

# Does Regulation Trade-Off Quality against Inequality? The Case of German Architects and Construction Engineers

## Online Appendix

October 3, 2018

### A Background Information

#### Fee Scale for Architects and Construction Engineers

The German Fee Structure for Architects and Engineers (“Verordnung über die Honorare für Leistungen der Architekten und der Ingenieure”, HOAI) is a federal ordinance to regulate the remuneration of services rendered by architects and engineers operating in the construction sector. Based on the Law on the Regulation of Services of Engineers and Architects (Gesetz zur Regelung von Ingenieur- und Architektenleistungen), it is considered a binding price law for all planning and monitoring services offered by architects and engineers and has its early roots in 1871 when the first private fee structure for architects emerged. Before 1977, there were two separate regulations, one for architects, and one for engineers. The HOAI as known today came into force in 1977.

There are several justifications for the HOAI: protection against undertreatment or overcharging in the product and service market, rental price control in the housing market, providing a minimum income for businesses, and internalization of external

effects that are in the public interest. While the first draft of the HOAI only had stipulated price ceilings in order to provide incentives for reducing costs of buildings and thus prevent rental prices to increase, price floors were added to prevent reduction of quantity or quality of services. However, the German Monopolies Commission (2006) emphasizes that the introduction of price floors was rather a response to wishes of the professional association than to actual problems with quality of services. Since a large share of architects are self-employed and provide often services without receiving adequate remuneration due to asymmetric information, the price floors provide a minimum income. Finally, the price floors aim to internalise aesthetic and safety concerns that are in the interest of the public.

The obligatory applicability to set prices according to HOAI applies to all provided services which are explicitly listed in the HOAI, some of which require specific occupational licenses (e.g., having obtained the right to carry the title architect or engineer and having a record in professional registers). These broadly include all necessary services pertaining area planning (landscape, land use), project planning (building and interiors, open air facilities, civil engineering structures, traffic installations) and specialist planning (structural planning, technical equipment). This means that for each service within the work contract between client and architect it has to be checked whether it is subject to the HOAI. All service profiles (e.g., service profile “Building and Interiors”) are further subdivided into up to nine service phases, which follow the object-specific planning process (see Table A.1 for an example of the service profile “Building and Interiors”). Each service phase is valued as a fixed percentage of the total fee. Reference for the determination of the total fee, for which the above mentioned price floors and ceilings apply, are either surface units (for area planning) or chargeable costs (for project and specialist planning, calculation is based on DIN 276-1:2008-12.). An example for the fee scale of the service profile “Building and Interiors” is given in Table A.2. As becomes apparent from the fee structure, the scope for price competition is very limited and restricted to the prices within the fee bands.

**Table A.1:** Service phases for the service profile “Buildings and Interior” (§34, HOAI 2013)

Phase	Service	in % of total fee
1	Basic evaluation	2
2	Preliminary planning	7
3	Draft planning	15
4	Approval planning	3 (buildings), 2 (interior)
5	Execution planning	25 (buildings), 30 (interior)
6	Award preparation	10 (buildings), 7 (interior)
7	Assisting with the awarding process	4 (buildings), 3 (interior)
8	Project monitoring, construction supervision and documentation	32
9	Project supervision	2 (buildings), 2 (interior)

*Notes:* This table lists the nine service phases for the service profile “Buildings and Interior”. The last column reports the relative share of the total fee for each phase.

