

Institute for Employment
Research

The Research Institute of the
Federal Employment Agency



IAB-Discussion Paper

3/2016

Articles on labour market issues

Employment expectations and uncertainties ahead of the new German minimum wage

Mario Bossler

ISSN 2195-2663

Employment expectations and uncertainties ahead of the new German minimum wage

Mario Bossler (IAB)

Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

The “IAB Discussion Paper” is published by the research institute of the German Federal Employment Agency in order to intensify the dialogue with the scientific community. The prompt publication of the latest research results via the internet intends to stimulate criticism and to ensure research quality at an early stage before printing.

Contents

Abstract	4
Zusammenfassung	4
1 Introduction	5
2 Institutional background	6
3 Data	7
3.1 The IAB Establishment Panel	7
3.2 Treatment assignment	8
3.3 Outcome variables of interest	10
4 Descriptive analysis	11
4.1 Descriptive difference-in-differences	11
4.2 Graphical analysis	11
5 Baseline results	12
6 Robustness checks	16
6.1 Matching on pre-treatment trends	16
6.2 Non-linear difference-in-differences	18
7 Heterogeneities by respondent characteristics	20
8 Actual adjustments due to expectations	20
9 Conclusion	24
References	26
A Online Appendix: The response of anticipating establishments	29
B Online Appendix: OLS and random effects estimation	30
C Online Appendix: Intensive margin employment trends	32
D Online Appendix: Propensity score overlap after propensity score weighting	33
E Online Appendix: The relationship between expectations and the observed employment development over time.	35

Abstract

Followed by an extensive policy discussion late 2013 and early 2014, the new German minimum wage was introduced on 1 January 2015. This article analyzes announcement effects of the new statutory minimum wage on employer expectations in 2014. The IAB Establishment Panel allows for a difference-in-differences comparison between affected and unaffected employers and entails variables that address the employers' employment expectations. In 2014, affected employers show an increased employment uncertainty and a drop in their expected employment development. They also more likely report wage costs to become a problem. In size, the employment expectations translate into a loss of about 12 800 jobs.

Zusammenfassung

Als Resultat einer ausführlichen politischen Debatte im Anschluss an die Bundestagswahl 2013 wurde in Deutschland am 1. Januar 2015 ein neuer Mindestlohn eingeführt. Dieser Artikel analysiert, ob die Bekanntgabe seiner Einführung bereits die Beschäftigungserwartungen von Arbeitgebern im Jahr 2014 beeinflusst hat. Das IAB-Betriebspanel erlaubt, betroffene und nicht-betroffene Betriebe mittels einer Differenzen-in-Differenzen-Analyse zu vergleichen und beinhaltet zudem Variablen über die Beschäftigungserwartungen. Die Analysen für 2014 zeigen eine gestiegene Beschäftigungsunsicherheit sowie eine schwächere Beschäftigungserwartung bei betroffenen Arbeitgebern. Außerdem werden von den vom Mindestlohn betroffenen Arbeitgebern Lohnkosten häufiger als aufkommendes Problem bezeichnet. Eine Abschätzung mithilfe vergangener Befragungswellen prognostiziert, dass diese negativen Arbeitgebererwartungen einen Beschäftigungsverlust in Höhe von rund 12 800 Beschäftigungsverhältnissen nach sich ziehen werden.

JEL classification: D22, J23, J38

Keywords: minimum wage, employment expectations, uncertainties, employers, Germany

Acknowledgements: I thankfully acknowledge helpful comments from participants of workshops at the IAB in Nuremberg, the ILO in Geneva, the University of Potsdam, and the CAED Conference in Istanbul. I also acknowledge particularly helpful comments and suggestions from Bodo Aretz, Lutz Bellmann, Gerald van den Berg, Philipp vom Berge, Annette Bergemann, Hans-Dieter Gerner, Tina Hinz, Michael Oberfichtner, and Marion Penninger.

1 Introduction

In Germany, a new statutory minimum wage of €8.50 per hour of work came into force on 1 January 2015. The relevance of the minimum wage legislation draws on its generality. A high affectedness of establishments in the extensive and intensive margin creates a severe wage setting restriction (Bellmann et al. (2015)), which may result in severe employment losses. Even though potential employment effects were heavily debated in advance and have been extensively analyzed for other countries,¹ such employment effects are ultimately an empirical question, and prominent economists argue in favor of independent scientific ex-post evaluations (e.g., Möller (2014); Zimmermann (2014)). Corresponding to this claim, I provide a first approach by analyzing how the minimum wage affected the employers' employment expectations and uncertainties after the law was announced but before it came into force. Overall, only few studies address announcement effects of legislations, where a famous exemption is a study by Ahern/Dittmar (2012), who analyze the stock market response to the announcement of a female board quota in Norway and find sizable effects.

The question whether the German minimum wage has had negative effects ahead of its introduction entered the public debate after the German Council of Economic Experts ("Sachverständigenrat") published its yearly report. This report raised the possibility that the law already dampened the economic development in 2014 (Sachverständigenrat (2014)). This was criticized by the German chancellor Angela Merkel stating: "It is not trivial to understand how a decision, which is not in force dampens the economic development," ZEIT ONLINE (2014). While macro economic effects ahead of the minimum wage introduction are indeed unlikely and difficult to identify, I contribute to this political debate by analyzing whether employer expectations change already in 2014 after the law was announced.

Economically, the analysis of employer expectations and uncertainties is of particular interest as uncertainties affect individual decision making in various microeconomic circumstances (Von Neumann/Morgenstern (1944); Akerlof (1970)). But also at the level of firms uncertainties have shown to exert real effects. Empirical studies, which analyze the link between firm-level uncertainties and real adjustments, show that uncertainties affect investment decisions (Bloom (2009)), production levels (Bachmann/Elstner/Sims (2013)), and employment decisions, e.g., by increasing layoffs (Mecikovsky/Meier (2015)).

Anticipatory changes in employer expectations are also of interest to empirical researchers as most empirical evaluation methods require an exogenous treatment event while excluding any kind of anticipation by assumption. Most of the recent studies analyzing employment effects of minimum wages in fact address the issue of anticipation (Dickens/Manning (2004); Dube/Lester/Reich (2010)). However, anticipatory adjustments can severely bias simple difference-in-differences estimates and should be treated cautiously. For Germany, first descriptive evidence points at a meaningful magnitude of anticipatory adjustments in wages (Bellmann et al. (2015); Kubis/Rebien/Weber (2015)). I add to this evidence by looking at whether anticipatory adjustments in employer expectations are observed in real data.

¹ For surveys on this topic, see Neumark/Wascher (2006) or Neumark/Salas/Wascher (2014).

To analyze the minimum wage effect on employment expectations and uncertainties, I apply a difference-in-differences analysis comparing establishments by their affectedness. The IAB Establishment Panel allows to distinguish affected from unaffected employers ahead of the minimum wage introduction and also includes the employers' assessments of the expected employment development, which I hypothesize to respond in the treatment year 2014 when the law was announced but not in force. In 2014, the survey information was collected between June and September, which is a few months before the minimum wage came into force. I estimate the response on the expected employment development but also on whether the employment development is uncertain. Finally, I also analyze whether affected employers more likely report wage costs to become a problem. This provides insights on the source of the expectations concerning employment.

In an additional step, I use the estimated responses in expectations from ahead of the minimum wage introduction to approximate the magnitude of employment losses which are likely to occur solely due to lowered expectations. This adds to the literature predicting employment effects using micro simulations in ex-ante evaluations (Arni et al. (2014); Knabe/Schöb/Thum (2014)). These studies find substantial effects on employment, but aim to predict a comprehensive employment effect. By contrast, I quantify employment reductions solely due to employer expectations, which most likely undercuts the overall employment effect.

The article proceeds as follows: Section 2 describes the minimum wage law and the time line of its adoption. Section 3 summarizes the data and the outcome variables of interest. Section 4 provides a descriptive analysis of the outcome variables. Section 5 presents the baseline estimation results, Section 6 shows two major robustness checks, and Section 7 allows for effect heterogeneities with respect to individual characteristics of the interview respondent. Section 8 translates the effects into real employment adjustments and Section 9 concludes.

2 Institutional background

The new German minimum wage came into force on 1 January 2015 and requires hourly wages of at least €8.50. It is the first general minimum wage in Germany which applies to all industries with only minor exemptions. It complements already existing industry specific minimum wages, which were in force, e.g., in the construction sector, for hair dressers, and roofers.² Sectorial minimum wages which under-cut the new minimum are allowed to delay their compliance for two-years. Similarly, industry specific collective bargaining agreements are also conceded an adjustment period of two years until 31 December 2016. Other exemptions from the minimum wage include youth-employment below the age of 18 years, apprenticeship trainees, compulsory internships of college students, and finally, long term unemployed are allowed to under-cut the minimum wage for the first 6 month after re-employment.

² Previous studies have evaluated employment effects of these sectorial minimum wages, but their results are mixed (Aretz/Arntz/Gregory (2013); Frings (2013); König/Möller (2009); vom Berge/Frings/Paloyo (2013)).

Table 1: Time line of the minimum wage introduction in Germany

Date	Event
22 September 2013	Federal election (“Bundestagswahl”).
14 December 2013	Signing of the coalition agreement which mentions the introduction of a minimum wage.
2 April 2014	Announcement of the government to propose a minimum wage law in parliament including 1 January 2015 as the date of introduction and a federal level of €8.50.
3 July 2014	Final decision of the parliament in favor of the minimum wage.
1 January 2015	The new regulation comes into force.

The introduction of the minimum wage was prevalent in many policy debates. The relevant public debate, which culminated in the minimum wage law, started with the federal election campaign in 2013, where all relevant left wing and centralized parties argued in favor of a minimum wage. As summarized in Table 1, the process continued with a prominent spot in the coalition agreement of the great coalition, in which the government announced that a minimum wage would be introduced. This coalition agreement was presented to the public in November 2013 and signed on 14 December 2014. The introduction date and the comprehensive federal level of €8.50 was announced in April 2014. The final parliamentary decision in favor of a new law was made in July 2014 and the legislation finally came into force on 1 January 2015. This time line clearly questions that the minimum wage introduction is an unanticipated exogenous event making anticipatory responses in expectations likely.

The data at hand allow to assess the expectations of employers in 2014 compared with previous years. As the survey information is collected between June and September, the data do not allow to distinguish between all the public announcements. However, it is feasible to analyze how expectations in the time span between June and September of 2014 differ from expectations of the previous years, when the introduction of the minimum wage was no concrete threat to affected employers.

