (%)	1.08	1.31	0.78	0.99	0.25	0.41	1.05	0.71
UAS ^a (%)	0.94	1.13	1.23	1.34	0.53	0.55	1.52	1.54
Meister ^b (%)	5.64	5.24	17.99	17.64	16.37	17.41	27.23	28.85
Geselle ^c (%)	54.32	59.21	65.67	70.15	69.96	72.70	62.46	65.11
None (%)	31.09	32.60	8.50	9.41	7.04	8.45	2.38	3.51
Non-response (%)	6.92	0.52	5.84	0.47	5.85	0.49	5.37	0.28
Secondary School								
Abitur ^d (%)	4.88	5.78	4.74	5.44	2.65	3.23	13.98	18.06
Other ^e (%)	84.00	85.73	89.58	91.78	91.47	93.92	82.02	81.39
None (%)	5.76	7.33	1.54	2.01	1.52	2.12	0.22	0.21
Non-response (%)	5.36	1.16	4.14	0.76	4.36	0.73	3.78	0.34
Children under 16 (#)	0.72	0.64	0.68	0.61	0.65	0.61	0.59	0.55
Married (%)	70.50	68.26	60.01	57.36	60.14	57.81	57.68	57.99
City size								
> 500,000 (%)	14.30	14.81	10.89	11.96	10.16	11.25	11.78	13.83
20,000—500,000 (%)	44.93	46.77	38.80	42.05	37.93	41.10	43.09	44.70
≤ 20,000 (%)	40.77	38.42	50.31	45.99	51.91	47.65	45.13	41.47
% of all self-employed craftsmen	24.11	27.20	46.92	46.67	23.13	21.27	5.84	4.86
Observations	28,188	47,002	27,424	44,675	16,733	25,553	2,792	4,302

Table: Estimation results of self-employment state and transition probabilities

	LPM Entry	LPM Entry	LPM Entry	LPM Exit	LPM Self-employed
dB1×dPost	0.0079* (0.0043)	0.0070* (0.0042)	0.0077* (0.0041)	-0.0285 (0.0240)	0.0227* (0.0118)
dA1×dPost			0.0069* (0.0039)	-0.0103 (0.0145)	0.0266** (0.0101)
dA2×dPost			0.0055 (0.0038)	-0.0067 (0.0136)	0.0161 (0.0110)
dEU×dPost		0.0152** (0.0060)	0.0122** (0.0052)	-0.0585 (0.0395)	0.0539*** (0.0164)
dB1	-0.0161* (0.0081)	-0.0012 (0.0058)	-0.0019 (0.0050)	0.0330*** (0.0116)	0.0094 (0.0167)
dA1			0.0060 (0.0038)	-0.2727*** (0.0137)	0.0407*** (0.0063)
dA2			-0.0303*** (0.0038)	0.0758*** (0.0106)	0.0133 (0.0105)
dPost	-0.0036 (0.0037)	-0.0005 (0.0038)	-0.0018 (0.0036)	-0.0182 (0.0123)	-0.0083 (0.0088)
dEU		0.0007 (0.0038)	0.0034 (0.0036)	0.0039 (0.0449)	0.0200* (0.0106)
Constant	0.0280*** (0.0066)	0.0128 (0.0091)	0.0337*** (0.0083)	0.7161*** (0.0420)	-0.2571*** (0.0470)
Year dummies		✓	✓	✓	✓
Occ. dummies		✓	✓	✓	✓
Branch dummies		✓	✓	✓	✓
Controls		✓	✓	✓	✓
Adj-R ²	<0.01	0.03	0.02	0.08	0.26
Observations	64,842	64,842	154,940	17,211	196,669

