

# Training behavior in the Great recession

## Evidence from an individual perspective

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Establishment Panel  
Analyses**

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**1. Motivation**

**2. Theoretical framework**

**3. Data and sample characteristics**

**4. Econometric modeling**

**5. Results**



# 1. Motivation

- To maintain competitiveness and to avoid skilled labor shortages, establishments invest in the human capital of their employees by means of training (Bechmann et al., 2012)
- Market-driven system of training in Germany → training investments are mainly taken and funded by the establishments (Bender et al., 2008)
- In difficult and uncertain times, establishments may refrain their training decisions (Bellmann et al., 2014)
  - Training investments are cost intensive and the benefits are hardly tangible (Becker, 1962, Popov, 2014) → credit constraints may lead to reductions in training investments
  - Uncertain future employment needs and reduction in demand → less demand for trained employees

## Questions

- **Are establishments' training activities influenced by the current economic crisis?**
- **Is the establishments' reaction in training activities specific to certain employee groups?**

# 1. Motivation

## Empirical evidence

- Most studies are focused on apprenticeship training and indicate that establishments rather cut back their training investments in economically difficult times (Alskilden & Nielsen, 2005; Bilginsoy, 2003; Dietrich & Gerner, 2008; Muehlemann et al., 2009; Schweri & Mueller, 2008)
- In the context of training most studies are conducted in the investigation period before the great recession and lead to various results (Bassanini et al., 2007; Bassanini & Brunello, 2008; Majmudar, 2007; Sepulveda, 2004)

## Hardly empirical evidence with respect to the recent economic crisis

- No dramatic overall decline in training (Felstead, et al. 2011)
  - Some employers reduced their training activities to cope with the difficult economic circumstances and tried to find ways of “training smarter”
- Recession has contributed to reductions in adult training in the UK (Mason & Bishop, 2015)
  - Decline in off-the-job training; training was targeted at employees with skill improvement needs
- Establishments decreased their training efforts in 2009 compared to 2008 (Bellmann et al., 2014)
  - Establishments directly affected by the crisis reduce their training activities more often
  - The establishment panel is the basis for our study

# 1. Motivation

## Contributions of this paper

- First paper with focus on individual training information
  - Very detailed information on the individual training history (real participation)
  - Consideration of personality traits of the training participants
- Joint consideration of establishment and individual level data
  - We know whether each individual training has taken place in an establishment that was affected by the crisis or not
- Long observation period before, during and after the crisis (2006 – 2010)
- Measuring the causal effect of the crisis on training due to the Diff-in-Diff-approach
  - Control for unobserved heterogeneity and endogeneity



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## 2. Theoretical framework

### Ambiguity about the impact of the recession on training

- Higher training incidence in difficult times:
  - Underutilized capacities and low exit risk reduce opportunity costs of training (Bellmann et al., 2014; Brunello, 2009)
  - Labor hoarding in conjunction with training to secure the demand of qualified labor (Möller, 2010)
- However, in times of recession, establishments may refrain their training decisions (Bellmann et al., 2014)
  - Uncertainty with regard to realizing the returns of training → reduced training activities (Bogedan, 2009)
  - Establishments are affected by credit constraints → lower investments in human capital (Popov, 2014)
  - Possibilities to utilize the capabilities of the trained employees are restricted (Stevens, 1994)
  - Companies need less skilled employees → extent of training is reduced (Muehleman et al., 2009)

H1a

*When establishments are affected by recession, they reduce the training intensity of their employees.*

H1b

*When establishments are affected by recession, they reduce the number of training of their employees.*

## 2. Theoretical framework

### Impact of recession on training from an individual perspective

- The impact of recession on training depend on how the downturn affects the anticipated impact on productivity, post training wages and the labor mobility (Mason & Bishop, 2015)
  - Training is only cost-effective for establishments if the trained workers' marginal productivity exceeds the growth in those workers' wages ( $p > w$ ) (Barron, Berger & Black, 1997)
- Skill level of the employees as one of the key drivers of training provision – especially in recession
  - Higher ability lowers the costs of training (Barron et al., 1989; Blundell et al., 1999) → it is more profitable for an establishment to train high-educated workers (Bassanini & Ok, 2007)
  - Higher rates of return to training for qualified employees (Arulampalam & Booth, 2001; Kuckulenz & Zwick, 2004)
  - Low-educated workers are less willing to participate in training (Borghans et al., 2008; Fourage, Schils & de Grip, 2013)
  - Education and skill level help to withstand the economic crisis → exacerbate wage differentials existing before the crisis (Hochfellner et al., 2015)
  - Skilled employees are able to adapt more rapidly and efficiently to new tasks and are the main source of innovation (Blundell et al., 1999)



