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Do minimum wages increase job satisfaction?

Micro data evidence from the new German
minimum wage

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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.

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Abstract

On 1 January 2015 a new statutory minimum wage of € 8.50 per hour of work was introduced in Germany. Using a difference-in-differences approach, we estimate effects on worker-level outcomes of continuing employees. The results reveal a meaningful absolute increase in the affected workers' pay satisfaction. The increase in job satisfaction is modest and predominantly driven by changes in pay satisfaction implying only a small effect on all other dimensions of job satisfaction. Moreover, effects from the minimum wage on work engagement and turnover intention are virtually zero.

Zusammenfassung

In Deutschland wurde am 1. Januar 2015 der gesetzliche Mindestlohn von € 8.50 pro Arbeitsstunde eingeführt. Mit einer Analyse von Differenzen-in-Differenzen schätzen wir den Effekt auf Outcomes von anhaltend Beschäftigten. Die Ergebnisse zeigen einen deutlichen absoluten Anstieg in der Entlohnungszufriedenheit von betroffenen Personen. Änderungen in der generellen Jobzufriedenheit sind weitestgehend durch den Anstieg in der Entlohnungszufriedenheit getrieben, sodass nur ein kleiner Effekt auf andere Dimensionen der Jobzufriedenheit bestehen bleibt. Effekte des Mindestlohns auf den Arbeitseinsatz und die Bleibebereitschaft zeigen sich nicht.

JEL classification: J28, J38, J63

Keywords: minimum wage, job satisfaction, work engagement, turnover intention, Germany

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1 Introduction

The new German minimum wage, which was introduced on 1 January 2015, requires an hourly wage of at least € 8.50. Prior to its implementation it was heavily debated whether the new minimum wage has negative employment effects. While there might be small disemployment effects (Bossler and Gerner 2016), impacts on continuing employees have not been investigated so far. Using worker-level panel data we look at effects of the minimum wage on job and pay satisfaction as well as on productivity-relevant outcomes such as work engagement and turnover intention.

The vast majority of the economic literature on minimum wages looks at employment effects. Most empirical studies analyze minimum wages in the US and they still debate whether or not there is a disemployment effect (Addison, Blackburn and Cotti 2015; Dube, Lester and Reich 2010; Neumark, Salas and Wascher 2014; Meer and West 2016). In Europe, the literature is much concentrated on the minimum wage in the UK, whereby most studies detect only small negative employment effects (Machin, Manning and Rahman 2003; Dolton, Rosazza Bondibene and Stops 2015). In line with these findings in the UK is a recent evaluation of the new German minimum wage by Bossler and Gerner (2016), who detect a modest job loss which is mostly driven by a reduction in hires.

In the last decade, the literature on employment adjustments moved towards explaining labor turnover. Studies for Canada (Brochu and Green 2013), Portugal (Portugal and Cardoso 2006), the US (Dube, Lester and Reich 2016; Gittings and Schmutte 2016) and also for Germany (Bossler and Gerner 2016) find a significant reduction in turnover induced by the minimum wage. So far, little attention has been paid to the effects of minimum wages on continuing workers' satisfaction, productivity (Riley and Rosazza Bondibene 2015) and work effort (Owens and Kagel 2010). Changes in these outcomes however could explain why labor demand adjustments are small (Schmitt 2015).

We start by analyzing effects on job and pay satisfaction, before moving to outcomes related to effort and turnover. Analyzing impacts on these satisfaction variables is particularly relevant as they measure the workers' subjective gains from the minimum wage. Moreover, the literature has shown that an increase in job satisfaction can in turn cause a rise in productivity (Böckerman and Ilmakunnas 2012).

At a first glance, it seems intuitive that minimum wages increase pay satisfaction since the law requires paying higher wages to affected workers. Also empirically, a positive relation between wages and satisfaction is well established (Powdthavee 2009 or Lydon and Chevalier 2002). However, this effect can be offset by adjustments of hourly wages through a reduction in paid working hours. Moreover, the minimum wage might have negative externalities on prices on the product market. These arguments hint at the possibility that the minimum wage does not vastly increase the purchasing power of affected employees. Thus, it is not clear a priori to what extent minimum wages increase the treated workers' pay satisfaction.