Table: Estimation results of self-employment state and transition probabilities

	Logit Entry	Logit Entry	Logit Entry	Logit Exit	Logit Self-employed
dB1xdPost	0.4556*** (0.1466)	0.4152*** (0.1446)	0.4630*** (0.1440)	-0.2057 (0.3426)	0.3528*** (0.1071)
dA1xdPost			0.2719* (0.1427)	-0.2270 (0.3657)	0.2205** (0.0907)
dA2xdPost			0.2571* (0.1440)	-0.1331 (0.4098)	0.1579 (0.1099)
dEUxdPost		1.1145** (0.5305)	0.4527 (0.2855)	-0.8180 (0.5496)	0.5809** (0.2667)
dB1	-0.8704* (0.4738)	0.1464 (0.1935)	-2.7259*** (0.1749)	3.5941*** (0.2985)	-3.3255*** (0.1234)
dA1			-0.7175*** (0.1290)	1.2221*** (0.2482)	-0.5682*** (0.0852)
dA2			-0.4634*** (0.1157)	1.0784*** (0.2652)	-0.4706*** (0.0795)
dPost	-0.1400 (0.1310)	0.1150 (0.1951)	-0.0309 (0.1346)	-0.7154** (0.3469)	-0.0709 (0.0831)
dEU		-0.1224 (0.5657)	0.1646 (0.2094)	-0.2910 (0.5718)	0.4252*** (0.1453)
Constant	-3.5482*** (0.2416)	-3.7692*** (0.7454)	-1.4658*** (0.4525)	-1.4618 (0.8993)	-2.2017*** (0.5096)
Year dummies		✓	✓	✓	✓
Occ. dummies		✓	✓	✓	✓
Branch dummies		✓	✓	✓	✓
Controls		✓	✓	✓	✓
Log likelihood	-5,346.12	-4,577.49	-13,667.83	-2,159.01	-54,391.46
Pseudo-R ²	<0.01	0.15	0.10	0.20	0.30
Observations	64,842	64,842	154,940	17,211	196,669

Table: Probabilities of entry into self-employment (in %): Difference in differences

	B1	A1	A2	AC	Δ_{B1}	Δ_{A1}	Δ_{A2}
Before reform 2004	0.25*** (0.02)	1.86*** (0.16)	2.38*** (0.20)	3.73*** (0.49)	-3.48*** (0.50)	-1.88*** (0.45)	-1.35*** (0.42)
After reform 2004	0.40*** (0.02)	2.39*** (0.12)	3.01*** (0.16)	3.68*** (0.30)	-3.28*** (0.31)	-1.29*** (0.22)	-0.67*** (0.19)
Δ between after and before reform 2004	0.14*** (0.02)	0.53*** (0.18)	0.63*** (0.21)	(0.48)	0.20 (0.48)	0.59 (0.47)	0.69 (0.49)
Before reform 2004	0.25*** (0.02)	1.86*** (0.16)	2.38*** (0.20)	3.73*** (0.49)	-3.48*** (0.50)	-1.88*** (0.45)	-1.35*** (0.42)
After reform 2004	0.25*** (0.04)	1.83*** (0.25)	2.35*** (0.33)	3.68*** (0.30)	-3.43*** (0.30)	-1.85*** (0.30)	-1.33*** (0.29)
Δ between after and before reform 2004	0.00 (0.03)	-0.03 (0.24)	-0.04 (0.31)	-0.06 (0.48)	0.05 (0.45)	0.03 (0.24)	0.02 (0.17)
Difference in differences					0.15*** (0.04)	0.56** (0.26)	0.67** (0.34)
Relative difference in differences					60.00	30.60	28.63

Notes: The upper panel shows the expected probabilities for the treatment groups (B1, A1, A2) and for the control group (AC) of a person with average characteristics before and after the reform rounded to two digits after the decimal point. Moreover, it depicts the differences in the expected probabilities and the difference in these differences, i.e. the cross differences. The next part of the table shows how the counter-factual cross differences are obtained using the expected probabilities for the post-reform period, which result when the reform's effects are restricted to zero. The lower panel reports the ATT, i.e. the differences in these cross differences. The relative differences in differences are computed, respectively, as the fraction of the treatment effect and the expected probability in the post-policy period subtracted by the treatment effect. The same calculation, based on the averages of the respective probabilities among actual persons in the data instead of the expected probabilities of a person with average characteristics, yields similar results and is available upon request