## 2. Theoretical framework

H2a

*When establishments are affected by recession, the negative reaction in the training intensity is stronger for unskilled employees.*

H2b

*When establishments are affected by recession, the negative reaction in the number of trainings is stronger for unskilled employees.*



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## 3. Data and sample characteristics

### WeLL-ADIAB

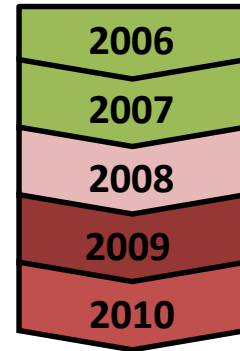
- German linked employer-employee panel data set with focus on training in four annual waves between 2007 and 2010 (Bender et al., 2008)
- Link with administrative labour market career and employer data provided by the Institute of Employment Research (IAB)



# 3. Data and sample characteristics

## Identification Strategies

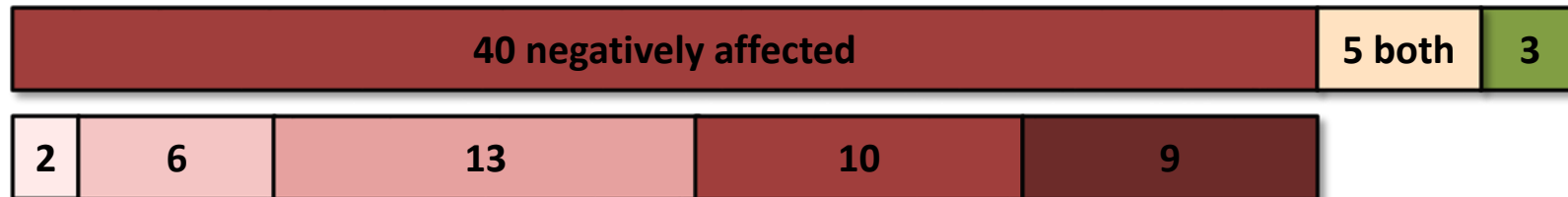
- Identification by means of time (Felstead, et al. 2011; Mason & Bishop, 2015)
  - However, time lag of human resource activities (training)
  - No classification in treatment- and control group
  
- Identification by means of the involvement of regional Landesbanks (Hochfellner, et al. 2015)
  - 84% consistency with self-assessment of establishments
  
- **Identification by means of self-assessment of establishments** (Bellmann, et al. 2015)
  - Information concerning the crisis (only available in the year 2010) are separated from individual training information for the period from 2006 to 2010
  - Effective strategy to overcome common method bias



# 3. Data and sample characteristics

## Identification Strategies

- 78 establishments with detailed information on economic crisis (only in 2010 available)
  - 48 establishments were affect by the economic crisis
  - 40 were affected negatively / 30 establishments were not affected



- Status in 2010:



### Employees in crisis and non-crisis establishments:



- **5,983** observations of **1,978** individuals
  - Only individuals employed in these 70 establishments
  - Full time employees in jobs covered by social security contributions
  - Employees affected by short-time work were eliminated

# 3. Data and sample characteristics

## Establishment characteristics

	<b>Crisis estabs</b>	<b>Non-crisis estabs</b>
<u>Establishment Size</u>		
< 199 employees	52.84%	37.50%
200 – 499 employees	30.68%	31.25%
500 – 1999 employees	16.48%	31.25%
<u>Sector</u>		
Manufacturing industry	68.72%	31,54%
Service industry	31.28%	68.46%
Located in West Germany	55.07%	60.40%
Collective branch agreement	48.85%	56.60%
Company agreement	17.24%	15.09%
Work council	81.25%	81.13%
Employee participation (different forms)	11.18%	11.64%
Founded before 1990	51.15%	78.75%
<b>Establishments</b>	<b>40</b>	<b>30</b>