3 Data

3.1 The IAB Establishment Panel

The data source is the IAB Establishment Panel, which is a large annual survey on general firm policies and personnel developments in Germany. The IAB Establishment Panel includes about 15 000 observations each year since 1993. The survey’s gross population comprises all establishments located in Germany with at least one employee liable to social security. The sample selection is representative for German states (“Bundesländer”), industries, and establishment size. The interviews are conducted face-to face by profes-

sional interviewers.³ This ensures a high data quality and a response rate of on average 83 percent. More comprehensive data descriptions of the IAB Establishment Panel can be found in Ellguth/Kohaut/Möller (2014) or Fischer et al. (2009).

The 2014 IAB Establishment Panel contains information on the establishments' affectedness by the minimum wage. The survey includes information on the incidence of affectedness by asking whether the respective establishment has employees with an hourly wage below €8.50. But it also includes information on the intensive margin counting the number of currently affected employees with an hourly wage below €8.50. Finally, the survey asks employers whether wages were already adjusted due to the minimum wage within the past 12 month, and hence, in anticipation of the minimum wage introduction.

A unique establishment identifier allows tracking establishments over time if the respective establishments continue to participate in the survey. When looking at the 2014 expectations and uncertainties of employers relative to the previous years, the establishment identifier allows to identify effects through changes over time while using the 2014 affectedness information. This yields an unbalanced panel of plants existing in 2014, while establishments enter the panel at different points in time.⁴

3.2 Treatment assignment

I distinguish between a treatment group, which comprises establishments affected by the minimum wage, and a control group, which is unaffected. The group of affected establishments is defined in two alternative ways. First, the extensive margin affectedness includes all establishments with at least one employee with an hourly wage below €8.50 in 2014. Second, the intensive margin affectedness again includes all establishments that have at least one affected employee, but it weights the establishment-level affectedness by the fraction of affected employees. The group of control establishments comprises only establishments without any employees affected by the minimum wage.⁵

A major issue for the exact differentiation between affected and unaffected establishments are establishments which adjusted wages ahead of the 2014 survey. If establishments already adjusted wages before the information was collected, their true affectedness is not revealed. This is a major issue since the public policy discussion makes anticipatory wage adjustments likely and first descriptive evidence already points at the prevalence of such anticipatory wage adjustments (Bellmann et al. (2015); Kubis/Rebien/Weber (2015)). Since the exact affectedness of anticipating establishments is unknown, I exclude them from the analysis.⁶

³ In most cases the interview respondent has a managerial job-position (83 percent of the cases). I present heterogeneities with respect to the job position of the respondents in Section 7.

⁴ Previous studies mostly used unbalanced panels when using the IAB-Establishment Panel, which increases sample size due to sample attrition. However, the results presented in this article do not rely on the unbalancedness.

⁵ To exclude false or socially desirable responses, a "unknown" category was allowed in the survey, which was included to capture all establishments that were not sure about their affectedness. Only 1.3 percent of the establishments made use of this category in the survey and I exclude these establishments from the analysis.

⁶ A robustness check in Online Appendix A shows that this exclusion does not affect any of the results, and presents separate effects for this group of establishments.

Table 2: Sample description

	(1) affected	(2) unaffected	(3) anticipatory wage adjustments
<i>Sample:</i>			
Number of establishments	1 661	11 898	1 521
Fraction of establishments	0.110	0.789	0.101
Avg. Number of employees	65.1	133.5	96.7
Median Number of employees	17	17	32
<i>Represented population:</i>			
Number of establishments	182 279	1 693 108	147 134
Number of employees	3 203 051	29 217 371	3 847 357
<i>Minimum wage affectedness:</i>			
Extensive margin affectedness	1	0	0.458
Intensive margin affectedness	0.381	0	0.170
<i>Means of other covariates:</i>			
Share of part-time	0.379	0.260	0.332
Share of females	0.527	0.416	0.523
Collective bargaining	0.226	0.449	0.356
Works council	0.143	0.298	0.202

Notes: Presented numbers are simple mean values of the some descriptive variables.

Data source: IAB Establishment Panel 2010-2014, analysis sample.

Another major issue for the construction of a control group of unaffected establishments is general equilibrium effects. Since I concentrate on expectations ahead of the minimum wage introduction, such indirect general equilibrium effects are unlikely and are excluded by assumption.⁷ However, indirect effects of the minimum wage would rather have an adverse impact on the control group and therefore the estimated treatment effects would show lower bounds of the true effects.

Table 2 shows a description of affected and unaffected establishments as well as the excluded group of anticipating plants. 11 percent of the establishments in the sample are affected, 78.9 percent are unaffected and 10.1 percent have been excluded due to anticipation. The average establishment size is much larger for unaffected plants, but as depicted by the median, the mean-divergence is driven by large outliers.⁸ Column 3 shows that median and average employment are both larger for the excluded group of anticipating establishments, which is most likely driven by the fact that large establishments have a greater chance for the incidence of such anticipatory wage adjustments.

Also summarized in Table 2, affected establishments represent about 3 203 000 employees in the German population. The gross number of represented employees is relevant when translating the employer expectations into an overall employment figure, see Section 8. Table 2 further shows, such as in Bellmann et al. (2015), that the intensive margin affectedness is very emphasized as about 38 percent of the employees are affected within affected establishments. This large intensive margin makes adjustments likely as the minimum wage is largely binding for affected establishments.

⁷ This is commonly known as the stable unit treatment value assumption, which has to hold throughout this article.

⁸ I checked that outliers with respect to size do not drive any of the results presented in the empirical analysis.

The last four rows of Table 2 display averages of some other covariates by affectedness. The averages show that affected establishments have significantly larger shares of part-time and female employees. It also reveals a lower affectedness if industrial relations such as collective bargaining or works councils are present. The difference-in-differences approach, which I use for the analysis, requires that affected and unaffected establishments behave similar in the absence of treatment. This is more plausible if establishments are similar. While fixed effects can already control for time constant differences, two more robustness checks are presented in this respect. First, the regression results are presented with and without control variables. Second, a propensity score weighting conditional on lagged outcomes and lagged covariates is presented for robustness.

3.3 Outcome variables of interest

The outcome variables of interest express the expectations of employers towards the employment development and the potential problem of rising wage costs.⁹ First, I look at whether the expected employment development is uncertain. This information is retrieved from a survey question which asks employers what the employment-level is most likely on 30 June of the subsequent year. This question allows for the response category “currently not foreseeable”, which I use as a binary outcome indicating an employment uncertainty. Of course, this is not a perfect measure for employment uncertainty. But when looking at group specific use of this category over time, it has to imply that employers are on average less certain to report a specific employment number for the subsequent year. On average, 6.5 percent of the employers report their employment development to be uncertain.

If instead the employer reports an explicit number of employees for 30 June of the following year, this defines the expected employment level given that the employment development is foreseeable. Accordingly, in the treatment year 2014 employers are asked for the employment level on 30 June 2015. For the analysis, I define the *expected employment development* as the expected employment level relative to the present number of employees:

$$\frac{\text{expected employment}_{i,t+1} - \text{employment}_{i,t}}{\text{employment}_{i,t}}. \quad (1)$$

Additional to the two outcomes concerning the expected employment development, I use the response to the survey question asking employers whether wage costs are likely to become a problem within the upcoming two years. This item provides an additional piece of information concerning the reasons of the employers’ employment expectations. For this question, the survey only allows for a “yes” or “no” response and does not allow to further differentiate in the intensity that wage costs become a problem. Moreover, for this variable I rely on 2010 and 2012 as the pre-treatment years for comparison because this question is only surveyed in a biennial mode.

⁹ In the survey, outcome variables are independent from the affectedness by the minimum wage. While the expectations are placed at very beginning (questions 4 and 5), the minimum wage affectedness is one of the last questions in the survey (questions 76 and 77).

4 Descriptive analysis

4.1 Descriptive difference-in-differences

Table 3 presents a summary of the sample size by outcome variables. The sample is slightly smaller when looking at the expected employment development because this outcome requires a foreseeable employment development, i.e., that it is not uncertain. From the second row onwards, Table 3 presents sample means of the outcome variables by affectedness. I also present the difference of the 2014 and 2013 averages, which is the time-trend of the outcome variables by affectedness. Finally, the last row displays the difference of these developments, which is the descriptive difference-in-differences estimate.

Table 3: Means of the outcomes by affectedness in 2013 and 2014

	Employment uncertainty		Expected empl. development		Problem of wage costs	
	(1)	(2)	(3)	(4)	(5)	(6)
	affected	unaffected	affected	unaffected	affected	unaffected
Number of Establishments	1 661	11 898	1 485	10 917	1 661	11 898
Mean in 2014	0.085	0.058	0.003	0.013	0.332	0.201
Mean in 2013	0.056	0.052	0.007	0.010	0.227	0.188
Difference (2014-2013)	0.029	0.006	-0.004	0.003	0.105	0.013
Difference-in-Differences		0.023		-0.007		0.092

Notes: Presented numbers are simple mean values of the outcome variables using the analysis sample.

Data source: IAB Establishment Panel 2013-2014, analysis sample.

The employment uncertainty in columns (1) and (2) is on average between 5 and 6 percentage points. However, it spikes for affected establishments in 2014, which implies an increased descriptive uncertainty in this group of establishments. In columns (3) and (4), the expected employment development is slightly larger for unaffected plants in both years. However, in 2014 the expected employment development decreases for affected plants but increases for unaffected plants implying a negative descriptive difference-in-differences estimate. The outcome that wage costs become a problem is reported by about 20 percent of the plants (columns 5 and 6). This value increases to more than 30 percent among the group of affected establishments in 2014, which implies a large descriptive effect.