**Table A.2:** Fee structure for “Buildings and Interior” (HOAI 2013 §35, in €)

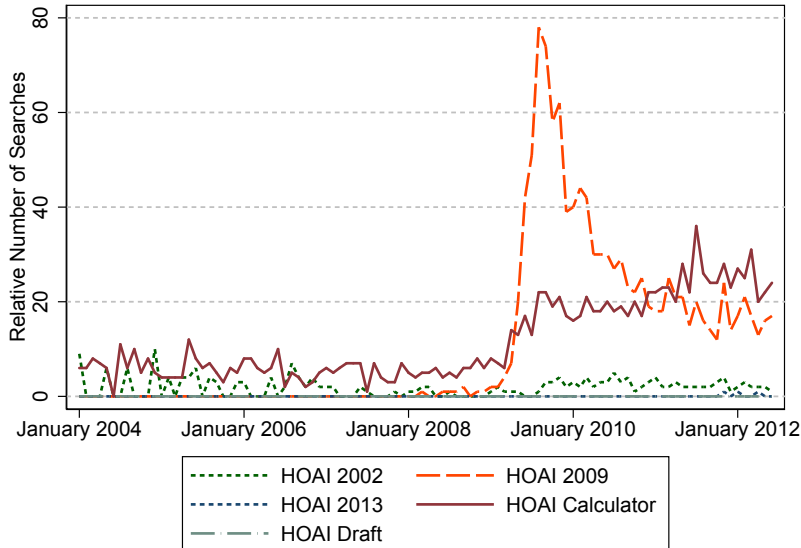
Chargeable costs	Fee band I		Fee band II		Fee band III		Fee band IV		Fee band V	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
25,000	3,120	3,657	3,657	4,339	4,339	5,412	5,412	6,094	6,094	6,631
35,000	4,217	4,942	4,942	5,865	5,865	7,315	7,315	8,237	8,237	8,962
50,000	5,804	6,801	6,801	8,071	8,071	10,066	10,066	11,336	11,336	12,333
70,000	8,342	9,776	9,776	11,601	11,601	14,469	14,469	16,293	16,293	17,727
100,000	10,790	12,644	12,644	15,005	15,005	18,713	18,713	21,074	21,074	22,928
150,000	15,500	18,164	18,164	21,555	21,555	26,883	26,883	30,274	30,274	32,938
200,000	20,037	23,480	23,480	27,863	27,863	34,751	34,751	39,134	39,134	42,578
300,000	28,750	33,692	33,692	39,981	39,981	49,864	49,864	56,153	56,153	61,095
500,000	45,232	53,006	53,006	62,900	62,900	78,449	78,449	88,343	88,343	96,118
750,000	64,666	75,781	75,781	89,927	89,927	112,156	112,156	126,301	126,301	137,416
1,000,000	83,182	97,479	97,479	115,675	115,675	144,268	144,268	162,464	162,464	176,761
1,500,000	119,307	139,813	139,813	165,911	165,911	206,923	206,923	233,022	233,022	253,527
2,000,000	153,965	180,428	180,428	214,108	214,108	267,034	267,034	300,714	300,714	327,177
3,000,000	220,161	258,002	258,002	306,162	306,162	381,843	381,843	430,003	430,003	467,843
5,000,000	343,879	402,984	402,984	478,207	478,207	596,416	596,416	671,640	671,640	730,744
7,500,000	493,923	578,816	578,816	686,862	686,862	856,648	856,648	964,694	964,694	1,049,587
10,000,000	638,277	747,981	747,981	887,604	887,604	1,107,012	1,107,012	1,246,635	1,246,635	1,365,339
15,000,000	915,129	1,072,416	1,072,416	1,272,601	1,272,601	1,587,176	1,587,176	1,787,360	1,787,360	1,944,648
20,000,000	1,180,414	1,383,298	1,383,298	1,641,513	1,641,513	2,047,281	2,047,281	2,305,496	2,305,496	2,508,380
25,000,000	1,436,874	1,683,837	1,683,837	1,998,153	1,998,153	2,492,079	2,492,079	2,806,395	2,806,395	3,053,358

*Notes:* This table presents the price structure for the first price levels for the service profile “Buildings and Interior”. For each cost level, there exist 5 different fee bands which apply depending on the complexity of the service provided.

## 2009 Reform of the HOAI

Since 1977, the HOAI has been reformed for several times with the last major revisions in 1996, 2009 and 2013. Declared aims of the reform in August 2009 were not only to adjust prices due to inflation but also to simplify and slightly liberalize the existing regulation scheme. Most importantly, the reform in 2009 led to a linear increase in all price floors and ceilings. The price increase in 2009 amounted to 10 percent for most services. This increase in prices is depicted in Figure 2 of the paper, which shows the percentage change in the consumer price index from 2007 to 2016. As apparent from the figure, the binding price increase resulting from the HOAI reform immediately translated into practice. The producer price index sharply increased in the third quarter of 2009 when the HOAI 2009 came into place. It is important to note that both price floors and ceilings (as shown in Table A.2) went up by around 10%. A major concern regarding the identification strategy in the paper might be that the HOAI reform was already planned and announced much earlier such that we might have an “Ashenfelters’ Dip” in our analysis. While the reform had been initiated already in 1995, even 10 years later when the grand coalition came into power in 2005, it was unclear whether the price regulation would be abolished altogether (see Jochem and Kaufhold 2016). A final draft of the reform had been proposed only in the End of April 2009 (see Bundesrat Drucksache 395/09) before the amendment to the HOAI was announced in June 2009 to be effective as of August 2009. We also checked the number of searches per month within that time period for the following keywords: HOAI 2009, HOAI 2012, HOAI 2013, HOAI Calculator and HOAI draft. The time series are shown in Figure A.1. There is a clear jump in the number of searches right before the HOAI come into place. This is, at least, some evidence that big media push or consumer interest has not occurred before the enforcement of the HOAI.