### 3. Data and sample characteristics

#### Differences between employees in crisis and non-crisis establishments

<b>Sociodemographic Factors</b>	<b>Total</b>	<b>Crisis estabs</b>	<b>Non-crisis estabs</b>	<b>t-values</b>
Female	<b>31.15%</b>	21.46%	40.84%	18.96***
<u>Birth year</u>				
≤ 1951	<b>14.02%</b>	13.07%	14.96%	2.42**
1952-61	<b>37.82%</b>	41.29%	34.35%	-6.40***
1962-71	<b>26.72%</b>	26.84%	26.59%	-0.24
≥ 1972	<b>21.44%</b>	18.80%	24.10%	5.75***
<u>Experience</u>				
< 10 years	<b>18.52%</b>	15.34%	21.69%	7.29***
10 – 20 years	<b>48.27%</b>	49.41%	47.12%	-2.04**
> 20 years	<b>33.22%</b>	35.25%	31.18%	-3.85***
<u>Tenure</u>				
< 10 years	<b>44.83%</b>	43.88%	45.77%	1.69*
10 – 20 years	<b>39.22%</b>	40.55%	37.89%	-2.42**
> 20 years	<b>15.96%</b>	15.58%	16.34%	0.93
<u>Education</u>				
No vocational education	<b>5.69%</b>	7.19%	4.20%	-5.66***
Vocational education	<b>70.60%</b>	75.86%	65.33%	-10.11***
University degree	<b>23.71%</b>	16.95%	30.47%	13.95***
Work satisfaction	<b>82.79%</b>	81.55%	84.04%	2.94***
Log daily wage	<b>4.63</b>	4.62	4.64	2.54**
<b>Observations</b>	<b>5,983</b>	<b>3,410</b>	<b>2,573</b>	

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## 4. Econometric modeling

### Estimation model

$$y_{ijt} = \beta_0 + C_{ij} * T'_t \beta_1 + C_{ij} \beta_2 + T'_t \beta_3 + X'_{ijt} \beta_4 + Z'_{ijt} \beta_5 + \varepsilon_{ijt}$$

#### Variables:

- $y_{ijt}$ : indicates whether employee participates in training (training dummy, number of training)
  - Only training which is financed (at least partially) by the firm
- $C_{ij} * T'_t$ : represents the “causal” effect that the individual training intensity is directly affected by the crisis (**Diff-in-Diff effect**)
- $C_{ij}$ : dummy which indicates whether or not an establishment was hit by the economic crisis
- $T'_t$ : is a vector of time dummies for the years 2006-2010 (2006 as reference category)
- $X'_{ijt}$ : is a vector of explanatory variables controlling for individual characteristics
  - **individual-level:** gender, age, schooling level, tenure, work experience
- $Z'_{ijt}$ : is a vector of explanatory variables controlling for establishment characteristics
  - **establishment-level:** size, sector, location

## 4. Estimation strategy

### Diff-in-Diff estimation

- OLS estimation with Diff-in-Diff dummy
- Standard errors are adjusted using a robust cluster-adjusted sandwich estimator
- Takes into account correlated observations within individuals and establishments
- Estimation for various groups of employees (unskilled, skilled → stib)
  - Chi<sup>2</sup>-Test to analyze significant differences in the coefficients between these groups



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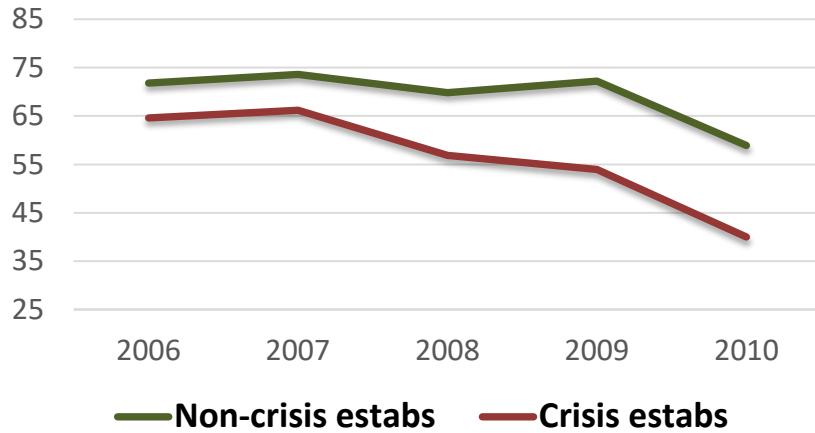
**3. Data and sample characteristics**