Cluster (occupation) robust standard errors calculated by the delta method are in parentheses

Asterisks (*/**/****) denote significance at the 10%/5%/1% level

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Probabilities of exit from self-employment (in %): Difference in differences

	B1	A1	A2	AC	Δ_{B1}	Δ_{A1}	Δ_{A2}
Before reform 2004	19.69*** (3.23)	2.24*** (0.30)	1.94*** (0.29)	0.67*** (0.16)	19.02*** (3.21)	1.57*** (0.31)	1.27*** (0.31)
After reform 2004	8.64*** (0.92)	0.86*** (0.07)	0.82*** (0.10)	0.32*** (0.04)	8.33*** (0.93)	0.54*** (0.08)	0.50*** (0.10)
Δ between after and before reform 2004	-11.05*** (2.92)	-1.38*** (0.36)	-1.13*** (0.34)	-0.35* (0.19)	-10.70*** (2.88)	-1.03*** (0.37)	-0.78** (0.38)
Before reform 2004	19.69*** (3.23)	2.24*** (0.30)	1.94*** (0.29)	0.67*** (0.16)	19.02*** (3.21)	1.57*** (0.31)	1.27*** (0.31)
After reform 2004	10.41*** (3.31)	1.07*** (0.36)	0.93*** (0.35)	0.32*** (0.04)	10.09*** (3.28)	0.75** (0.33)	0.61** (0.31)
Δ between after and before reform 2004	-9.28** (3.81)	-1.16*** (0.43)	-1.01*** (0.36)	-0.35* (0.19)	-8.93** (3.64)	-0.81*** (0.26)	-0.66*** (0.19)
Difference in differences					-1.77 (3.19)	-0.22 (0.38)	-0.11 (0.37)
Relative difference in differences					-17.00	-20.37	-11.83

Notes: The upper panel shows the expected probabilities for the treatment groups (B1, A1, A2) and for the control group (AC) of a person with average characteristics before and after the reform rounded to two digits after the decimal point. Moreover, it depicts the differences in the expected probabilities and the difference in these differences, i.e. the cross differences. The next part of the table shows how the counter-factual cross differences are obtained using the expected probabilities for the post-reform period, which result when the reform's effects are restricted to zero. The lower panel reports the ATT, i.e. the differences in these cross differences. The relative differences in differences are computed, respectively, as the fraction of the treatment effect and the expected probability in the post-policy period subtracted by the treatment effect. The same calculation, based on the averages of the respective probabilities among actual persons in the data instead of the expected probabilities of a person with average characteristics, yields similar results and is available upon request

Cluster (occupation) robust standard errors calculated by the delta method are in parentheses

Asterisks (*/**/***) denote significance at the 10%/5%/1% level

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Probabilities of being self-employed (in %): Difference in differences

	B1	A1	A2	AC	$\Delta B1$	$\Delta A1$	$\Delta A2$
Before reform 2004	1.04*** (0.07)	14.21*** (0.71)	15.44*** (0.93)	22.62*** (1.99)	-21.58*** (1.98)	-8.41*** (1.59)	-7.18*** (1.47)
After reform 2004	1.40*** (0.06)	16.40*** (0.70)	16.88*** (0.95)	21.73*** (1.99)	-20.33*** (1.98)	-5.34*** (1.43)	-4.85*** (1.41)
Δ between after and before reform 2004	0.36*** (0.09)	2.19*** (0.76)	1.44 (1.22)	-0.89 (1.47)	1.25 (1.46)	3.08* (1.48)	2.33 (1.69)
Before reform 2004	1.04*** (0.07)	14.21*** (0.71)	15.44*** (0.93)	22.62*** (1.99)	-21.58*** (1.98)	-8.41*** (1.59)	-7.18*** (1.47)
After reform 2004	0.99*** (0.10)	13.59*** (1.15)	14.78*** (1.35)	21.73*** (1.99)	-20.74*** (1.95)	-8.14*** (1.44)	-6.95*** (1.32)
Δ between after and before reform 2004	-0.05 (0.08)	-0.62 (1.00)	-0.66 (1.07)	-0.89 (1.47)	0.84 (1.38)	0.27 (0.46)	0.23 (0.39)
Difference in differences					0.41*** (0.11)	2.80*** (1.08)	2.10 (1.42)
Relative difference in differences					41.41	20.59	14.21