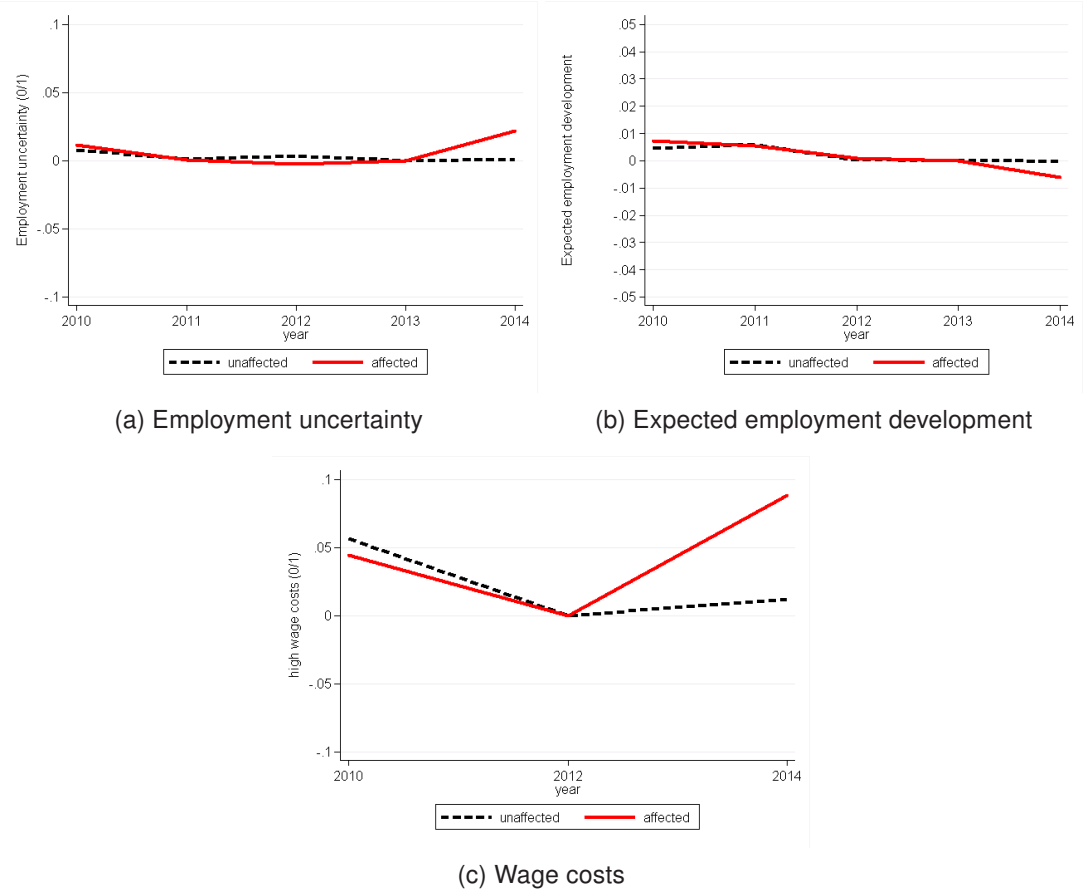
4.2 Graphical analysis

In the graphical analysis, I present time series of the outcome variables by affectedness. To eliminate differences in levels, I use 2013 as the reference period and normalize all other values relative to 2013, i.e., I subtract the 2013 group average.

The graphical results are presented in Figure 1. Panel (a) displays the time series of the employment uncertainty by affectedness. It shows that both trends are parallel for most of the period of analysis. In 2014, we observe a spike for affected establishments implying a sharp increase in employment uncertainties. Panel (b) shows trends in the expected employment development, which are similar ahead of the treatment year 2014. In 2014,

the expected employment development decreases for affected establishments. Finally, Panel (c) presents trends in the incidence that wage costs become a problem. Only in 2010, 2012, and 2014 this outcome was included in the survey. Between 2010 and 2012 the graph shows very similar trends, but in 2014 it shows a much stronger increase in the problem of wage costs for affected establishments. This pattern descriptively shows that wage costs become a problem for the group of affected employers.

Figure 1: Time series of the dependent variables by affectedness



Notes: Group averages are centered at the pre-treatment values. In panels *a* and *b* the last pre-treatment observation is observed in 2013 and in panel *c* the last pre-treatment period is 2012 since establishments are asked whether wage costs become a problem in a biennial mode.
Data source: IAB Establishment Panel 2010-2014, analysis sample.

5 Baseline results

In this section, I present regression results from a difference-in-differences specification. The regression analysis adds to the descriptive analysis by estimating the magnitude of the visually observed responses, it allows to control for covariates, and provides a judgement about the statistical precision of such effects. I use a standard difference-in-differences type of regression specification with establishment fixed effects. This controls for any time-constant differences across establishments including structural differences implied by the

sector or the location. 2014 is defined as the treatment period of interest,¹⁰ because in 2014 the introduction of the minimum wage was decided.

$$y_{it} = affected_i * d_{2014} * \delta + \Psi_i + \gamma_t + \epsilon_{it} \quad (2)$$

δ is the treatment effect on the treated establishments (ToT) and quantifies the effects of interest, which are the responses in expectations of affected plants in comparison with an unaffected control group. Ψ_i captures establishment fixed effects, γ_t are time fixed effects, and ϵ_{it} is an idiosyncratic error term with an establishment-level error correlation.

Estimates of δ are presented in Tables 4 to 6. Each of these tables addresses one of the hypothesized outcomes. The first three columns present results from a specification in which the affectedness is defined by the extensive margin and the latter three columns define the affectedness by the intensive margin (fraction of affected employees).¹¹

Table 4: The effect on employment uncertainties

	Extensive margin affectedness			Intensive margin affectedness		
	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	With controls	Placebo	Baseline	With controls	Placebo
ToT	0.027*** (0.008)	0.028*** (0.008)	0.003 (0.008)	0.057*** (0.020)	0.061*** (0.020)	0.011 (0.018)

Notes: Presented coefficients are partial effects from fixed effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** p<0.01, ** p<0.05, and * p<0.10. Covariates in columns (2) and (5) are dummies for collective bargaining, works councils, and fractions of females and high qualified employees. For the placebo treatment in columns (3) and (6), the treatment is assigned to 2013 and 2014 is excluded from the regression.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

In Table 4, the effect on the incidence that the employment development is uncertain ahead of the minimum wage introduction is 2.7 percentage points (column 1). Since on average only 6 percent of the establishments report an uncertain employment development, this effect implies that the affected employers' uncertainty rises by about 40 percent. The effect is robust when adding controls, which include the shares of part-time and full-time employees; but also participation in collective bargaining and the existence of a works council. Column 3 presents a placebo test in which the treatment year is artificially assigned to the year 2013, when the minimum wage was not yet a relevant threat to affected employers. The placebo effect is small and insignificant.

When the affectedness is defined by the intensive margin (columns 4-6), the effect with and without covariates is about 6 percentage points. The placebo test is again small and insignificant. Compared with the extensive margin, the effect size is similar. Since in fact

¹⁰ Online Appendix B shows that the results are fully robust towards a simple difference-in-difference specification using OLS and a specification with random effects.

¹¹ Online Appendix C presents descriptive employment trends in which the treatment group is weighted by the intensive margin affectedness.

only 38 percent of the employees are affected within affected establishments, the intensive margin effect should be multiplied by 0.38 in order to correspond with the extensive margin effect.

Table 5: The effect on the expected employment development

	Extensive margin affectedness			Intensive margin affectedness		
	(1) Baseline	(2) With controls	(3) Placebo	(4) Baseline	(5) With controls	(6) Placebo
ToT	-0.008** (0.003)	-0.009*** (0.003)	-0.002 (0.004)	-0.026*** (0.009)	-0.028*** (0.009)	-0.005 (0.010)

Notes: Presented coefficients are partial effects from fixed effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Covariates in columns (2) and (5) are dummies for collective bargaining, works councils, and fractions of females and high qualified employees. For the placebo treatment in columns (3) and (6), the treatment is assigned to 2013 and 2014 is excluded from the regression.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

When looking at the expected employment development in Table 5, the forthcoming minimum wage lowers the affected establishments' employment expectation by -0.8 percent. Again, this effect is larger when looking at the intensive margin affectedness. The placebo tests are small and statistically insignificant. These results show that the minimum wage reduces the expected employment development additional to the increased employment uncertainty.

Table 6: The effect on the problem of high wage costs

	Extensive margin affectedness			Intensive margin affectedness		
	(1) Baseline	(2) With controls	(3) Placebo	(4) Baseline	(5) With controls	(6) Placebo
ToT	0.104*** (0.016)	0.101*** (0.016)	0.022 (0.018)	0.227*** (0.036)	0.217*** (0.036)	0.040 (0.036)

Notes: Presented coefficients are partial effects from fixed effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Covariates in columns (2) and (5) are dummies for collective bargaining, works councils, and fractions of females and high qualified employees. For the placebo treatment in columns (3) and (6), the treatment is assigned to 2013 and 2014 is excluded from the regression.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

In Table 6, the treatment effect on the incidence that personnel costs become a problem is 10 percentage points in the extensive margin. In relative terms this implies an increase by about 40 percent. The intensive margin effect is 22 percentage points, which is again very comparable in size. Moreover, both placebo effects are not significantly different from zero. The result hints at a potential channel for the effects on employment expectations. As implied by standard microeconomic theory, minimum wages may reduce labor demand because employers cannot afford paying wages exceeding the value of marginal product.

In Table 7, I exploit variation in the treatment intensity and estimate separate effects on employer expectations. For this purpose I split the affectedness into 5 intensities, which are

Table 7: Treatment effects on the treated across different magnitudes of affectedness

	(1)	(2)	(3)
	Dependent variable		
	Empl. Uncertainty	Expected employment development	Wage costs
affectedness 1-20 %	0.040*** (0.013)	-0.003 (0.004)	0.092*** (0.024)
affectedness 21-40 %	-0.011 (0.014)	-0.001 (0.008)	0.075** (0.034)
affectedness 41-60 %	0.020 (0.022)	-0.003 (0.006)	0.101*** (0.036)
affectedness 61-80 %	0.012 (0.022)	-0.023* (0.012)	0.153*** (0.042)
affectedness 81-100 %	0.106*** (0.030)	-0.034*** (0.013)	0.213*** (0.054)

Notes: Presented coefficients are partial effects from fixed effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

1-20 %, 21-40 %, 41-60 %, 61-80 %, and 81-100 %.¹² The reference category comprises all unaffected establishments.

The results in Table 7 show that the adverse responses in the affected employers' expectations increase in the intensity of affectedness. The largest responses are observed for the group of establishments in which 81-100 percent of the employees are affected by the minimum wage. While the employment uncertainty and the expected employment development only respond among the most largely affected employers, we observe a significant response in wage costs becoming a problem across all intensities of affectedness. A possible explanation is that wage costs become a problem for all affected plants, where those with a particularly high affectedness cannot cope with this problem without an expected reduction in employment levels.