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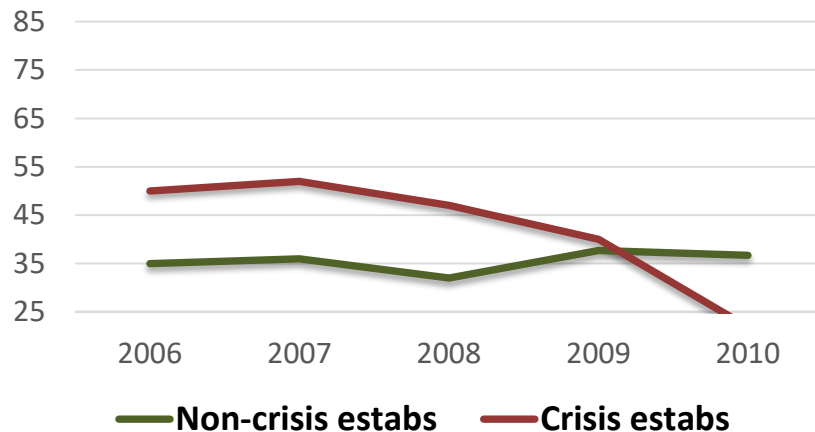
**5. Results**

# 5. Results

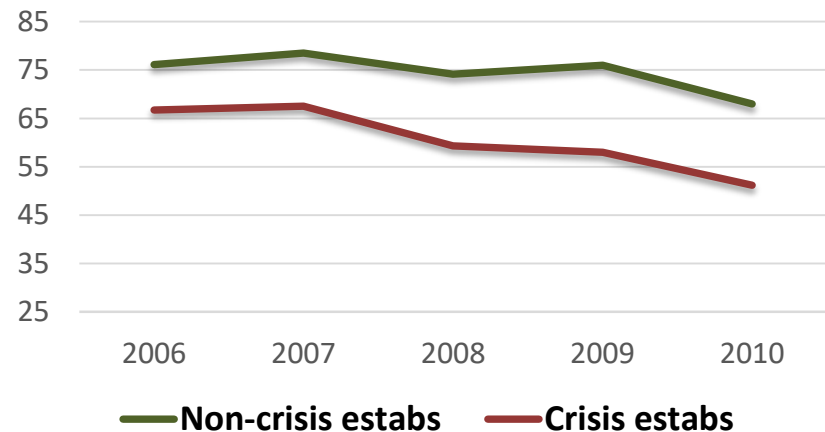
## Training probability



## Unskilled employees

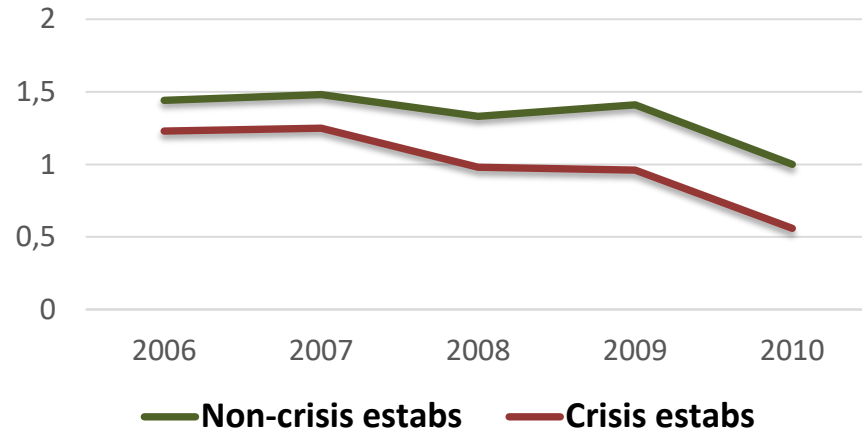


## Skilled employees

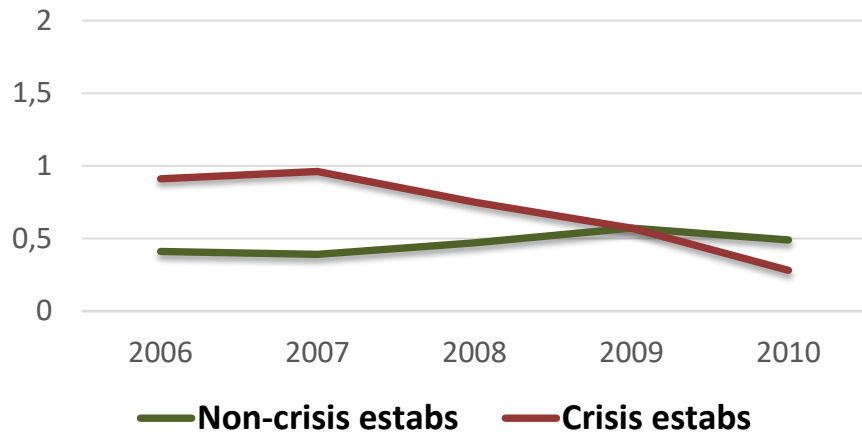


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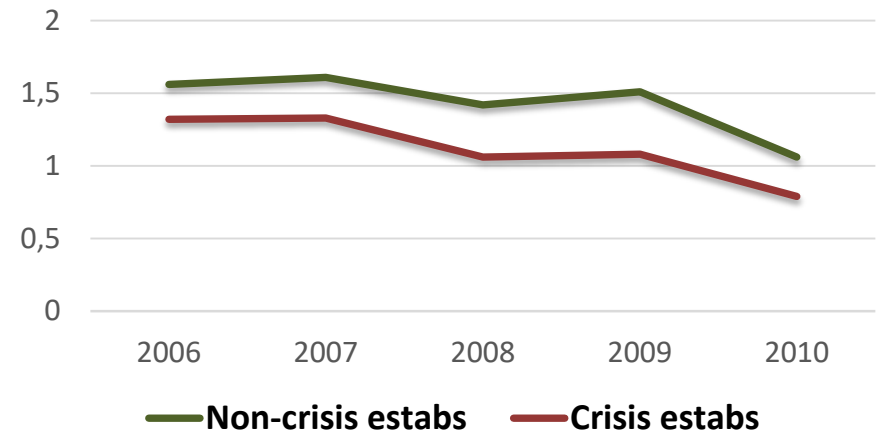
## Number of training



## Unskilled employees



## Skilled employees



# 5. Results

Dependent variable:	Training dummy	Number of training
<b>Crisis * Year 2007</b>	<b>-0.003</b> <b>(0.013)</b>	<b>-0.009</b> <b>(0.046)</b>
<b>Crisis * Year 2008</b>	<b>-0.053*</b> <b>(0.032)</b>	<b>-0.106</b> <b>(0.104)</b>
<b>Crisis * Year 2009</b>	<b>-0.117***</b> <b>(0.039)</b>	<b>-0.267**</b> <b>(0.112)</b>
<b>Crisis * Year 2010</b>	<b>-0.194***</b> <b>(0.068)</b>	<b>-0.496***</b> <b>(0.152)</b>
Year 2007	0.016 (0.012)	0.021 (0.037)
Year 2008	-0.031 (0.021)	-0.166** (0.066)
Year 2009	-0.002 (0.023)	-0.048 (0.068)
Year 2010	-0.149*** (0.050)	-0.475*** (0.079)
Crisis (treatment)	0.029 (0.040)	0.134 (0.122)
Individual characteristics	Yes	Yes
Establishment characteristics	Yes	Yes
R <sup>2</sup>	0.091	0.100
Observations	5,983	5,983