**Figure A.1:** Number of Google Searches for HOAI Keywords



Notes: This figure shows the number of Google searches for the following five keywords: HOAI 2009, HOAI 2012, HOAI 2013, HOAI Calculator and HOAI draft for the years 2004 to 2012.

### BauNetz Media GmbH Office Ranking

BauNetz is the largest online magazine in Germany which publishes the most important news within the architectural world on a daily basis. The importance of this platform is also mirrored by over 11 million clicks per month on their website. On this website, the BauNetz Media GmbH also publishes every second month their office ranking (available from 2006 onwards). In essence, they rank architectural offices using a simple scoring model which uses the number, length and level of detail of publications made within the previous 24 months in professional journals. These journals include two German (Bauwelt, Detail) and six international professional journals (Architectural Review, a+u, architektur aktuell, Werk Bauen und Wohnen, domus). For even more details on the journals, see

<https://www.baunetz.de/ranking/?area=info&type=verfahren&lang=en>.

In particular, the professional contributions are evaluated based on registration of the illustrated editorial contributions and documentations on architectural and urbanistic works of the last 10 years. Moreover, among others, information on object description, object location and office location is taken into account. The number of pages of a report is converted into a score according to the following rule:

**Table A.3:** Conversion Table BauNetz Media GmbH

Kind of report	Pages	Conversion into points
Illustrated note	1 page	= 1 point
Short presentation	2 pages	= 2 points
Small report	3-4 pages	= 3 points
Report	5-7 pages	= 4 points
Large report	8 pages or more	= 5 points

*Source:* <https://www.baunetz.de/ranking/?area=info&type=verfahren>

The final score is the weighted sum of points, where the multiplication factor depends on the information density of the respective journal (see Table A.4). In a last step, all points are summed together to get the final score per office that we use in our SCM analysis (after aggregating the data on the country-level).

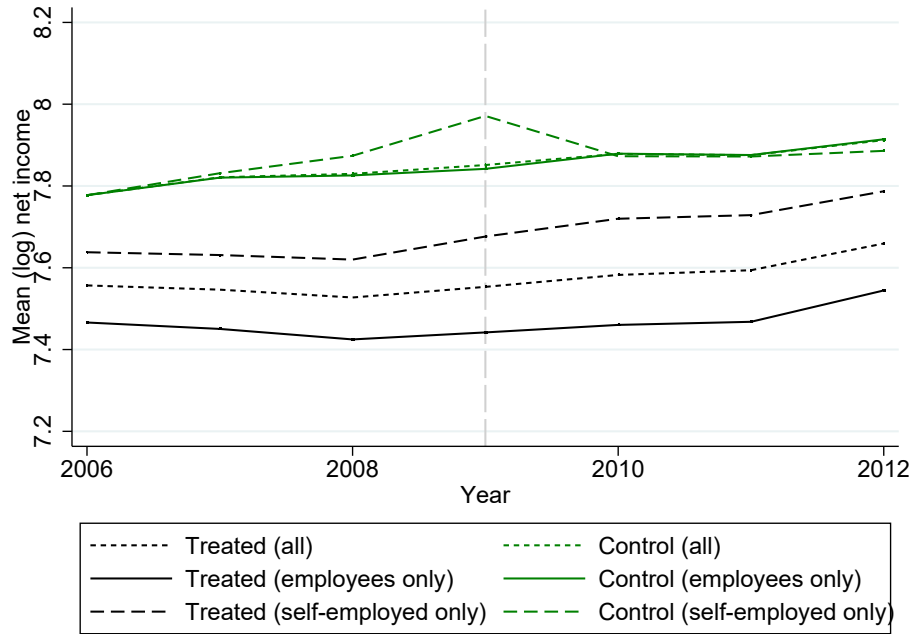
**Table A.4:** Multiplication Factors Architectural Journals