We identify effects using a difference-in-differences estimation that compares employees affected by the minimum wage with unaffected employees. For the treatment assignment, we distinguish two different definitions. First, an objective differentiation based on 2013 hourly wages. Second, a subjective assessment, which allows differentiating between employees who report to have received a pay raise and adversely affected employees who report a pay cut, a reduction in bonus payments, or an increased work-load.

We contribute to the literature by presenting first evidence for an absolute increase in job and pay satisfaction induced by minimum wages. As we shall see there is a meaningful difference when looking at workers who report to have received a pay raise compared to objectively treated workers. Additionally, the study provides first insights into the relationship between the minimum wage and survey measures for work engagement and turnover intention. While effects on these variables could be a rational explanation for the relatively small labor demand adjustments (Schmitt 2015), we do not detect any beneficial effects here.

The article proceeds as follows: Section 2 provides a description of the Linked Personnel Panel, which we use for our analyses, and describes the treatment assignment. In Section 3 we present the baseline effects of the minimum wage on job and pay satisfaction and check the robustness with respect to spillovers. Section 4 discusses the relation between job and pay satisfaction and shows whether there is an effect on job satisfaction irrespective of the pay dimension. In section 5 we address effects on work engagement and turnover intention. The last section concludes.

2 Data

2.1 The Linked Personnel Panel

For our analyses, we use the German Linked Personnel Panel (LPP) provided by the IAB. The LPP is a biennial linked employer-employee survey attached to the IAB Establishment Panel, which itself is a representative establishment survey on firm policies and labour demand in Germany.¹ For the LPP employer survey, establishments from the industries agriculture, forestry and fishery, as well as civil services and charity organisations were excluded. Furthermore, the sample was limited to establishments with at least 50 employees liable to social security. The employee level of the LPP, which randomly includes employees from within these establishments, is the core of our analysis. The collected employee data includes information on demographic features, job characteristics, as well as self-assessed job specific attitudes such as job and pay satisfaction.²

¹ Further information on the IAB Establishment Panel is provided in Ellguth, Kohaut and Möller (2014) and Fischer, Janik, Müller and Schmucker (2009).

² Comprehensive descriptions of the LPP including an analysis of sample selectivity are provided by Bellmann et al. (2015) and Broszeit and Wolter (2015).

The LPP has a panel dimension and allows comparing affected with unaffected employees over time. The first wave of the LPP was surveyed early in 2013, which is almost two years ahead of the minimum wage introduction. The second wave followed in 2015 only a few months after the introduction of the new statutory minimum wage on 1 January 2015.

2.2 Treatment assignment

The data include different variables allowing for two alternative definitions of the group of treated employees. First, we construct an objective affectedness measure using 2013 hourly wages.³ Based on real wages,⁴ we define employees with an hourly wage below € 8.50 as affected and individuals with a wage above € 8.50 to be unaffected. Due to the possibility of spillover effects along the wage distribution, the minimum wage could affect wages even above € 8.50 (Aretz, Arntz and Gregory 2013; Dittrich, Knabe and Leipold 2014). In a robustness check, we therefore restrict the control group to individuals with an initial hourly wage above € 10.

Second, we construct a treatment definition using direct survey responses included in the 2015 survey, asking employees whether they feel affected by the minimum wage. For this subjective treatment assignment, the survey allows differentiating between positively affected employees, who report to have experienced a pay raise, and adversely affected employees, who report to have experienced a cut in bonus payments, an increased workload or did not receive an expected pay raise.⁵

[Table 1 about here]

Table 1 presents summary statistics of the analysis sample. The balanced sample comprises 2,754 employees, who participated in the survey both in 2013 and after the minimum wage introduction in 2015. Of these employees, 109 are objectively affected by the minimum wage introduction. 100 employees report to have experienced a pay raise and 81 indicate to be adversely affected by the minimum wage.