Reference category for age: birth year  $\leq 1951$ ; reference category for tenure: tenure  $\geq 20$ ; reference category for experience: experience  $\geq 20$ ; reference category for education: no vocational education; establishment characteristics: size, sector; \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.1; Standard errors in parentheses; Source: WeLL-ADIAB 2006-2010.

# 5. Results

Dependent variable	Training dummy	Training dummy	Differences (chi <sup>2</sup> -Test)
	Unskilled employees	Skilled employees	
Crisis * Year 2007	0.046 (0.038)	-0.014 (0.018)	2.18 (0.140)
Crisis * Year 2008	-0.062 (0.083)	-0.047 (0.035)	0.03 (0.868)
Crisis * Year 2009	-0.228** (0.101)	-0.081* (0.043)	1.83 (0.176)
Crisis * Year 2010	-0.453*** (0.126)	-0.027 (0.075)	7.95*** (0.005)
Year 2007	0.001 (0.025)	0.020 (0.013)	0.56 (0.454)
Year 2008	-0.013 (0.060)	-0.032 (0.021)	0.09 (0.762)
Year 2009	0.066 (0.073)	-0.013 (0.022)	1.10 (0.295)
Year 2010	0.063 (0.081)	-0.157*** (0.030)	6.76*** (0.009)
Crisis (treatment)	0.209*** (0.069)	-0.026 (0.041)	10.05*** (0.001)
Individual characteristics	Yes	Yes	
Establishment characteristics	Yes	Yes	
R <sup>2</sup>	0.120	0.057	
Observations	926	5,142	

Reference category for age: birth year ≤ 1951; reference category for tenure: tenure ≥ 20; reference category for experience: experience ≥ 20; reference category for education: no vocational education; establishment characteristics: size, sector; \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.1; Standard errors in parentheses; Source: WeLL-ADIAB 2006-2010.