Journals	Factor
Wettbewerbe Aktuell	Factor 1
Bauwelt, Baumeister, DBZ, db, Detail	Factor 2
Architectural Review, a+u, domus, Werk Bauen und Wohnen, architektur.aktuell	Factor 3

*Source:* <https://www.baunetz.de/ranking/?area=info&type=verfahren>

## B Additional Figures and Tables

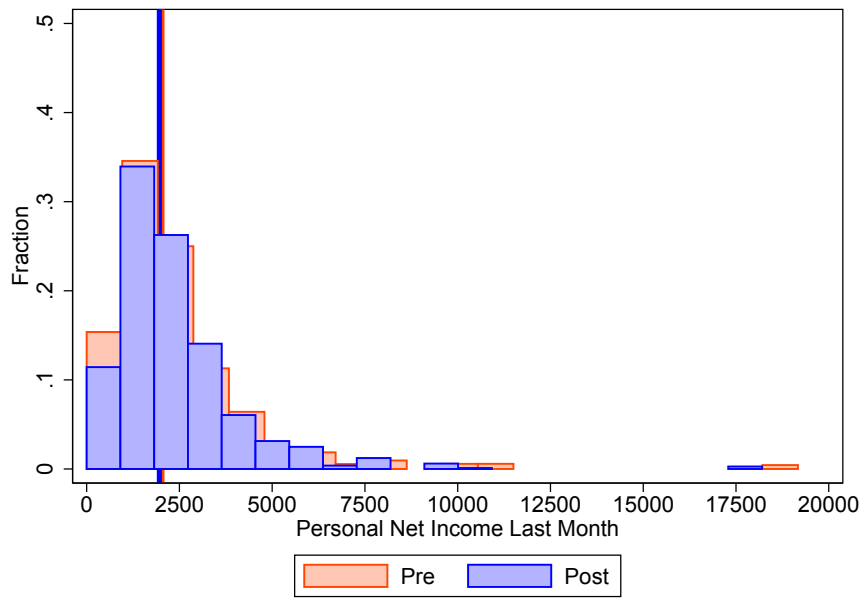
Figure B.1: Average Income by Year and Treatment Status



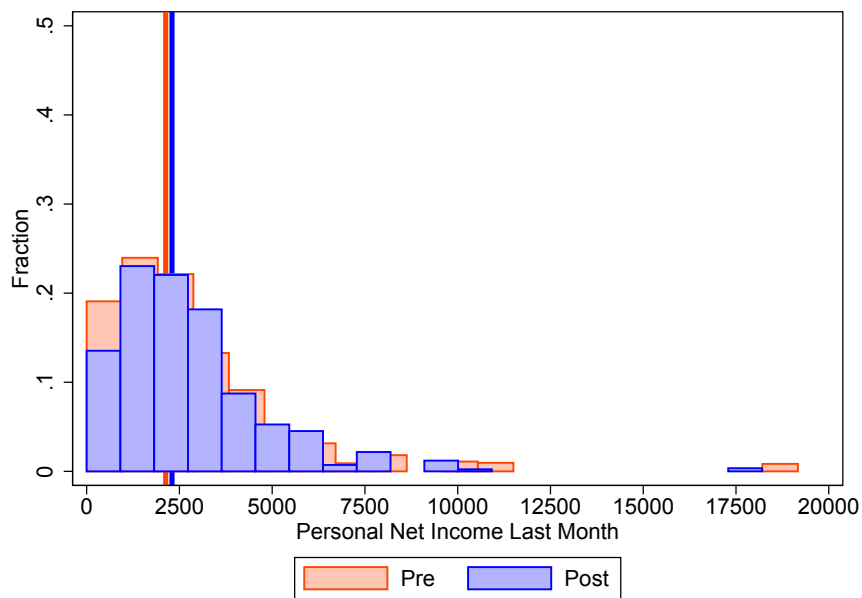
Notes: This figure plots the (log) average net income separately for the treatment (in black) and the control group (in green). The dotted line shows the time series for all individuals, while the solid line and the dashed line plot the averages for employees and self-employed.