Notes: The upper panel shows the expected probabilities for the treatment groups (B1, A1, A2) and for the control group (AC) of a person with average characteristics before and after the reform rounded to two digits after the decimal point. Moreover, it depicts the differences in the expected probabilities and the difference in these differences, i.e. the cross differences. The next part of the table shows how the counter-factual cross differences are obtained using the expected probabilities for the post-reform period, which result when the reform's effects are restricted to zero. The lower panel reports the ATT, i.e. the differences in these cross differences. The relative differences in differences are computed, respectively, as the fraction of the treatment effect and the expected probability in the post-policy period subtracted by the treatment effect. The same calculation, based on the averages of the respective probabilities among actual persons in the data instead of the expected probabilities of a person with average characteristics, yields similar results and is available upon request

Cluster (occupation) robust standard errors calculated by the delta method are in parentheses

Asterisks (*/**/****) denote significance at the 10%/5%/1% level

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Treatment effects on entry into self-employment and on the share of self-employed for subgroups (in %): Difference in differences

Sample	German	Unsubsidized	Female	Male	No qualification	Geselle	Meister
Treatment effects on entry into self-employment							
DID _{B1}	0.13*** (0.03)	0.13*** (0.03)	-0.01 (0.06)	0.36*** (0.12)	0.23*** (0.06)	0.16*** (0.05)	0.07 (0.46)
Relative DID _{B1}	57.90	68.18	-8.16	55.92	806.97	78.09	4.61
DID _{A1}	0.57** (0.26)	0.64*** (0.21)	-1.34 (1.08)	0.62*** (0.20)	1.43* (0.79)	0.81*** (0.21)	-2.33 (1.51)
Relative DID _{A1}	32.25	43.27	-52.10	57.46	354.18	93.87	-30.87
DID _{A2}	0.66** (0.33)	0.60** (0.25)	0.00 (0.01)	0.57** (0.26)	6.40*** (2.44)	0.89*** (0.33)	-1.87 (1.49)
Relative DID _{A2}	30.01	32.38	0.00	39.23	573.94	71.37	-26.56
Treatment effects on the share of self-employed							
DID _{B1}	0.34*** (0.10)	0.34*** (0.10)	0.56*** (0.16)	0.51** (0.24)	0.50*** (0.12)	0.32 (0.20)	0.88 (0.55)
Relative DID _{B1}	35.70	37.71	114.38	24.59	77.55	29.79	18.39
DID _{A1}	2.64** (1.05)	2.48** (1.14)	7.33** (3.55)	1.63** (0.65)	2.29 (1.77)	2.20** (1.12)	2.61 (2.33)
Relative DID _{A1}	18.71	19.55	53.66	13.84	29.52	28.20	4.49
DID _{A2}	1.73 (1.37)	1.82 (1.41)	11.33 (9.42)	0.87 (0.86)	3.22 (2.58)	1.86 (1.37)	3.05 (2.62)
Relative DID _{A2}	11.58	13.87	44.43	7.00	32.22	21.14	6.04

Notes: The treatment effects are based on the expected probabilities for a person with average characteristics. The relative differences in differences are computed as the fraction of the treatment effect and the expected probability in the post-policy period, subtracted by the treatment effect, respectively

Cluster (occupation) robust standard errors calculated by the delta method are in parentheses

Asterisks (* / ** / ***) denote that a difference in differences is significantly different from zero at the 10%/5%/1% level

Table: Timing sensitivity: Logit estimation results of self-employment state probability