These descriptive figures imply a share of objectively affected employees which is 4.0 percent and a share of subjectively benefitting employees which is 3.6 percent. Looking at the same size categories in the IAB Establishment Panel, we receive an affectedness of 3.0 percent of the employees. Hence, the information on affectedness collected in the LPP is comparable to the aggregated information in the IAB Establishment Panel, supporting the representativeness of our sample.

³ Since the wage variable has about 10 percent missing values in the survey data, we additionally use administrative data from the Integrated Employment Biographies (IEB) to impute the missing wage information of 2013 for the definition of objectively affected employees.

⁴ We deflate 2013 wages using the consumer price index provided by the German Central Bank (“Deutsche Bundesbank”).

⁵ Due to small numbers of observations we do not differentiate between these sub-categories in our analyses.

3 Empirical analysis

We start with a baseline analysis estimating the effects of the minimum wage on job and pay satisfaction. We use a difference-in-differences specification which yields a treatment effect on the treated workers, whereby the objective and the subjective treatment assignment are exploited separately.

3.1 Baseline specification

The baseline estimates are retrieved from the following difference-in-differences specification:

$$y_{it} = affected_i * d2015_t * \delta + d2015_t \beta_1 + X_{it} \beta_2 + \theta_i + \varepsilon_{it} \quad (1),$$

in which θ_i is an employee-specific fixed effect capturing all time-constant differences between affected and unaffected employees, β_1 denotes a time effect, which is constant for all employees and β_2 captures effects of time-varying covariates included in the matrix X_{it} . The treatment effect of interest δ estimates the difference in the development of the dependent variable y_{it} for the group of affected employees. ε_{it} is an idiosyncratic error for which we allow a clustered individual-specific error correlation.

When looking at the subjective affectedness we observe two different treatment groups. This leads to a specification with two interaction effects:

$$y_{it} = positively\ affected_i * d2015_t * \delta_1 + adversely\ affected_i * d2015_t * \delta_2 + d2015_t \beta_1 + X_{it} \beta_2 + \theta_i + \varepsilon_{it} \quad (2),$$

where δ_1 is the treatment effect on the positively affected employees and δ_2 is the treatment effect on the adversely affected employees.

An underlying assumption of the difference-in-differences analysis requires that individuals from the treatment and control group would have evolved equally in the outcome variables if the minimum wage had not been introduced. With two waves of data we cannot inspect parallel trends ahead of the minimum wage introduction. We instead estimate several specifications with and without control variables to ensure that the treatment and control group are in fact similar and would have developed equally in the absence of the minimum wage introduction.

3.2 Baseline regression results

The baseline results on job and pay satisfaction using the objective treatment assignment are displayed in Table 2. Columns 1 and 3 present effects without control variables; in columns 2 and 4 control variables for individual and job characteristics are included. The treatment effect on pay satisfaction of affected employees is positive and large both with and without control variables. The effects on the overall job

satisfaction are also positive and of meaningful size, but fall short of conventional significance levels.

[Table 2 about here]

In Table 3 we again estimate treatment effects from difference-in-differences specifications, but use the subjective treatment assignment. This allows estimating two treatment effects: first, for employees who report to have received a pay raise, and second, for individuals who report to be adversely affected by the minimum wage. We again present estimates with (columns 2 and 4) and without (columns 1 and 3) control variables.

[Table 3 about here]

For individuals who report to have received a pay raise, the effect on pay satisfaction is large and highly significant. Moreover, we find positive effects on job satisfaction when employees report a pay raise. The effects on adversely affected employees lack precision, but still point in the expected negative direction and are not negligible in size.

[Table 4 about here]

The reported effects are larger when using the subjective treatment assignment compared with the objective treatment assignment. But, when we calculate the wage effects for these two different treatment assignments, as reported in Table 4, the treatment effects reveal a large and positive pay raise of about 20 percent for the objectively treated employees, but much smaller and imprecise effects when using the subjective treatment assignment. The wage effect is virtually zero for employees who report to have received a pay raise as well as for the group that feels adversely affected. In combination with the results before, employees have to feel positively affected by the policy measure to experience positive effects on job and pay satisfaction. As the small wage effect indicates, this positive subjective affectiveness does not require a significant pay raise.