To provide a descriptive overview of the employers that adjusted their expectations by the largest magnitudes, Table 8 displays sample averages by intensities of affectedness. Severely affected employers are on average slightly smaller in terms of employment, have higher employment turnover rates, the fraction of qualified workers is relatively lower, and on average they employ larger fractions of part-time and female employees. These are the typical characteristics that explain affectedness by the minimum wage. Looking at the lower part of Table 8, which displays averages of dummy variables, the most severely affected establishments less likely have a works council and less likely participate in collective bargaining; they more likely report high product market competition, tend to be younger and are much more likely located in the Eastern part of Germany. When interacting the treatment effects of Tables 4 to 7 with variables of Table 8, none of them shows a statistically significant treatment effect interaction. This is most likely because heterogeneities are already reflected in the magnitude of affectedness.

¹² The treatment intensity group 1-20 % affected employees includes 793 establishments, the group 21-40 % 516 establishments, the group 41-60 % 417 establishments, the group 61-80 % 326 establishments, and finally the group 81-100 % includes 252 establishments.

Table 8: Description of employers by affectedness

	Affectedness				
	(1) 1-20 %	(2) 21-40 %	(3) 41-60 %	(4) 61-80 %	(5) 81-100 %
<i>Continuous variables:</i>					
Establishment size in 2014	130.2	47.0	33.8	28.9	59.8
Employment turnover rate	0.254	0.279	0.319	0.361	0.399
Share of qualified employees	0.723	0.563	0.481	0.508	0.482
Share of part-time employees	0.284	0.379	0.415	0.452	0.476
Share of female employees	0.469	0.532	0.582	0.608	0.611
<i>Dummy variables:</i>					
Works council	0.278	0.097	0.077	0.018	0.052
Collective bargaining	0.298	0.231	0.165	0.190	0.215
High competition	0.119	0.144	0.153	0.152	0.152
Founded before 1990	0.362	0.266	0.193	0.239	0.191
Est Germany	0.547	0.599	0.691	0.736	0.794
Establishments	793	516	417	326	252

Notes: Presented figures are 2014 sample averages by intensity of affectedness in 2014.

Data source: IAB Establishment Panel 2014, analysis sample.

6 Robustness checks

In this section, I check the robustness of the baseline results proposing two major robustness checks. First, I use a propensity score weighted control group based on observable characteristics and the pre-treatment trends of the outcome variables. Second, I account for the non-linear nature of the outcome variables employment uncertainty and that personnel costs become a problem, which are both binary.

6.1 Matching on pre-treatment trends

To assess whether the treatment effects are robust to a different, but with respect to the parallel trends assumption harmonized control group, I present a robustness check in which I weight control establishments based on their similarity in the pre-treatment outcome levels. The intuition of this robustness check is in line with the synthetic control method by Abadie/Diamond/Hainmueller (2010), where a weighted control group is matched to the treated units.¹³ I weight the control units based on the propensity score, which is estimated conditional on pre-treatment levels of the outcome variables, but also conditional on covariates. The covariates control for major differences between treatment and control group and comprise lagged values of all variables described in Table 8.

¹³ The synthetic control method tends to assign a large weight on only few control units (Abadie/Diamond/Hainmueller (2015)). When looking at large observational data, in which individuals or establishments are the units of observation, this may lead to bad finite sample properties. However, I am not aware of any explicit investigations of this issue.

I apply the propensity score weighting estimator first proposed in Rosenbaum (1987).¹⁴ The treatment effect on the affected establishments is specified in equation 3 (Wooldridge (2010)).

$$ToT_{psw} = \frac{1}{N} \sum_{i=1}^N \frac{[Affected_i - \hat{p}(\cdot)] * \Delta y_i}{\hat{p}[1 - \hat{p}(\cdot)]}, \quad (3)$$

Affected_i is the treatment variable indicating affected establishments. To estimate an effect for different intensities of affectedness, I apply treatment dummies with differing intensities of affectedness as in Table 7 but in separate estimations. \hat{p} is the fraction of affected establishments in the sample, and $\hat{p}(\cdot)$ is the estimated propensity score from a logit regression conditional on lagged levels of y defined as y_{t-1}, \dots, y_{t-5} , dummies indicating missing observations in the previous panel waves (m_{t-1}, \dots, m_{t-5}), and lagged covariates (x_{t-1}). The first group of variables controls for the similarity of pre-treatment trends, the second controls for selective entry in the survey, and the third group of variables controls for differences in observable characteristics.

For consistency the propensity score weighting estimator requires two assumptions (Heckman/Ichimura/Todd (1998)).¹⁵ First, it requires mean-ignorability of the treatment assignment (equation 4).

$$E[y_0 | y_{t-1}, \dots, y_{t-5}, m_{t-1}, \dots, m_{t-5}, x_{t-1}, Affected] = E[y_0 | y_{t-1}, \dots, y_{t-5}, m_{t-1}, \dots, m_{t-5}, x_{t-1}] \quad (4)$$

Mean-ignorability requires that in the absence of treatment the mean-outcome conditional on y_{t-1}, \dots, y_{t-5} , m_{t-1}, \dots, m_{t-5} , and x_{t-1} is not different for affected and unaffected plants. I believe that this crucial assumption is plausible because there is no obvious reason why in the absence of treatment the mean-outcome would depend on the affectedness after partialing out structural differences in covariates as well as differences in the trends of y .

Second, consistency requires for all possible combinations of $y_{t-1}, \dots, y_{t-5}, m_{t-1}, \dots, m_{t-5}, x_{t-1}$ that

$$P(Affected = 1 | y_{t-1}, \dots, y_{t-5}, m_{t-1}, \dots, m_{t-5}, x_{t-1}) < 1. \quad (5)$$

This second assumption is a so-called overlap assumption requiring untreated establishments which serve as counterfactual controls for each covariate combination in the data.

The propensity score weighting estimates are displayed in Table 9.¹⁶ In columns 1 to 3, the treatment variable indicates all affected establishments irrespective of their margin of affectedness. Columns 4 to 6 display treatment effects for different levels of affectedness defined by the fraction of affected employees which is 1-20%, 21-40%, 41-60%, 61-80%,

¹⁴ The propensity score weighting estimates can be precisely replicated using a matching method which compares nearest neighbors based on the Mahalanobis metric (e.g., Imbens (2015)).

¹⁵ See also the survey by Imbens/Wooldridge (2009) or the textbook by Wooldridge (2010).

¹⁶ Online Appendix D presents a graphical evaluation of the common support, i.e., the overlap of the propensity score for affected and unaffected plants.

Table 9: Propensity score weighting estimates

	Extensive margin affectedness, <i>Affected</i> = 1			Intensive margin affectedness, <i>Affected</i> = <i>a</i>		
	Empl. Uncertainty	Expected employment development	Wage costs	Empl. Uncertainty	Expected employment development	Wage costs
	(1)	(2)	(3)	(4)	(5)	(6)
ToT_{psw}	0.022*** (0.009)	-0.009** (0.004)	0.108*** (0.015)			
ToT_{psw} ($0 < a \leq 0.2$)				0.028*** (0.010)	-0.003 (0.003)	0.133*** (0.019)
ToT_{psw} ($0.2 < a \leq 0.4$)				0.007 (0.013)	-0.002 (0.007)	0.153*** (0.026)
ToT_{psw} ($0.4 < a \leq 0.6$)				0.032* (0.019)	-0.013 (0.008)	0.161*** (0.030)
ToT_{psw} ($0.6 < a \leq 0.8$)				0.027 (0.020)	-0.016 (0.014)	0.211*** (0.034)
ToT_{psw} ($0.8 < a \leq 1$)				0.063*** (0.024)	-0.035** (0.015)	0.217*** (0.040)

Notes: Propensity score weighting estimates. The propensity score is estimated from a logit specification conditional on lagged covariates displayed in Table 8. Additionally, the estimation conditions on lagged values of y (y_{t-1}, \dots, y_{t-5}) and on indicator variables for missings of y in the panel (m_{t-1}, \dots, m_{t-5}). If $y_{i,t}$ is missing (i.e., $m_{i,t} = 1$), $y_{i,t}$ is defined as the sample average \bar{y} . Standard errors in parentheses are retrieved from a block clustered bootstrap with 500 iterations (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Data source: IAB Establishment Panel 2014, analysis sample. Number of establishments as in Table 3.

or 81-100%. As suggested by Imbens/Wooldridge (2009), I estimate the effect of these different treatments from separate estimations, in which one of these groups is defined as the treatment group of interest while the other intensities of affectedness are left out from the respective estimation. This leads to treatment effect estimations, in which the propensity score and thus also the weighted control group differs for each outcome and intensity of affectedness. For consistency, the assumptions formulated in equations 4 and 5 have to hold for each of the treatment levels.

The results in the first three columns are not qualitatively different from Tables 4 to 6. The effects are very similar in size supporting an effect of the minimum wage on employer expectations. As depicted by the estimates for different degrees of affectedness in columns 4 to 6, the responses in expectations increase when employers are largely affected. I conclude that the treatment effects on all three outcomes are robust when controlling for lagged outcomes and observable characteristics.

6.2 Non-linear difference-in-differences

In this subsection, I estimate probit based non-linear regressions on the two binary outcomes, which are the employment uncertainty and the problem of wage costs:

$$Pr(y = 1) = \Phi(\beta_0 + \textit{Affected} * \psi + d_{2014} * \gamma + \textit{Affected} * d_{2014} * \delta), \quad (6)$$

where ψ is the group effect, γ is the effect of the treatment year 2014, and $Affected * d_{2014}$ is the interaction of interest. In non-linear models, the identification of a treatment effect is less intuitive as group and time effects do not drop when taking the respective differences (Lechner (2011)). However, Puhani (2012) derives the treatment effect on the treated (ToT) based on the potential outcomes framework.¹⁷

In line with Puhani (2012), equation 7 derives the $ToT_{non-linear}$. This is the expectation of the potential outcome when affected (the intensity of affectedness a) minus the expectation of the potential outcome when unaffected, both conditional on the treatment year 2014 and the affectedness a . The difference leads to a treatment effect formulation in which the $ToT_{non-linear}$ is the contribution of the interaction $\delta * a$ to the estimated cumulative distribution function (equation 8).

$$ToT_{non-linear} = E[y^a | d_{2014} = 1, Affected = a] - E[y^0 | d_{2014} = 1, Affected = a] \quad (7)$$

$$= \Phi(\beta_0 + \psi * a + \gamma + \delta * a) - \Phi(\beta_0 + \psi * a + \gamma) \quad (8)$$

When looking at the incidence of affectedness of establishments, i.e., by using the dummy-affectedness without differentiating in the intensity, equation 8 simplifies by inserting $a = 1$. When I instead use the average fraction of affected employees $a = 0.38$, the marginal effect is the treatment effect evaluated at the average affectedness of affected establishments.