**Figure B.2:** Income Distribution 2006-2009 and 2010-2012 for Architects and Construction Engineers



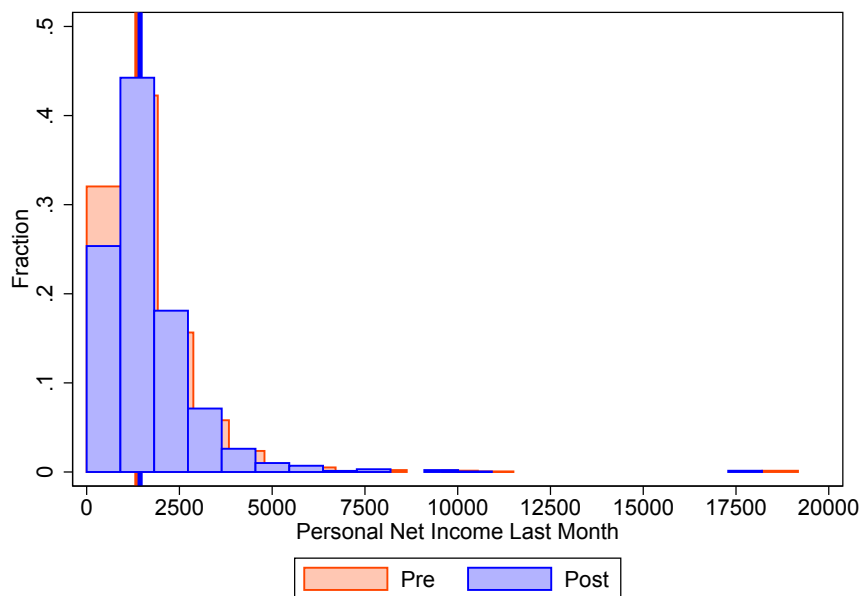
(a) Employees



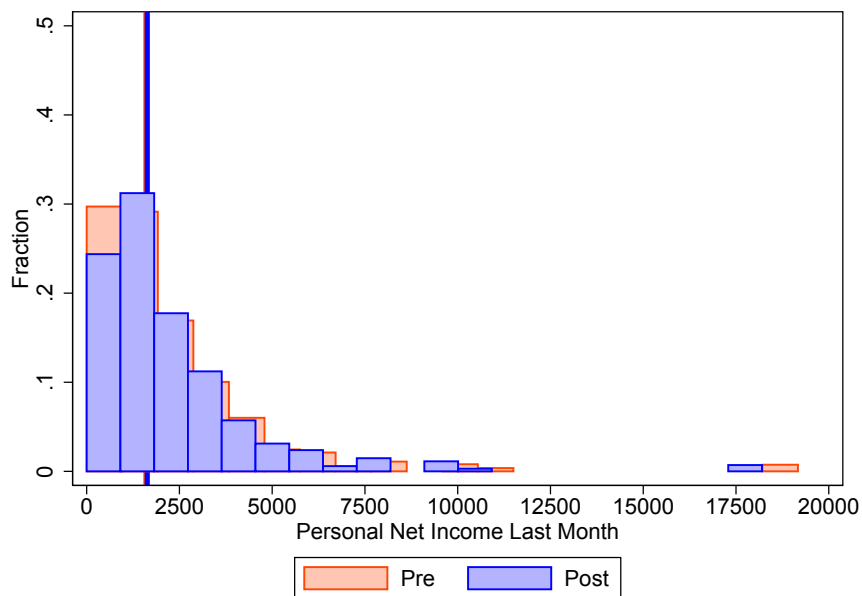
(b) Self-Employed

*Source:* Own depiction based on the scientific use file of the German microcensus (2006-2012).

**Figure B.3:** Income Distribution 2006-2009 and 2010-2012 for Working Population Except Architects and Construction Engineers



(a) Employees



(b) Self-Employed

*Source:* Own depiction based on the scientific use file of the German microcensus (2006-2012).

**Table B.1:** Effects of Regulation on Income (without 2009)

Sample	I	II	III	IV
	Self-Employed	Self-Employed	Employees	All
Treated × Post	0.081 (0.051)	0.068 (0.047)	0.002 (0.022)	0.009 (0.021)
Treated	-0.202*** (0.037)	-0.134*** (0.034)	-0.214*** (0.017)	-0.173*** (0.016)
Post	0.037 (0.036)	0.061 (0.054)	0.081*** (0.010)	0.063*** (0.009)
Year Indicators		✓	✓	✓
State Indicators		✓	✓	✓
Other Controls		✓	✓	✓
Observations	3532	3532	25110	28642

*Estimation Equation:* DD estimated using OLS.