3.3 Discussion

The observed differences in the results of the two treatment assignments imply that the two treatment definitions are only partially overlapping. Of the 2,754 employees in the analysis sample, 51 individuals report to have received a pay raise and are objectively treated; another 49 employees report to have received a pay raise, but are not objectively treated. Finally, 58 employees do not report to have received a pay raise, but are objectively affected. This divergence corresponds with other data sources such as the British Household Panel, which included a measure of affectiveness for the UK minimum wage introduction (Stewart and Swaffield 2002). For the divergence, two explanations are possible: first, there is a divergence in the items of measurement. While the objective measure defines individuals by their pre-treatment hourly wage, the subjective question only requires a perceived pay raise.

Accordingly, in the subjective definition also pay raises for individuals initially above € 8.50 are possible. Second, there could be a divergence in the individuals' perception. Some employees may feel subjectively affected while they are in fact not, and vice versa. The latter explanation seems particularly plausible as the wage effects reveal a larger effect on the objectively treated than on the subjectively treated employees.

[Table 5 about here]

To shed some more light on the divergence between both treatment definitions, we construct interactions between both groups. This allows estimating treatment effects for three distinct groups: employees who report to have received a pay raise and are objectively treated by the minimum wage, employees who report a pay raise but are not objectively treated, and employees who do not report a pay raise but are objectively affected. The results in Table 5 indicate that the positive treatment effects on job and pay satisfaction are mostly driven by the groups, which report to have received a pay raise, irrespective of their objective affectedness. By contrast, the group, which is only objectively but not subjectively treated, shows much smaller and insignificant effects.

3.4 Robustness with respect to spillovers

Some of the literature on job satisfaction suggests that the relative wage position rather than the absolute wage is crucial for pay satisfaction (Brown, Gardner, Oswald and Qian 2008 or Clark and Oswald 1996). Applying this argumentation, any exogenous change in wages would only cause relative, but no absolute effects. Policies, such as minimum wages, would then be a zero-sum-game for the measure of pay satisfaction. However, according to some other literature, individuals' own pay satisfaction is not always relative to other workers' wages (Clark, Kristensen and Westergaard-Nielsen 2009). For affected individuals, a reference point could also be their own wage before the minimum wage introduction, and this is what the difference-in-differences approach actually identifies.

To investigate whether there is an offsetting effect on unaffected employees in the neighborhood of the minimum wage, we check for spillovers. If there is an adverse spillover effect, the impact on pay satisfaction is only of relative nature. By contrast, if there is no offsetting spillover effect, the impact is of absolute nature.

Spillovers along the wage distribution may affect employees whose wage was initially already above the minimum of € 8.50 (Aretz, Arntz and Gregory 2013). Moreover, spillovers within workplaces can be an issue, for example, if unaffected colleagues demand a re-negotiation of wages (Dittrich, Knabe and Leipold 2014).

In order to measure spillovers, we again use both an objective and a subjective definition. For the objective definition, we look at all individuals with an initial hourly wage between € 8.50 and € 10 as these are in the direct neighborhood of the minimum wage and most likely to face an adverse spillover. The subjective measure

included in the survey asks whether there are direct colleagues, who are affected by the minimum wage in terms of a pay raise. If this is the case, the respective employee might feel relatively disadvantaged. This in turn may result in a negative offsetting response concerning pay satisfaction.

[Table 6 about here]

As outcome variables, we again look at pay and job satisfaction. Panel A of Table 6 shows estimates, when the spillover groups are excluded. The effects are similar to the baseline regressions (Tables 2 and 3) indicating that the results are not driven by negative spillovers to the control group. Panel B of Table 6 does not exclude the potential spillover groups, but estimates an own effect for these groups in the neighborhood of the minimum wage. The estimates imply that there is no offsetting effect on unaffected employees in our data. The results suggest an absolute increase in job and pay satisfaction, which is not offset by any adverse spillovers in the neighborhood of the minimum wage.