Table 10: Partial effects from a non-linear specification

	Extensive margin affectedness, $a = 1$ (1)	Average intensive margin affectedness, $a = 0.38$ (2)
Effect on employment uncertainties		
$ToT_{non-linear}$	0.035*** (0.011)	0.023*** (0.007)
Effect on the concern of raising wage costs		
$ToT_{non-linear}$	0.054*** (0.009)	0.053*** (0.009)

Notes: Partial effects from non-linear difference-in-differences specifications as specified in equation 8. Standard errors in parentheses are retrieved from a block clustered bootstrap with 500 iterations (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

Table 10 displays the treatment effects on the affected establishments for the employment uncertainty and the incidence that wage costs become a problem, which are both binary. Such as in the baseline regressions, Table 10 presents a positive and significant response in the employment uncertainty. Similarly, the effect on wage costs becoming a problem is again positive but smaller compared with Table 6. However, both effects remain statistically

¹⁷ Puhani (2012) shows that marginal effects in non-linear difference-in-differences are differences in cross-differences and therefore differ from simple cross-differences as in Ai/Norton (2003). This is because the interaction itself is the only treatment variable in difference-in-differences, whereas group and time effects are interpreted as control variables (Puhani (2012)).

significant and meaningful in size. Differences in the size of the coefficients are plausible as the treated group is evaluated at a specific point along the estimated cumulative distribution function, which can be rather steep or flat.

7 Heterogeneities by respondent characteristics

In addition to the regular survey questions, the IAB Establishment Panel collects information on the survey respondent, which is a contact person in the establishment. Since I analyze the minimum wage effect on expectations, characteristics of the respondent might be relevant to explain heterogeneities in the expectations. To estimate the effects for different respondents, I fully interact the baseline difference-in-differences specification by respondent characteristics, which include two age groups (below 50 and at least 50), gender, and the job position (manager position and non-managerial position):

$$y_{it} = affected_i * d_{2014} * \delta_1 + C_i * affected_i * d_{2014} * \delta_2 + \Psi_i + d_t * \gamma + C_i * d_t * \rho + \epsilon_{it}, \quad (9)$$

To retrieve effects for each type of respondent, each of the characteristic in C_i is mean-adjusted, i.e. $C_i = Characteristic_i - \overline{Characteristic}$. This ensures that the baseline effect δ_1 is estimated for the average respondent. The treatment effects for specific groups—say female respondents—is then defined by $ToT_{females} = \delta_1 + (1 - \overline{female}) * \delta_2$, whereas the effect for male respondents is $ToT_{males} = \delta_1 + (0 - \overline{female}) * \delta_2$.

Because of missing information in the respondent characteristics, the sample size reduces to 8,804 establishments. Of the respondents 36 percent are females and 64 percent are males. 56 percent are below 50 years of age and 44 percent are at least 50 years old. Finally, 84 percent of the respondents can be classified as managers, whereas the remaining 16 percent are in regular non-managerial job positions. Although the sample size is slightly smaller, Table 11 shows the same baseline effects as presented in Tables 4 to 6. Looking at the effect heterogeneities by age, the treatment effects also remain unchanged. For male respondents the effects on employment uncertainties and the expected employment development seem slightly larger. However, the most impressive effect difference is observed by job position of the respondent. When the respondent is a manager the magnitude of the effects increase, while they turn insignificant for the group of non-managerial respondents. For my analysis, the managers' expectations should be more important as managers ultimately decide over establishment policies such as reductions in employment.

8 Actual adjustments due to expectations

In this section, I analyze how employment expectations are related to actual changes in establishment-level employment. This provides an insight on the magnitude of the detected effects, which also allows to judge about the relevance of these anticipatory expectations.

Table 11: The minimum wage effect on anticipatory expectations by respondent characteristics

	uncertain empl. develop (1)	expected empl. de- velopment (2)	wage costs (3)
Baseline effects:			
<i>ToT</i>	0.024*** (0.009)	-0.008** (0.004)	0.106*** (0.018)
ToT by age-groups of respondents:			
<i>ToT_{young}</i>	0.024* (0.013)	-0.009 (0.005)	0.102*** (0.025)
<i>ToT_{old}</i>	0.024* (0.013)	-0.007 (0.005)	0.112*** (0.025)
ToT by gender of respondents:			
<i>ToT_{females}</i>	0.016 (0.016)	-0.007 (0.007)	0.115*** (0.029)
<i>ToT_{males}</i>	0.029** (0.011)	-0.009* (0.005)	0.101*** (0.023)
ToT by position of respondents:			
<i>ToT_{regular employees}</i>	0.019 (0.023)	0.007 (0.009)	0.017 (0.048)
<i>ToT_{managerial position}</i>	0.025** (0.010)	-0.011*** (0.004)	0.124*** (0.019)
Reduced num. of establishments	8,804	8,582	8,804

Notes: Presented coefficients are partial effects from fixed effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Data source: IAB-Establishment Panel 2010-2014, analysis sample with complete information of the interview respondents.

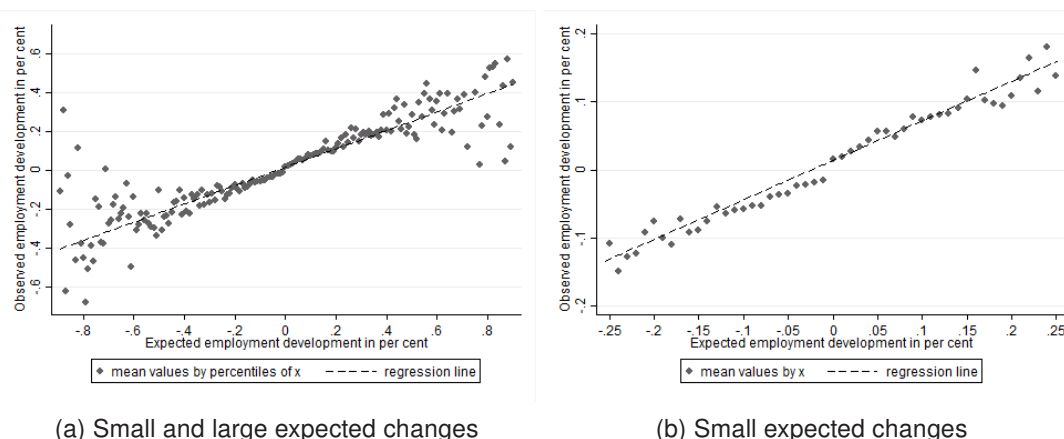
I will predict how the anticipatory expectations translate into real adjustments by estimating a general relationship between between employment uncertainties and subsequently realized employment changes as well as a relationship between the expected employment development and subsequently realized employment adjustments using previous panel waves of the IAB Establishment Panel. This relation retrieved from the past is then used to predict how the expectations will most likely translate into real adjustments. This allows a prediction of the overall employment loss due to responses in expectations, but the underlying assumption of this prediction requires that the 2014 variation in expectations translates into real employment adjustments just as in previous years.¹⁸

I raise the possibility that not only a fall in the expected employment development but also the employment uncertainty may cause real employment adjustments. In the literature various studies show that uncertainties can cause real adjustments (Bachmann/Elstner/Sims (2013); Bloom (2009); Mecikovsky/Meier (2015)). Technically, both outcomes are complementary as they are retrieved from a single survey question. Employers either report to be uncertain about the employment development or they report an explicit prediction concern-

¹⁸ Online Appendix E demonstrated that this assumption is plausible as the relationship between expectations and realized adjustments is quite stable over time.

ing their expected employment development. This allows to add up the effects from both outcomes into a combined measure of employment adjustments.

Figure 2: Descriptive relation between expectations and observed development



Data source: IAB Establishment Panel 1993-2014.

Figure 2 presents the descriptive relation between the expected employment development and actually observed employment adjustments. Both Panels display the mean values of the observed employment adjustments for each percentile bin of the expected employment development. While Panel (a) provides a broad picture including small and large changes, Panel (b) restricts the sample to relatively smaller expected employment changes. Small expected changes lead to a more restrictive sample as small establishments cannot change employment by only few percent. Nevertheless, the zoomed graph demonstrates that the general relationship between expected and actually observed changes does not depend on large outliers. In fact, both graphs show a pretty linear relationship between both variables, where the slope coefficient of the respective bivariate regression is about 0.5. Moreover, the graphical description also shows that this linear pattern holds for positive as well as negative expectations of employers; implying that both positive and negative expectations are over-estimated by the ratio 2 to 1.¹⁹

$$\frac{\text{employment}_{i,t+1} - \text{employment}_{i,t}}{\text{employment}_{i,t}} = \frac{\text{expected employment}_{i,t+1} - \text{employment}_{i,t}}{\text{employment}_{i,t}} * \beta + \Psi_i + \gamma_t + \epsilon_{it} \quad (10)$$

The regression model in equation 10 estimates the relationship between the expected employment development (explanatory variable) and actually realized changes in employment (dependent variable). This yields an exact estimate and a judgement on the precision. Equation 10 also controls for an establishment fixed effect Ψ_i , which captures permanent employer specific over- or underestimations of the expected employment development.

¹⁹ It is theoretical unclear why employers over-estimate employment adjustments. High adjustment costs can be an explorative explanation to the observed divergence.

Moreover, the time effects γ_t control for time-specific deviations from the relation, which could come along with an uncertainty shock induced by an unexpected crisis.

$$\frac{\text{employment}_{i,t+1} - \text{employment}_{i,t}}{\text{employment}_{i,t}} = \text{employment uncertainty}_{i,t} * \beta + \Psi_i + \gamma_t + \epsilon_{it} \quad (11)$$

Using the same regression method, equation 11 quantifies the relation between employment uncertainties (explanatory variable) and actual employment changes (dependent variable).

Table 12: The relation between the expected and the actual employment development

	Dependent variable: Actual employment development in percent			
	(1) (analysis sample)	(2) (1996-2014)	(3) (analysis sample)	(4) (1996-2014)
Expected employment development	0.490*** (0.029)	0.469*** (0.010)		
Employment uncertainty			-0.012 (0.008)	-0.002 (0.004)
Clusters	17,818	41,596	18,503	43,306
N	46,342	193,748	50,021	212,713

Notes: Presented coefficients are partial effects from linear regressions controlling for establishment and year fixed effects. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Data source: IAB Establishment Panel 1996-2014.

Table 12 presents estimates of β as specified in equations 10 and 11 from two alternate samples. I use the analysis sample as well as a much longer panel covering the IAB-Establishment Panel from 1996 to 2014. The relation between employment expectations and actual employment adjustments is slightly below 0.5 and seems stable across various sample periods.^{20,21} By contrast, uncertainties do not have a significant relation with actually observed employment adjustments. While the point estimate is slightly negative, it is not significantly different from zero.