# 5. Results

Dependent variable	Number of training	Number of training	Differences
	Unskilled employees	Skilled employees	
Crisis * Year 2007	0.070 (0.051)	-0.028 (0.050)	1.95 (0.162)
Crisis * Year 2008	-0.283 (0.210)	-0.088 (0.124)	1.09 (0.296)
Crisis * Year 2009	-0.457* (0.260)	-0.215* (0.119)	1.04 (0.308)
Crisis * Year 2010	-0.947*** (0.276)	-0.262 (0.248)	6.03** (0.014)
Year 2007	-0.004 (0.051)	0.033 (0.041)	0.75 (0.387)
Year 2008	0.101 (0.166)	-0.192*** (0.070)	5.88** (0.015)
Year 2009	0.196 (0.176)	-0.096 (0.064)	4.39** (0.036)
Year 2010	0.130 (0.168)	-0.515*** (0.064)	19.08*** (0.001)
Crisis (treatment)	0.509*** (0.183)	0.037 (0.128)	8.57*** (0.003)
Individual characteristics	Yes	Yes	
Establishment characteristics	Yes	Yes	
R <sup>2</sup>	0.114	0.067	
Observations	926	5,142	

Reference category for age: birth year ≤ 1951; reference category for tenure: tenure ≥ 20; reference category for experience: experience ≥ 20; reference category for education: no vocational education; establishment characteristics: size, sector; \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.1; Standard errors in parantheses; Source: WeLL-ADIAB 2006-2010.



## 5. Conclusions

- When establishments are affected by the economic crisis, this reduces significantly the training intensity of their employees.

→ **H1a confirmed**

- When establishments are affected by the economic crisis, this reduces significantly the number of training of their employees.

→ **H1b confirmed**

- Higher negative effects of the crisis on training intensity and number of training for unskilled employees

- Still negative significant effects after the crisis for unskilled employees

- No significant negative effect after the crisis for skilled employees

- Significant different effects in the year 2010 between unskilled and skilled employees

→ **H2a / H2b confirmed**



# Thank you for your attention

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# Backup: Robustness check

Dependent variable	Training dummy	Number of training
<b>Crisis * Year 2007 * Unskilled employees</b>	<b>0.059</b> <b>(0.041)</b>	<b>0.114</b> <b>(0.071)</b>
<b>Crisis * Year 2008 * Unskilled employees</b>	<b>-0.005</b> <b>(0.090)</b>	<b>-0.158</b> <b>(0.198)</b>
<b>Crisis * Year 2009 * Unskilled employees</b>	<b>-0.142*</b> <b>(0.085)</b>	<b>-0.225</b> <b>(0.246)</b>
<b>Crisis * Year 2010 * Unskilled employees</b>	<b>-0.429***</b> <b>(0.146)</b>	<b>-0.673***</b> <b>(0.243)</b>
Crisis * Year 2007	-0.014 (0.013)	-0.028 (0.032)
Crisis * Year 2008	-0.048 (0.036)	-0.091 (0.105)
Crisis * Year 2009	-0.081** (0.041)	-0.215* (0.128)
Crisis * Year 2010	-0.027 (0.085)	-0.262 (0.175)
Crisis * Unskilled employees	0.281*** (0.072)	0.588*** (0.152)
Year 2007 * Unskilled employees	-0.022 (0.026)	-0.056 (0.043)
Year 2008 * Unskilled employees	0.007 (0.062)	0.250** (0.118)
Year 2009 * Unskilled employees	0.068 (0.075)	0.271* (0.139)
Year 2010 * Unskilled employees	0.199** (0.087)	0.609*** (0.151)
Year 2007	0.020** (0.008)	0.033 (0.022)
Year 2008	-0.032* (0.019)	-0.191*** (0.066)
Year 2009	-0.013 (0.022)	-0.096 (0.074)
Year 2010	-0.156*** (0.027)	-0.516*** (0.075)
Unskilled employees	-0.391*** (0.053)	-1.015*** (0.097)
Crisis (treatment)	-0.020 (0.028)	0.037 (0.090)
Individual characteristics	Yes	Yes
Establishment characteristics	Yes	Yes
R <sup>2</sup>	0.103	0.100