Finally, Panel C of Table 6 presents results from a regression which excludes individuals with initial hourly wages above €20. The intuition of this robustness check is based on the argument that employees with high wages are different from employees that are affected by the minimum wage. Hence, they are no suitable controls for the group of treated individuals. However, the effects are similar compared with our baseline results indicating that high wage employees do not drive our results.

4 The relation between job and pay satisfaction

Although many scholars are of the opinion that an increase in wages is associated with an increase in job satisfaction (see Lydon and Chevalier 2002 or Judge, Piccolo, Podsakoff, Shaw and Rich 2010 for a meta-analysis), we dig deeper into this relationship and ask whether the effect of the minimum wage on job satisfaction is mainly driven by the increase in pay satisfaction or whether there is also a separate effect on job satisfaction. Since the minimum wage was introduced by law and does not reflect a reward for the employees' performance or work effort, it well could be that the investigated effect on job satisfaction is solely driven through the pay dimension. Additionally, employers can try to compensate for the increased wage costs by demanding more or better work results, which again may also lead only to an increase in pay, but not in overall job satisfaction. However, the minimum wage may also affect the contents of work (Hirsch, Kaufman and Zelenska 2015), which in turn could increase job satisfaction that is not related to pay.

To address this question, we estimate the same difference-in-differences specification on job satisfaction as before while controlling for pay satisfaction. The estimated treatment effect captures any effect of the minimum wage on job satisfaction which is not explained by changes in pay satisfaction.

The results are presented in Table 7 and show that the effect on job satisfaction of objectively affected individuals shrinks to zero. Analogous the effect of the subjec-

tively treated employees largely shrinks, but does not lose its significance completely. Thus, if employees feel positively affected by the minimum wage, they are not only more satisfied with their pay, but also to a small extent with their job in general. As expected, our regressions show a strong and positive correlation between job and pay satisfaction.

[Table 7 about here]

5 Effects on work engagement and turnover intention

While there is only a small effect on job satisfaction after controlling for pay satisfaction, there might be effects of the minimum wage on other work related attitudes. We look at work engagement and turnover intention, which are measures reflecting the employees' effort (Schaufeli, Bakker and Salanova 2006) and preferences for job mobility.

A prominent reason of why minimum wages do not lead to a decrease in labor demand is that not only labor costs rise, but also productivity increases (Metcalf 2008; Schmitt 2015). In fact, a recent study by Riley and Rosazza Bondibene (2015) presents firm-level evidence that both the British minimum wage introduction as well as the minimum wage increases in the aftermath of the crisis caused productivity to increase. Theoretical reasons for this growth in productivity are (Riley and Rosazza Bondibene 2015): (a) labor becomes more productive when firms substitute away labor inputs towards capital, (b) labor becomes more productive through firms investing in training (Acemoglu and Pischke 2001; Arulampalam, Booth and Bryan 2004), (c) labor becomes more productive through efficiency enhancing human resource practices (Hirsch, Kaufman and Zelenska 2015), (d) labor becomes more productive through higher performance standards of the firm, and (e) labor becomes more productive through increased worker effort in response to receiving higher or fair wages (Akerlof 1984; Owens and Kagel 2010). Since we look at individual engagement as an outcome variable, this mostly identifies effects via the last channel.

Another explanation why minimum wages do not cause employment losses is a reduction of employee turnover. In the empirical literature a lot of studies discuss the effect of minimum wages on employment turnover, where most present evidence points towards a turnover reduction. Among these studies are recent analyses of minimum wages in the US (Dube, Lester and Reich 2016) and Germany (Bossler and Gerner 2016). A popular theoretical argument concerning the reduced turnover as a result of minimum wages is presented in van den Berg and Ridder (1998). The authors show that turnover may fall through lowered on-the-job-search. As minimum wages compress the wage distribution, the expected payoffs from search decrease and employees have reduced incentives to search. If this argument holds true, we would observe a lowered turnover intention as a result of the minimum wage.