Given the relationship between the expected employment development and actually observed employment changes, I can translate the effect on expectations (Table 5) into a magnitude of real employment adjustments. As about half of the response in expectations is likely to be translated into subsequent employment changes, the employment expectation will cause a reduction in employment of affected establishments by about 0.4 percent ($0.008 * 0.5 = 0.004$). Accounting for the gross population of affected employees, this allows for a rough calculation of the employment loss due to anticipatory expectations using the following equation:

²⁰ The estimate of 0.5 remains unchanged (but is less precise) when I use using a sample of affected establishments only, which corresponds to the group of treated establishments, for which the treatment effect on the treated (ToT) was estimated in Tables 4 to 6.

²¹ Online Appendix E adds additional time interactions to demonstrate that the estimated relationships are stable over time.

$$\text{predicted empl. loss} = \underbrace{\text{response in expectation}}_{0.008} * \underbrace{\text{realized fraction}}_{0.5} * \underbrace{\text{empl. in affected establ}}_{3\,203\,051} \quad (12)$$

Since the *response in expectation* is 0.008 (Table 5), the *realized fraction* is 0.5 (Table 12), and the total *employment in affected establishments* is calculated as 3 203 051 (Table 2), the predicted employment loss due to responses in expectations corresponds to approximately 12 800 jobs.

9 Conclusion

I evaluate the employers' expectations in anticipation of the minimum wage introduction in Germany. The response in expectations is estimated at a point in time when the minimum wage introduction was announced and decided but not in force. The IAB Establishment Panel allows for a difference-in-differences comparison of affected and unaffected establishments. The results show that the employment uncertainty increases among the group of affected employers. Moreover, the minimum wage announcement affects the expected employment development (if foreseeable) to shrink by about 0.8 percent at affected establishments. Finally, the results also reveal a large relative increase in the affected employers reporting that wage costs become a problem. When looking at different intensities of affectedness, the effects increase in size when establishments are most severely affected.

Since common trends in the absence of treatment are a major assumption in difference-in-differences analyses, I provide a robustness check in which I weight the control group based on past levels of the outcome variables. Based on a propensity score weighting method, the results are similar compared with the baseline. In a second robustness check, I use a probit based non-linear difference-in-differences as suggested by Puhani (2012). Again, the effects remain largely unchanged. When looking at heterogeneities by different survey respondents, the results seem largely driven by managers. However, managers should be the group of respondents which is of highest relevance as these ultimately decide over changes in employment.

In a final step, the responses on the expected employment development are translated into a predicted employment loss. I predict this loss by estimating the relationship between expectations and subsequently observed changes from previous panel waves of the IAB Establishment Panel. This exercise reveals that about half of the expectation is likely to be realized. This in turn predicts that responses in expectations cause a loss of about 12 800 jobs at affected establishments. This job-loss calculation is a lower bound estimate as the effect size increases when looking at manager respondents only. Moreover, the overall employment loss, which was predicted in ex-ante evaluation studies (e.g., Arni et al. (2014); Knabe/Schöb/Thum (2014)), might be larger than my own calculation because I solely look at employment losses due to anticipatory expectations.

The results demonstrate that legislations can change expectations even before they come in force. As such expectations may also affect real measures (Bachmann/Elstner/Sims (2013); Bloom (2009); Mecikovsky/Meier (2015)), politics should consider anticipatory expectations in policy making. But also the empirical research community should be aware of anticipatory expectations as most ex-post evaluation methods exclude any kind of anticipation by assumption.

While the presented analysis reveals meaningful responses in expectations concerning the new German minimum wage, this does not substitute empirical ex-post evaluations. The results rather demonstrate that employment effects can be identified even if they are small.

References

- Abadie, Alberto; Diamond, Alexis; Hainmueller, Jens (2015): Comparative Politics and the Synthetic Control Method. In: *American Journal of Political Science*, Vol. 59, No. 2, p. 495–510.
- Abadie, Alberto; Diamond, Alexis; Hainmueller, Jens (2010): Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program. In: *Journal of the American Statistical Association*, Vol. 105, No. 490, p. 493–505.
- Ahern, Kenneth R.; Dittmar, Amy K. (2012): The Changing of the Boards: The impact on firm valuation of mandated female board representation. In: *The Quarterly Journal of Economics*, Vol. 127, No. 1, p. 137–197.
- Ai, Chunrong; Norton, Edward C. (2003): Interaction terms in logit and probit models. In: *Economics Letters*, Vol. 80, No. 1, p. 123–129.
- Akerlof, George A. (1970): The market for "lemons": Quality uncertainty and the market mechanism. In: *The Quarterly Journal of Economics*, Vol. 84, No. 3, p. 488–500.
- Aretz, Bodo; Arntz, Melanie; Gregory, Terry (2013): The Minimum Wage Affects Them All: Evidence on Employment Spillovers in the Roofing Sector. In: *German Economic Review*, Vol. 14, No. 3, p. 282–315.
- Arni, Patrick; Eichhorst, Werner; Pestel, Nico; Spermann, Alexander; Zimmermann, Klaus F. (2014): Der gesetzliche Mindestlohn in Deutschland: Einsichten und Handlungsempfehlungen aus der Evaluationsforschung. In: *Journal of Applied Social Science Studies*, Vol. 134, p. 149–182.
- Bachmann, Rüdiger; Elstner, Steffen; Sims, Eric R. (2013): Uncertainty and Economic Activity: Evidence from Business Survey Data. In: *American Economic Journal: Macroeconomics*, Vol. 5, No. 2, p. 217–249.
- Bellmann, Lutz; Bossler, Mario; Gerner, Hans-Dieter; Hübler, Olaf (2015): Reichweite des Mindestlohns in deutschen Betrieben. In: *IAB-Kurzbericht*, 6/2015.
- Bloom, Nicholas (2009): The impact of uncertainty shocks. In: *Econometrica*, Vol. 77, No. 3, p. 623–685.
- Dickens, Richard; Manning, Alan (2004): Spikes and Spill-overs: The impact of the national minimum wage on the wage distribution in a low-wage sector. In: *The Economic Journal*, Vol. 114, No. 494, p. C95–C101.
- Dube, Arindrajit.; Lester, T. William.; Reich, Michael. (2010): Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties. In: *The Review of Economics and Statistics*, Vol. 92, No. 4, p. 945–964.
- Ellguth, Peter; Kohaut, Susanne; Möller, Iris (2014): The IAB Establishment Panel - methodological essentials and data quality. In: *Journal for Labour Market Research*, Vol. 47, No. 1-2, p. 27–41.

Fischer, Gabriele; Janik, Florian; Müller, Dana; Schmucker, Alexandra (2009): The IAB Establishment Panel * things users should know. In: *Journal of Applied Social Science Studies*, Vol. 129, No. 1, p. 133–148.

Frings, Hanna (2013): The Employment Effect of Industry-Specific, Collectively Bargained Minimum Wages. In: *German Economic Review*, Vol. 14, No. 3, p. 258–281.

Heckman, James J; Ichimura, Hidehiko; Todd, Petra (1998): Matching as an econometric evaluation estimator. In: *The Review of Economic Studies*, Vol. 65, No. 2, p. 261–294.

Imbens, Guido W. (2015): Matching Methods in Practice: Three Examples. In: *Journal of Human Resources*, Vol. 50, No. 2, p. 373–419.

Imbens, Guido W.; Wooldridge, Jeffrey M. (2009): Recent Developments in the Econometrics of Program Evaluation. In: *Journal of Economic Literature*, Vol. 47, No. 1, p. 5–86.

Knabe, Andreas; Schöb, Ronnie; Thum, Marcel (2014): Der flächendeckende Mindestlohn. In: *Perspektiven der Wirtschaftspolitik*, Vol. 15, No. 2, p. 133–157.

König, Marion; Möller, Joachim (2009): Impacts of minimum wages: a microdata analysis for the German construction sector. In: *International Journal of Manpower*, Vol. 30, No. 7, p. 716–741.

Kubis, Alexander; Rebien, Martina; Weber, Enzo (2015): Neueinstellungen im Jahr 2014: Mindestlohn spielt schon im Vorfeld eine Rolle. In: *IAB-Kurzbericht*, 12/2015.

Lechner, Michael (2011): The Estimation of Causal Effects by Difference-in-Difference Methods. In: *Foundations and Trends (R) in Econometrics*, Vol. 4, No. 3, p. 165–224.

Mecikovsky, Ariel; Meier, Matthias (2015): Do plants freeze upon uncertainty shocks? In: mimeo.

Möller, Joachim (2014): Werden die Auswirkungen des Mindestlohns überschätzt? In: *Wirtschaftsdienst*, Vol. 94, No. 6, p. 387–392.

Neumark, David; Salas, J.M. Ian; Wascher, William (2014): More on recent evidence on the effects of minimum wages in the United States. In: *IZA Journal of Labor Policy*, Vol. 3, No. 1, p. 24.

Neumark, David; Wascher, William L. (2006): Minimum Wages and Employment. In: *Foundations and Trends® in Microeconomics*, Vol. 3, No. 1–2, p. 1–182.

Puhani, Patrick A. (2012): The treatment effect, the cross difference, and the interaction term in nonlinear “difference-in-differences” models. In: *Economics Letters*, Vol. 115, No. 1, p. 85–87.

Rosenbaum, Paul R. (1987): Model-based direct adjustment. In: *Journal of the American Statistical Association*, Vol. 82, No. 398, p. 387–394.

Sachverständigenrat (2014): Mehr Vertrauen in Marktprozesse, Jahresgutachten 14/15, p. 8. URL http://www.sachverstaendigenrat-wirtschaft.de/fileadmin/dateiablage/gutachten/jg201415/JG14_ges.pdf, last access on 22 July 2015.

vom Berge, Philipp; Frings, Hanna; Paloyo, Alfredo R. (2013): High-impact minimum wages and heterogeneous regions. In: Ruhr economic papers, 408, Essen.

Von Neumann, John; Morgenstern, Oskar (1944): Theory of Games and Economic Behavior. In: Princeton: Princeton UP.

Wooldridge, Jeffrey M. (2010): Econometric Analysis of Cross Section and Panel Data. Cambridge: The MIT Press, 2nd ed..

ZEIT ONLINE (2014): Merkel streitet mit Wirtschaftsweisen über Mindestlohn. URL <http://www.zeit.de/wirtschaft/2014-11/wirtschaftsweisen-angela-merkel-mindestlohn-streit>, last access on 22 July 2015.