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.2:** Effects on Other Labor Market Outcomes (without 2009)

Dep. Variable	I	II	III	IV	V
	Hours Worked	Self-Employed	Firmsize	Cont. Educ (y/n)	Cont. Educ (h)
Treated × Post	-0.811** (0.380)	-0.042** (0.017)	0.204 (0.544)	0.003 (0.017)	-6.040** (2.546)
Treated	4.237*** (0.281)	0.470*** (0.012)	-9.394*** (0.396)	0.002 (0.012)	0.629 (2.135)
Post	-0.125 (0.180)	-0.000 (0.006)	0.174 (0.428)	0.010 (0.011)	2.569 (1.835)
Year Indicators	✓	✓	✓	✓	✓
State Indicators	✓	✓	✓	✓	✓
Other Controls	✓	✓	✓	✓	✓
Observations	30,118	30,136	26,213	30,134	30,003

*Estimation:* Results from DD models estimated with OLS.

*Sample:* Architects, construction engineers and unregulated engineers.

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, hours worked, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.3:** Trimming the youngest workers (younger than 30): Effects on Income

Sample	I	II	III	IV
	Self-Employed	Self-Employed	Employees	All
Treated × Post	0.090* (0.048)	0.077* (0.044)	0.011 (0.022)	0.016 (0.020)
Treated	-0.218*** (0.032)	-0.149*** (0.030)	-0.233*** (0.016)	-0.186*** (0.014)
Post	0.013 (0.033)	0.062 (0.052)	0.088*** (0.010)	0.053*** (0.009)
Year Indicators		✓	✓	✓
State Indicators		✓	✓	✓
Other Controls		✓	✓	✓
Observations	4017	4017	26582	30599

*Estimation Equation:* DD estimated using OLS.

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.4:** Trimming the youngest workers (younger than 30): Effects on Other Labour Market Outcomes

Dep. Variable	I	II	III	IV	V
	Hours Worked	Self-Employed	Firmsize	Cont. Educ (y/n)	Cont. Educ (h)
Treated × Post	-0.666* (0.385)	-0.035** (0.016)	0.206 (0.498)	0.002 (0.016)	-3.620 (2.249)
Treated	3.423*** (0.261)	0.493*** (0.011)	-9.331*** (0.334)	-0.004 (0.011)	-0.839 (1.667)
Post	0.468*** (0.172)	0.003 (0.007)	0.433 (0.413)	0.007 (0.011)	-0.468 (1.337)
Year Indicators	✓	✓	✓	✓	✓
State Indicators	✓	✓	✓	✓	✓
Other Controls	✓	✓	✓	✓	✓
Observations	32,250	32,271	30,618	32,268	32,139

*Estimation:* Results from DD models estimated with OLS.

*Sample:* Architects, construction engineers and unregulated engineers.

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, hours worked, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.5:** Effect Heterogeneity among the Treated Professions: Effects on Income

Sample	I	II	III	IV
	Self-Employed	Self-Employed	Employees	All
Architect $\times$ Post	0.149* (0.079)	0.116 (0.076)	-0.074*** (0.029)	-0.029 (0.028)
Construction Engineer $\times$ Post	0.235* (0.132)	0.148 (0.121)	-0.002 (0.042)	0.023 (0.046)
Architect	-0.204*** (0.052)	-0.145*** (0.053)	-0.199*** (0.022)	-0.184*** (0.021)
Construction Engineer	-0.119 (0.081)	-0.062 (0.081)	-0.149*** (0.025)	-0.119*** (0.029)
Post	-0.004 (0.060)	-0.014 (0.096)	0.077*** (0.015)	0.093*** (0.016)
Year Indicators		✓	✓	✓
State Indicators		✓	✓	✓
Other Controls		✓	✓	✓
Observations	1289	1289	10045	11334

*Estimation:* Results from DD models estimated with OLS.

*Sample:* Architects, construction engineers and unregulated engineers.