[Table 8 about here]

Table 8 shows the effects on work engagement and turnover intention. Both outcome variables are mean standardized survey responses allowing for an effect interpretation in standard deviations. The treatment effects are small in size and virtually zero implying that there is no measurable effect of the minimum wage on work engagement and turnover intention. The latter is in line with Bossler and Gerner (2016), who do not find an effect of the new German minimum wage on the quit rate of employees.

6 Conclusion

This study identifies the effects of the new statutory minimum wage in Germany on job and pay satisfaction of continuing employees. We use the Linked Personnel Panel, which was surveyed in early 2013, sufficiently far ahead of the minimum wage introduction, and in early 2015, a few months after the minimum wage was introduced. The data allow us to differentiate between affected and unaffected workers using (a) an objective treatment assignment from 2013 hourly wages, and (b) a subjective treatment assignment based on the employees' survey responses.

We identify treatment effects on the treated employees through a difference-in-differences comparison. The results show a positive effect on pay satisfaction for both measures of affectedness, and an imprecise negative effect when employees feel adversely affected. Moreover, we observe the same effect directions but effects which are smaller in size on the affected employees' job satisfaction. However, these effects are to a large extent explained by simultaneous changes in pay satisfaction implying only a small effect on job satisfaction irrespective of the pay dimension.

The large effect on pay satisfaction is mostly driven by employees, who feel subjectively affected by the minimum wage, but not by objectively treated employees. This is surprising, since wage effects are only observed for objectively treated employees but not for employees who believe to have received a pay raise. For employers, this demonstrates the importance to communicate positive effects from the minimum wage in order to make their employees to appreciate the pay raise.

The estimated effects on work engagement and turnover intention are zero and not statistically significant suggesting that there are either only small or no effects at all. In order to detect significant effects larger data is necessary.

Since our data were collected only a few months after the minimum wage introduction, the stability of the effects in the longer run is unclear. This calls for replications with longer data panels, which would also allow addressing the parallel trends assumption, which we cannot assess here. Besides these limitations, we believe that the analysis of worker outcomes of continuing employees is important and should be further addressed in future research. The analysis of worker outcomes allows for a more comprehensive picture of minimum wages, which is a popular policy tool in industrialized countries such as the UK, the US, and more recently, Germany.

References

- Acemoglu, D. and J.-S. Pischke (2001). Minimum Wages and On-the-Job Training. IZA Discussion Paper No. 384, Bonn.
- Addison, J. T., Blackburn, M. L. and C. D. Cotti (2015). On the robustness of minimum wage effects: geographically-disparate trends and job growth equations. IZA Journal of Labor Economics, 4(1).
- Akerlof, G. A. (1984). Gift Exchange and Efficiency-Wage Theory: Four Views. The American Economic Review: Papers and Proceedings, 74(2), 79-83.
- Aretz, B., Arntz, M. and T. Gregory (2013). The Minimum Wage Affects Them All: Evidence on Employment Spillovers in the Roofing Sector. German Economic Review, 14(3), 282-315.
- Arulampalam, W., Booth, A. and L. Bryan (2004). Training and the New Minimum Wage. The Economic Journal, 114(494), C87–C94.
- Brochu, P. and D. A. Green (2013). The Impact of Minimum Wages on Labour Market Transitions. The Economic Journal, 123, 1203-1235.
- Broszeit, S. and S. Wolter (2015). LPP - Linked Personnel Panel. Quality of work and economic success: longitudinal study in German establishments (data documentation on the first wave). (FDZ-Datenreport, 01/2015 (en)), Nürnberg, 132p.
- Bellmann, L., Bender, S., Bossler, M., Broszeit, S., Dickmann, C., Gensicke, M., Gilberg, R., Grunau, P., Kampkötter, P., Laske, K., Mohrenweiser, J., Schröder, H., Schütz, H., Sliwka, D., Steffes, S., Stephani, J., Tschersich, N. and S. Wolter (2015). LPP - Linked Personnel Panel. Quality of work and economic success: longitudinal study in German establishments (data collection on the first wave). (FDZ-Methodenreport, 05/2015 (en)), Nürnberg, 27p.
- Böckerman, P. and P. Ilmakunnas (2012). The job satisfaction-productivity nexus: A study using matched survey and register data. Industrial & Labor Relations Review, 65(2), 244-262.
- Bossler, M. and H.-D. Gerner (2016). Employment effects of the new German minimum wage: evidence from establishment-level micro data. IAB-Discussion Paper, 10/2016, Nuremberg, 35p.
- Brown, G., Gardner, J., Oswald, A. and J. Qian (2008). Does Wage Rank Affect Employees' Well-being? Industrial Relations: A Journal of Economy and Society, 47(3), 355-389.
- Clark, A., Kristensen, N. and N. Westergaard-Nielsen (2009). Job satisfaction and co-worker wages: status or signal? The Economic Journal, 119, 430–447.
- Clark, A. and A. Oswald (1996). Satisfaction and comparison income. Journal of Public Economics, 61, 359-381.
- Dittrich, M., Knabe, A. and K. Leipold (2014). Spillover Effects of Minimum Wages in Experimental Wage Negotiations. CESifo Economic Studies, 60(4), 780-804.
- Dolton, P., Rosazza Bondibene, C. and M. Stops (2015). Identifying the employment effect of invoking and changing the minimum wage: A spatial analysis of the UK. Labour Economics, 37, 54-76.
- Dube, A., Lester, T. W. and M. Reich (2010). Minimum wage effects across state borders: Estimates using contiguous counties. The Review of Economics and Statistics, 92(4), 945-964.