	Self-employed: Timing (2001-2009)	Self-employed: Timing 2004 dropped (2002-2009)	Self-employed: Timing 2004 as post (2002-2009)	Self-employed: Placebo reform in 2002 (2001-2004)	Self-employed: Placebo reform in 2002 (2002-2004)	Self-employed: Placebo reform in 2003 (2002-2004)
	I	II	III	IV	V	VI
dB1×dPost	0.4505*** (0.1029)	0.3853*** (0.1055)	0.3173*** (0.0839)	0.2432* (0.1427)	0.0829 (0.1373)	0.1087 (0.1163)
dA1×dPost	0.3183*** (0.0895)	0.2533*** (0.0850)	0.2295*** (0.0667)	0.2878** (0.1401)	0.1433 (0.1309)	0.1133 (0.0938)
dA2×dPost	0.2139** (0.1079)	0.1818* (0.1105)	0.1476* (0.0879)	0.2032 (0.1414)	0.1370 (0.1397)	0.0788 (0.0924)
dEU×dPost	0.6124** (0.2497)	0.6695*** (0.2529)	0.5106** (0.2485)	0.2622 (0.1617)	0.3116* (0.1813)	0.2640 (0.1900)
dB1	-1.0689*** (0.2088)	-1.0644*** (0.2093)	-0.9379*** (0.2159)	-1.1287*** (0.2103)	-1.0182*** (0.2296)	-1.0017*** (0.2265)
dA1	1.7002*** (0.2000)	1.6872*** (0.2046)	1.7793*** (0.2013)	1.6867*** (0.2032)	1.7667*** (0.2283)	1.8234*** (0.2108)
dA2	-0.5579*** (0.0709)	-0.5403*** (0.0841)	-0.4517*** (0.0665)	-0.6524*** (0.0891)	-0.4838*** (0.1110)	-0.4168*** (0.0645)
dPost	-0.0953 (0.0778)	-0.0996 (0.0730)	-0.1750*** (0.0593)	-0.1052 (0.1364)	-0.0492 (0.1261)	-0.0258 (0.0898)
dEU	0.4142*** (0.1370)	0.3323*** (0.1216)	0.5428*** (0.1302)	0.3276** (0.1317)	0.2344 (0.1482)	0.3574*** (0.1243)
Constant	-4.5595*** (0.4784)	-4.4227*** (0.4945)	-4.4666*** (0.4845)	-4.8397*** (0.4515)	-4.8152*** (0.4603)	-4.8564*** (0.4536)
Year dummies	✓	✓	✓	✓	✓	✓
Occ. dummies	✓	✓	✓	✓	✓	✓
Branch dummies	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Log likelihood	-60,898.75	-47,945.16	-54,411.65	-25,907.46	-19,434.86	-19,435.57
Pseudo-R ²	0.30	0.30	0.30	0.32	0.31	0.31
Observations	223,241	172,664	196,669	101,709	75,137	75,137

Notes: Robust standard errors clustered by occupation are given in parentheses below logit coefficients. Controls included are age, gender, education, experience, occupation, occupation square, and dummy variables indicating gender, type of secondary schooling and professional qualification, nationality, region of residence, size of the respondent's residence city, marital status, the number of children, citizenship of foreigners in a member state of the European Union, and its interaction with the post-policy period. Moreover, year dummies and indicators for the branch of craftsmanship, for the occupation, and a constant are included

Significance of the logit coefficients is indicated at the 10%/5%/1% level by asterisks (*/**/***)

Table: Robustness: Logit estimation results of self-employment state probabilities

	Self-employed: B1	Self-employed: A1	Self-employed: A2
$dO \times d2003$	-0.0010 (0.1596)	0.0875 (0.1567)	0.0747 (0.1773)
$dO \times d2004$	0.2407 (0.1664)	0.1582 (0.1746)	0.1383 (0.1942)
$dO \times d2005$	0.4233*** (0.1608)	0.2287 (0.1626)	0.1826 (0.1912)
$dO \times d2006$	0.4283** (0.1824)	0.2445 (0.1762)	0.1815 (0.1968)
$dO \times d2007$	0.4755*** (0.1356)	0.3556*** (0.1324)	0.2027 (0.1667)
$dO \times d2008$	0.4566*** (0.1638)	0.3337** (0.1401)	0.1501 (0.1960)
$dO \times d2009$	0.5520*** (0.1957)	0.4807*** (0.1541)	0.3297* (0.1781)