Zimmermann, Klaus F. (2014): Germany's Minimum Wage needs Independent Evaluation. In: IZA Compact, Vol. May-Issue.

A Online Appendix: The response of anticipating establishments

In this online appendix, I analyze whether employers that adjusted wages in anticipation of the minimum wage have different expectations concerning the expected employment development. For this robustness check, I include the observations of establishments which report to have adjusted wages in anticipation of the minimum wage introduction. For the estimation, I use equation 2 of the article and add an additional treatment effect for such anticipating establishments, i.e., an interaction between this group of establishments and the year 2014. In a second step, I further separate this group of anticipating establishments into workplaces that still employ workers below €8.50 and workplaces that no longer employ any affected employees.

The results in Table A1 show that the overall group of anticipating establishments has a much smaller effect on employment uncertainties and the expected employment development. When looking at columns 4 to 6, the group of employers which anticipates but is no longer affected shows no response in expectations, whereas the group of anticipating but still affected employers shows very similar expectations as the baseline treatment group.

Table A1: Effects of the group of anticipating establishments

	Including anticipating establishments			Including two different groups of anticipating establishments		
	Empl. Uncertainty (1)	Expected employment development (2)	Wage costs (3)	Empl. Uncertainty (4)	Expected employment development (5)	Wage costs (6)
Affected	0.027*** (0.008)	-0.008** (0.003)	0.109*** (0.011)	0.027*** (0.008)	-0.008** (0.003)	0.104*** (0.016)
Anticipating	0.005 (0.007)	-0.006* (0.003)	0.104*** (0.016)			
Anticipating and affected				0.022** (0.011)	-0.010** (0.004)	0.162*** (0.024)
Anticipating but unaffected				-0.008 (0.010)	-0.003 (0.005)	-0.018 (0.022)

Notes: Presented coefficients are partial effects from fixed effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

B Online Appendix: OLS and random effects estimation

In this online appendix, I re-estimate the baseline specifications using OLS and random effects instead of fixed effects. The OLS specification includes a group effect ($affected_i$) instead of fixed effects (Ψ_i):

$$y_{it} = affected_i * d_{2014} * \delta + affected_i + \gamma_t + \epsilon_{it}. \quad (13)$$

The random effects specification also includes a group effect ($affected_i$), and in addition an establishment-specific random effect Ψ_i , which is by assumption not correlated with other right hand side variables:

$$y_{it} = affected_i * d_{2014} * \delta + affected_i + \gamma_t + \Psi_i + \epsilon_{it}. \quad (14)$$

Technically, the results should not differ by much. In a balanced panel, difference-in-differences estimates from equations 2, 13, and 14 should lead to very similar point estimates. However, if the analysis sample is unbalanced, differences between fixed effects, random effects, and OLS can be driven by selective panel attrition.

The treatment effects from OLS regressions presented in Table B1 are very similar compared with the fixed effect specifications in the article, and also the treatment effects from random effects estimation (Table B2) are very similar. Moreover, they seem slightly more precisely estimated.

Table B1: Regression Results using OLS specifications

	Extensive affectedness			Intensive affectedness		
	(1) Baseline	(2) With controls	(3) Placebo	(4) Baseline	(5) With controls	(6) Placebo
Effect on employment uncertainties						
ToT	0.024*** (0.008)	0.025*** (0.008)	0.002 (0.008)	0.048*** (0.018)	0.052*** (0.018)	0.009 (0.017)
Effect on the expected employment development						
ToT	-0.008** (0.003)	-0.009** (0.003)	-0.002 (0.003)	-0.022*** (0.009)	-0.024*** (0.009)	-0.006 (0.009)
Effect on the concern of raising wage costs						
ToT	0.095*** (0.015)	0.095*** (0.015)	0.006 (0.018)	0.213*** (0.032)	0.213*** (0.032)	0.026 (0.035)

Notes: Presented coefficients are partial effects from OLS regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Covariates in columns (2) and (5) are dummies for collective bargaining, works councils, and fractions of females and high qualified employees.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

Table B2: Regression Results using random effects specifications

	Extensive affectedness			Intensive affectedness		
	(1) Baseline	(2) With controls	(3) Placebo	(4) Baseline	(5) With controls	(6) Placebo
Effect on employment uncertainties						
ToT	0.025*** (0.008)	0.026*** (0.008)	0.001 (0.008)	0.052*** (0.018)	0.055*** (0.018)	0.009 (0.016)
Effect on the expected employment development						
ToT	-0.008** (0.003)	-0.009*** (0.003)	-0.002 (0.003)	-0.024*** (0.008)	-0.025*** (0.008)	-0.007 (0.009)
Effect on the concern of raising wage costs						
ToT	0.099*** (0.014)	0.098*** (0.014)	0.011 (0.017)	0.219*** (0.032)	0.215*** (0.032)	0.030 (0.035)

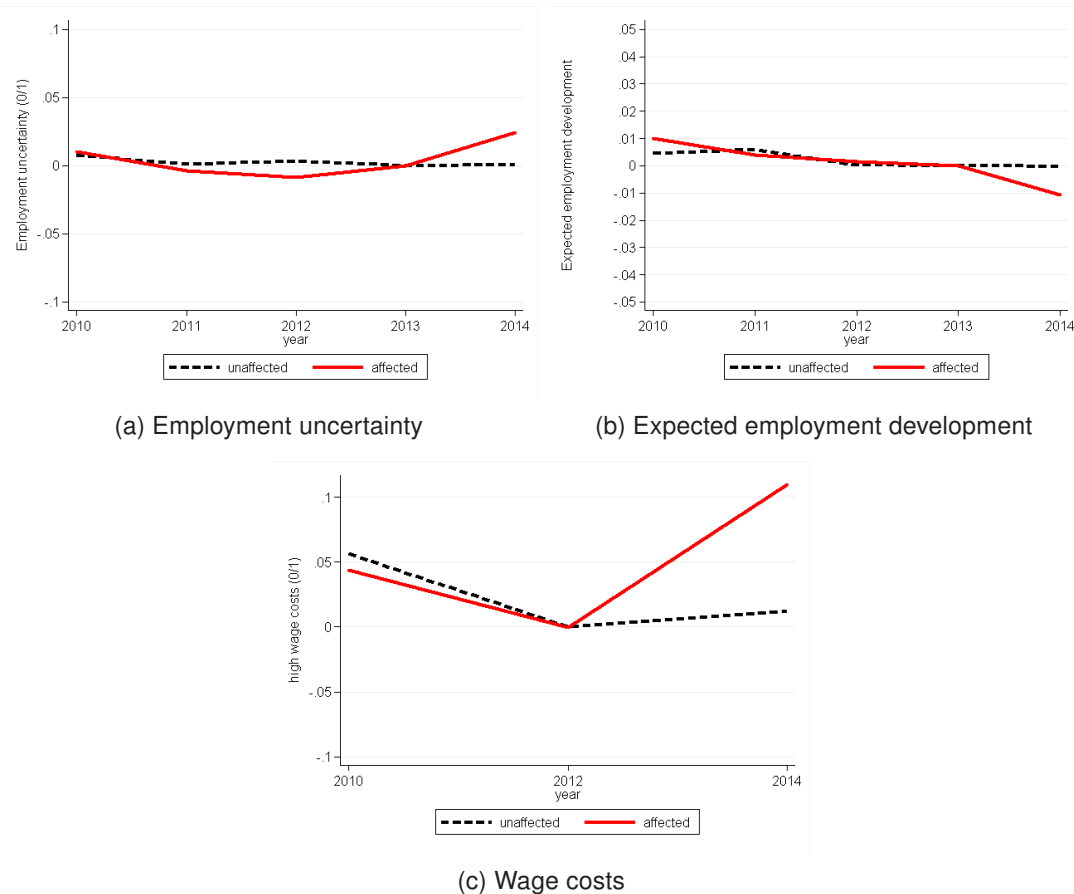
Notes: Presented coefficients are partial effects from random effect regressions. Cluster robust standard errors are presented in parentheses (cluster=establishment). Asterisks indicate significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Covariates in columns (2) and (5) are dummies for collective bargaining, works councils, and fractions of females and high qualified employees.

Data source: IAB Establishment Panel 2010-2014, analysis sample. Number of establishments as in Table 3.

C Online Appendix: Intensive margin employment trends

In this online appendix, I present the employment trends using the intensive margin treatment assignment. While the dashed line still represents unaffected plants, the red line comprises affected plants weighted by their intensive margin affectedness, which is the fraction of affected employees within affected plants. In figure C1, the time series do not show meaningful differences compared with the extensive margin time trends presented in the paper.

Figure C1: Time series of the dependent variables by the intensive margin affectedness

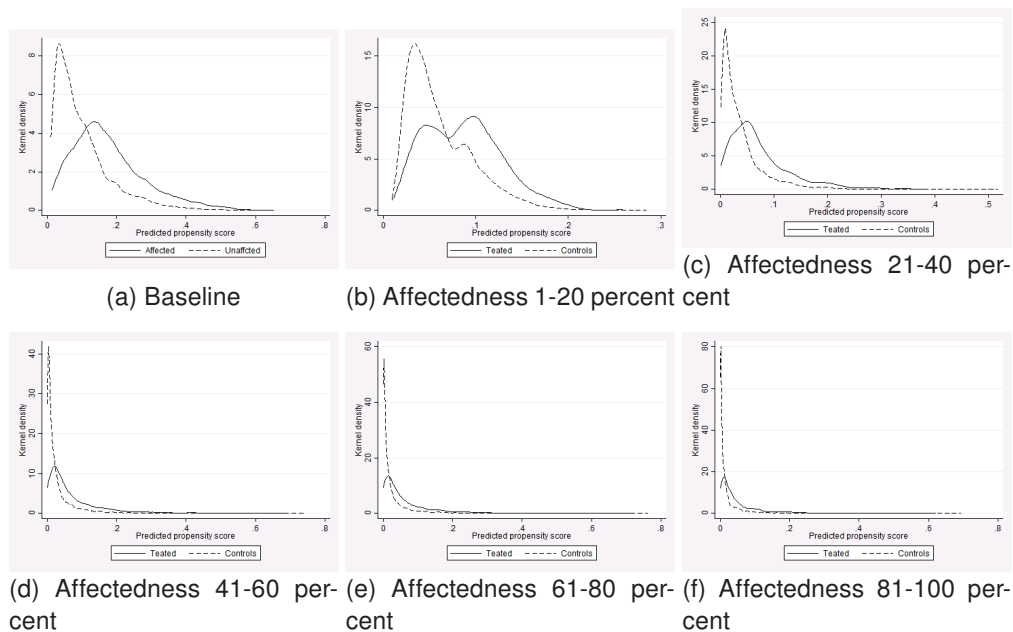


Data source: IAB Establishment Panel 2010-2014, analysis sample, own calculations.