- Dube, A., Lester, T. W. and M. Reich (2016). Minimum Wage Shocks, Employment Flows and Labor Market Frictions. *Journal of Labor Economics*, forthcoming.
- Ellguth, P., Kohaut, S. and I. Möller (2014). The IAB Establishment Panel - methodological essentials and data quality. *Journal for Labour Market Research*, 47(1-2), 27-41.
- Fischer, G., Janik, F., Müller, D. and A. Schmucker (2009). The IAB Establishment Panel. Things users should know. *Schmollers Jahrbuch: Journal of Contextual Economics*, 129(1), 133-148.
- Gittings, R. K. and I. M. Schmutte (2016). Getting Handcuffs on an Octopus: Minimum Wages, Employment, and Turnover. *Industrial & Labor Relations Review*, forthcoming.
- Hirsch, B. T., Kaufman, B. E. and T. Zelenska (2015). Minimum wage channels of adjustment. *Industrial Relations: A Journal of Economy and Society*, 54(2), S. 199-239.
- Judge, T., Piccolo, F., Podsakoff, N., Shaw, J. and B. Rich (2010). The relationship between pay and job satisfaction: A meta-analysis of the literature, *Journal of Vocational Behavior*, 77(2), 157-167.
- Lydon, R. and A. Chevalier (2002). Estimates of the Effect of Wages on Job Satisfaction. Centre for Economic Performance, CEP Discussion Paper No. 531, 30p.
- Machin, S., Manning, A. and L. Rahman (2003). Where the minimum wage bites hard: the introduction of the UK national minimum wage to a low wage sector. *Journal of the European Economic Association*, 1(1), 154-180.
- Meer, J. and J. West (2016). Effect of the minimum wage on employment dynamics. *Journal of Human Resources*, 51(2), 500-522.
- Metcalf, D. (2008). Why has the British National Minimum Wage had Little or No Impact on Employment? *Journal of Industrial Relations*, 50(3), 489-512.
- Neumark, D., Salas, I. and W. L. Wascher (2014). Revisiting the Minimum Wage-Employment Debate: Throwing Out the Baby with the Bathwater? *Industrial & Labor Relations Review*, 67(Supplement), 608-648.
- Owens, M. F. and J. H. Kagel (2010). Minimum wage restrictions and employee effort in in-complete labor markets: An experimental investigation. *Journal of Economic Behavior & Organization*, 73(3), 317-326.
- Portugal, P. and A. R. Cardoso (2006). Disentangling the minimum wage puzzle: An analysis of worker accessions and separations. *Journal of the European Economic Association*, 4, 988-1013.
- Powdthavee, N. (2009). How much does money really matter? Estimating the causal effects of income on happiness. *Empirical Economics*, 39(1), 77-92.
- Riley, R. and C. Rosazza Bondibene (2015). Raising the standard: minimum wages and firm productivity. NIESR Discussion Paper No. 449, London.
- Schaufeli, W. B., Bakker, A. B. and M. Salanova (2006). The measurement of work engagement with a short questionnaire a cross-national study. *Educational and psychological measurement*, 66(4), 701-716.
- Schmitt, J. (2015). Explaining the Small Employment Effects of the Minimum Wage in the United States. *Industrial Relations: A Journal of Economy and Society*, 54(4), 547-581.