Notes: Robust standard errors, clustered by occupation, are given in parentheses below logit coefficients. Controls included are age and its square, and dummy variables indicating gender, type of secondary schooling and professional qualification, nationality, region of residence, the size of the respondent's city of residence, marital status, the number of dependent children, citizenship of foreigners in an EU member state and its interaction with the post-policy period. Moreover, year dummies and indicators for the branch of craftsmanship, for the occupation, and a constant are included. The log-likelihood value is -54,322.07, the pseudo- R^2 0.3, and the number of observations 196,669

Significance of the logit coefficients is indicated at the 10%/5%/1% level by asterisks (*/**/***)

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Table: Self-employment rates in treatment groups and control group by year. Percentage share of self-employed among B1, A1, A2, and AC occupations and percentage share of self-employed among working persons (WP)

	B1	A1	A2	AC	WP
2002	7.88	15.20	12.41	19.26	11.17
2003	7.54	15.80	12.92	19.68	11.56
2004	8.20	16.98	13.38	20.91	12.00
2005	9.32	17.22	13.96	20.81	12.44
2006	9.48	17.39	14.20	18.49	12.27
2007	9.73	17.76	13.83	20.46	12.11
2008	9.78	17.24	13.69	19.30	11.95
2009	9.87	18.66	14.51	18.13	12.13

Source: Own calculations based on the scientific use file of the German microcensus (2002-2009)

Conclusions

- ▶ **higher entry** probabilities result **from male craftsmen** in *B1-*, *A1-*, and *A2*-occupations
- ▶ **higher self-employment** probabilities **from male craftsmen** in *B1-*, and *A1*-occupations
- ▶ **higher entry** probabilities result **from less than Meister-qualified workers** in *B1-*, *A1-*, and *A2*-occupations
- ▶ **higher self-employment** probabilities result **from less than Meister-qualified workers** in *B1-*, and *A1*-occupations
- ▶ if exits increased (there is no evidence), then not much
- ▶ reform effect still significant **after 5 years**

- Ardagna, S., and A. Lusardi (2009): "Where Does Regulation Hurt? Evidence from New Businesses Across Countries," NBER Working Paper 14747, National Bureau of Economic Research, Cambridge, MA.
- (2010): "Explaining International Differences in Entrepreneurship: The Role of Individual Characteristics and Regulatory Constraints," in *International Differences in Entrepreneurship*, ed. by J. Lerner, and A. Schoar, National Bureau of Economic Research Conference Report, pp. 17–62. University of Chicago Press, Chicago and London.
- Bruhn, M. (2011): "License to Sell: The Effect of Business Registration Reform on Entrepreneurial Activity in Mexico," *The Review of Economics and Statistics*, 93(1), 382–386.
- Ciccone, A., and E. Papaioannou (2007): "Red Tape and Delayed Entry," *Journal of the European Economic Association*, 5(2-3), 444–458.
- Djankov, S., R. La Porta, F. Lopez-De-Silanes, and A. Shleifer (2002): "The Regulation of Entry," *Quarterly Journal of Economics*, 117(1), 1–37.
- Klapper, L., L. Laeven, and R. Rajan (2006): "Entry Regulation as a Barrier to Entrepreneurship," *Journal of Financial Economics*, 82(3), 591–629.
- Müller, K. (2006): *Erste Auswirkungen der Novellierung der Handwerksordnung von 2004*, vol. 74 of *Göttinger handwerkswirtschaftliche Studien*. Mecke Druck und Verlag, Duderstadt.
- Prantl, S., and A. Spitz-Oener (2009): "How Does Entry Regulation Influence Entry into Self-Employment and Occupational Mobility?," *The Economics of Transition*, 17(4), 769–802.
- van Stel, A., D. Storey, and A. Thurik (2007): "The Effect of Business Regulations on Nascent and Young Business Entrepreneurship," *Small Business Economics*, 28(2), 171–186.