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, hours worked, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.6:** Effect Heterogeneity among the Treated Professions: Effects on Other Labour Market Outcomes

Dep. Variable	I	II	III	IV	V
	Hours Worked	Self-Employed	Firmsize	Cont. Educ (y/n)	Cont. Educ (h)
Architect $\times$ Post	-0.729 (0.579)	-0.046* (0.025)	-0.039 (0.717)	0.017 (0.026)	-6.267 (7.255)
Construction Engineer $\times$ Post	-0.272 (0.882)	-0.028 (0.041)	2.415** (1.108)	0.011 (0.044)	-9.741* (5.638)
Architect	3.136*** (0.400)	0.448*** (0.018)	-9.378*** (0.512)	-0.067*** (0.018)	1.294 (4.853)
Construction Engineer	2.510*** (0.615)	0.270*** (0.028)	-9.243*** (0.700)	-0.017 (0.030)	-0.746 (4.858)
Post	0.254 (0.266)	-0.003 (0.010)	-0.437 (0.581)	-0.004 (0.016)	-0.038 (2.635)
Year Indicators	✓	✓	✓	✓	✓
State Indicators	✓	✓	✓	✓	✓
Other Controls	✓	✓	✓	✓	✓
Observations	13,746	13,750	12,103	13,745	13,667

*Estimation:* Results from DD models estimated with OLS.

*Sample:* Architects, construction engineers and unregulated engineers.

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, hours worked, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.7:** Different Control Occupations: Effects on Income

Sample	I	II	III	IV
	Self-Employed	Self-Employed	Employees	All
<i>Panel A: Tax consultants (share self-employed: 51.25%)</i>				
Treated × Post	0.028 (0.050)	0.044 (0.046)	0.021 (0.034)	0.037 (0.029)
Treated	-0.490*** (0.033)	-0.535*** (0.033)	-0.323*** (0.025)	-0.415*** (0.021)
Post	0.077** (0.036)	0.018 (0.053)	0.088** (0.043)	0.051 (0.035)
Observations	3551	3551	3556	7107
<i>Panel B: Lawyers and Notaries (share self-employed: 44.17%)</i>				
Treated × Post	-0.007 (0.046)	0.008 (0.041)	-0.027 (0.027)	-0.012 (0.024)
Treated	-0.242*** (0.032)	-0.184*** (0.032)	-0.106*** (0.020)	-0.127*** (0.018)
Post	0.111*** (0.031)	0.095** (0.041)	0.123*** (0.030)	0.139*** (0.026)
Observations	4835	4835	5869	10704
Year Indicators		✓	✓	✓
State Indicators		✓	✓	✓
Other Controls		✓	✓	✓

*Estimation:* Results from DD models estimated with OLS.

*Sample:* Architects and construction engineers, tax consultants (in Panel A) or Lawyers and Notaries (Panel B)

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, hours worked, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).

**Table B.8:** Different Control Occupations: Effects on Other Labor Market Outcomes

Dep. Variable	I	II	III	IV	V
	Hours Worked	Self-Employed	Firmsize	Cont. Educ (y/n)	Cont. Educ (h)
<i>Panel A: Tax consultants (share self-employed: 51.25%)</i>					
Treated × Post	0.047 (0.538)	0.002 (0.022)	-0.326 (0.602)	-0.038* (0.022)	-7.210* (3.910)
Treated	-1.901*** (0.386)	0.087*** (0.016)	-4.036*** (0.430)	-0.215*** (0.016)	-24.861*** (2.594)
Post	-0.283 (0.586)	-0.043* (0.024)	0.847 (0.662)	0.049* (0.026)	3.051 (4.809)
Observations	7,632	7,643	3,699	7,642	7,604
<i>Panel B: Lawyers and Notaries (share self-employed: 44.17%)</i>					
Treated × Post	0.050 (0.444)	-0.049*** (0.018)	0.891* (0.525)	-0.001 (0.019)	0.369 (2.732)
Treated	0.372 (0.314)	0.184*** (0.013)	-5.742*** (0.355)	-0.093*** (0.013)	-8.859*** (2.194)
Post	-0.966** (0.420)	-0.001 (0.018)	-0.777 (0.564)	-0.022 (0.019)	-6.875** (2.862)
Observations	11,426	11,446	6,104	11,440	11,385
Year Indicators	✓	✓	✓	✓	✓
State Indicators	✓	✓	✓	✓	✓
Other Controls	✓	✓	✓	✓	✓

*Estimation:* Results from DD models estimated with OLS.

*Sample:* Architects and construction engineers, tax consultants (in Panel A) or Lawyers and Notaries (Panel B)

*Control variables:* Indicators of year, federal state, nationality, children, gender, marital status, hours worked, educational and vocational qualification, tenure and its square.

*Inference:* Robust standard errors are in parentheses, significance levels are \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Source:* Own calculations based on the scientific use file of the German microcensus (2006-2012).