D Online Appendix: Propensity score overlap after propensity score weighting

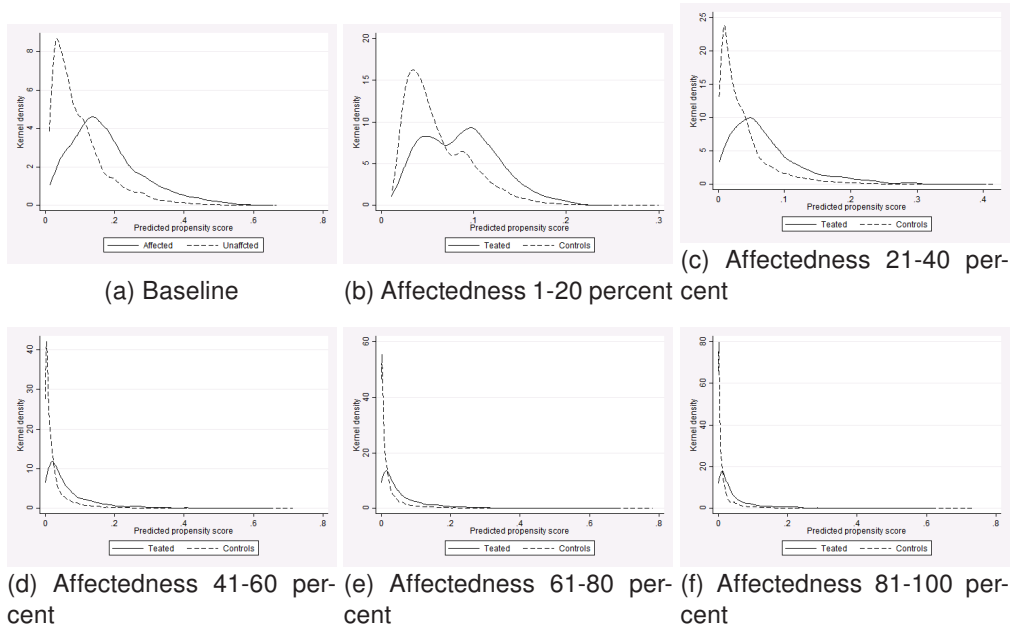
In this online appendix, I provide a graphical description of the densities of the propensity scores by affectedness of establishments. This is important because it shows that there is sufficient common support in the propensity score for the estimates presented in section 6.1. Figure D1 presents the overlap for the outcome that the employment development is uncertain, Figure D2 for the expected employment development, and Figure D3 for the reported problem of rising wage costs. The graphs show that propensities scores of the control group largely overlap with the propensity scores of the treatment group for all outcomes and intensities of affectedness.

Figure D1: Common support in the propensity score for the outcome employment uncertainty



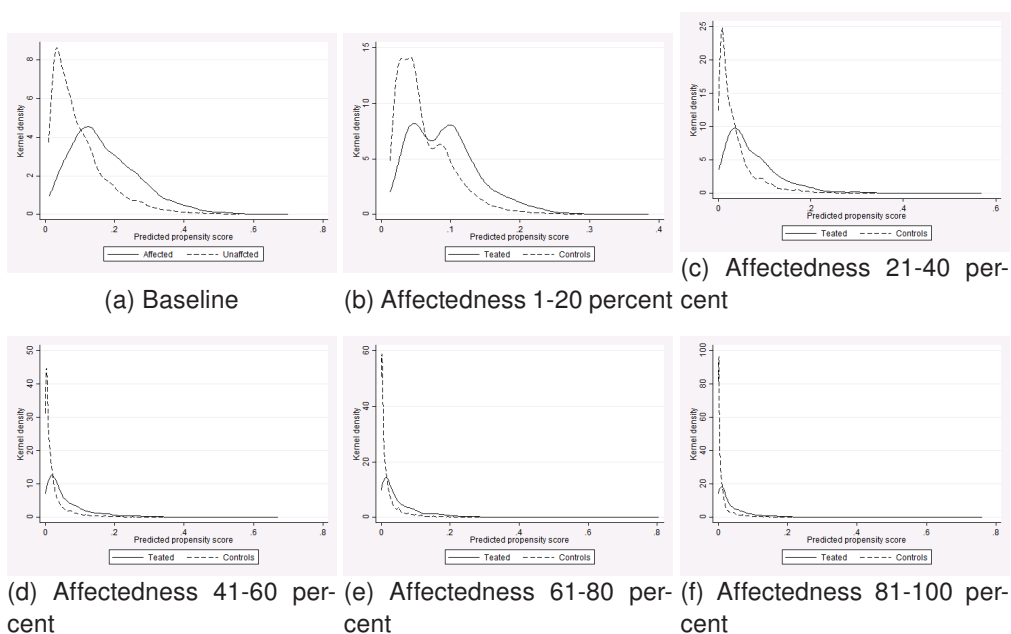
Data source: IAB Establishment Panel 2010-2014, analysis sample.

Figure D2: Common support in the propensity score for the expected empl. development



Data source: IAB Establishment Panel 2010-2014, analysis sample.

Figure D3: Common support in the propensity score for high reported wage costs

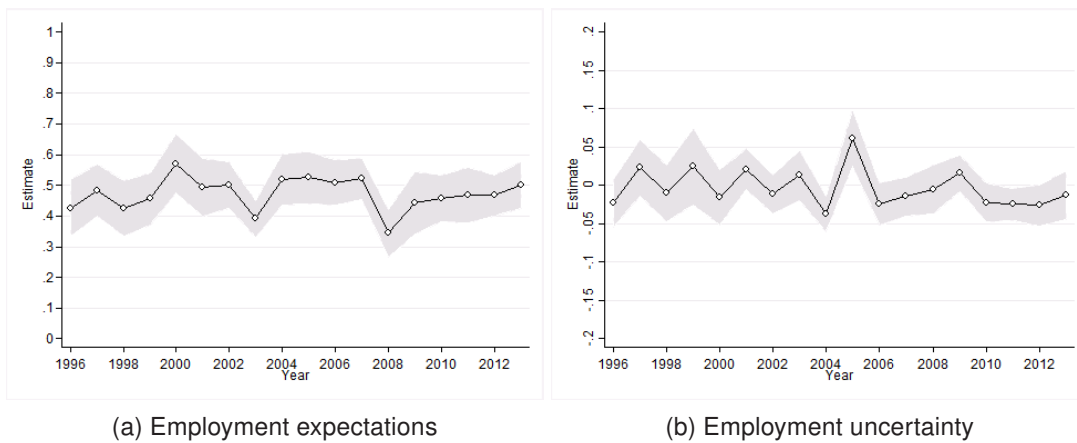


Data source: IAB Establishment Panel 2010-2014, analysis sample.

E Online Appendix: The relationship between expectations and the observed employment development over time.

In this Online Appendix, I re-estimate the relationship between expectations and subsequently observed employment changes. To estimate the relationship for each year separately, I add yearly interactions to the equations 10 and 11. The respective estimates are illustrated in Figure E1. Panel (a) shows the relationship between employment expectations and subsequently observed employment changes over time, and Panel (b) shows the relationship between employment uncertainty and subsequently observed employment changes over time. Both patterns show only small deviations from the average time-constant effect presented in the article.

Figure E1: Relation between employment expectations and subsequently observed changes over time



Data source: IAB Establishment Panel 1996-2014.

Recently published

No.	Author(s)	Title	Date
24/2015	Dietrich, H.	Jugendarbeitslosigkeit aus einer europäischen Perspektive: Theoretische Ansätze, empirische Konzepte und ausgewählte Befunde	9/15
25/2015	Christoph, B.	Empirische Maße zur Erfassung von Armut und materiellen Lebensbedingungen: Ansätze und Konzepte im Überblick	9/15
26/2015	Bauer, A.	Reallocation patterns across occupations	9/15
27/2015	Dauth, W. Fuchs, M. Otto, A.	Long-run processes of geographical concentration and dispersion: Evidence from Germany	9/15
28/2015	Klinger, S. Weber, E.	Detecting unemployment hysteresis: A simultaneous unobserved components model with Markov switching	10/15
29/2015	Eckman, S. Kreuter, F.	Misreporting to looping questions in surveys: Recall, motivation and burden	10/15
30/2015	Lehmann, R. Weyh, A.	Forecasting employment in Europe: Are survey results helpful?	11/15
31/2015	Umkehrer, M.	The impact of changing youth employment patterns on future wages	11/15
32/2015	Fuchs, J. Weber, E.	Long-term unemployment and labor force participation: A decomposition of unemployment to test for the discouragement and added worker hypotheses	11/15
33/2015	Reichelt, M., Haas, A.	Commuting farther and earning more? How employment density moderates workers' commuting distance	11/15
34/2015	van den Berg, G. Uhlendorff, A. Wolff, J.	Under heavy pressure: Intense monitoring and accumulation of sanctions for young welfare recipients in Germany	12/15
35/2015	Kampkötter, P. Mohrenweiser, J. Sliwka, D. Steffes, S. Wolter, S.	Measuring the use of human resources practices and employee attitudes: The Linked Personnel Panel	12/15
1/2015	Mendolicchio, C. Pietra, T.	Endowment redistribution and Pareto improvements in GEI economies	1/16
2/2015	Van den Berg, G. Hofmann, B. Uhlendorff, A.	The role of sickness in the evaluation of job search assistance and sanctions	1/16

As per: 2016-02-02

For a full list, consult the IAB website

<http://www.iab.de/de/publikationen/discussionpaper.aspx>

Imprint

IAB-Discussion Paper 3/2016

2 February 2016

Editorial address

Institute for Employment Research
of the Federal Employment Agency
Regensburger Str. 104
D-90478 Nuremberg

Editorial staff

Ricardo Martinez Moya, Jutta Palm-Nowak

Technical completion

Gertrud Steele

All rights reserved

Reproduction and distribution in any form, also in parts,
requires the permission of IAB Nuremberg

Website

<http://www.iab.de>

Download of this Discussion Paper

<http://doku.iab.de/discussionpapers/2016/dp0316.pdf>

ISSN 2195-2663

For further inquiries contact the author:

Mario Bossler

Phone +49.911.179 3043

E-mail mario.bossler@iab.de