Stewart, M. B. and Swaffield, J. K. (2002). Using the BHPS Wave 9 Additional Questions to Evaluate the Impact of the National Minimum Wage. *Oxford Bulletin of Economics and Statistics*, 64, 633-652.

van den Berg, G. J. and G. Ridder (1998). An Empirical Equilibrium Search Model of the Labor Market. *Econometrica*, 66, 1183-1222.

Table Appendix

Table 1
Sample description for 2013 by affectedness

	All em- ployees	Objectively affected	Positively affected	Adversely affected
Numbers:				
Employees	2,754	109	100	81
Covariate sample averages:				
Females	0.281	0.596	0.590	0.407
Age	47.5	48.2	49.3	48.4
Education:				
Apprenticeship, in-firm training	0.099	0.083	0.100	0.123
Vocational training in the educa- tional system	0.219	0.083	0.080	0.111
Master craftsmen's or technical col- lege	0.085	0.018	0.010	0.025
University of applied sciences de- gree	0.106	0.028	0.010	0.049
University degree	0.015	0.046	0.020	0.025
Part-time	0.133	0.284	0.320	0.198
Blue collar worker	0.387	0.606	0.700	0.617
Leading position	0.312	0.128	0.070	0.198
Compensation of overtime:				
Compensated with time-off	0.482	0.275	0.260	0.358
Fully paid	0.142	0.370	0.380	0.247
Partly paid	0.279	0.211	0.160	0.222
Not compensated	0.088	0.119	0.170	0.173
Pre-treatment averages and standard deviations (in parentheses) of the out- come variables:				
Pay satisfaction (0-10 scale)	6.84 (2.00)	4.03 (2.70)	4.32 (2.67)	4.48 (2.71)
Job satisfaction (0-10 scale)	7.63 (1.62)	6.85 (2.09)	6.62 (2.21)	6.40 (2.18)
Engagement (1-5 scale)	3.75 (0.79)	3.56 (0.97)	3.50 (0.90)	3.46 (0.89)
Turnover intention (1-5 scale)	1.53 (0.84)	1.85 (1.09)	1.99 (1.13)	2.11 (1.173)

Data source: LPP, balanced analysis sample.

Table 2
Minimum wage effects on objectively treated employees

	(1)	(2)	(3)	(4)
	Pay satisfaction	Pay satisfaction	Job satisfaction	Job satisfaction
Objectively affected	0.750*** (0.259)	0.731*** (0.258)	0.172 (0.211)	0.169 (0.211)
Controls	no	yes	no	yes
Observations	5,508	5,508	5,508	5,508

Notes: Estimates are treatment effects on the treated retrieved from difference-in-differences specifications. All specifications include individual fixed effects. Dependent variables as indicated by column titles. Control variables in columns (2) and (4) are the individual age and dummies for part-time work, job-position, leading position, and the compensation of overtime. Cluster robust standard errors are in parentheses (cluster=individual). Asterisks indicate significance levels: * p<0.10, ** p<0.05, and *** p<0.01.

Data source: LPP, balanced employee panel.

Table 3
Minimum wage effects on subjectively treated employees

	(1)	(2)	(3)	(4)
	Pay satisfaction	Pay satisfaction	Job satisfaction	Job satisfaction
Positively affected	1.164*** (0.260)	1.150*** (0.262)	0.688*** (0.237)	0.702*** (0.235)
Adversely affected	-0.261 (0.253)	-0.278 (0.252)	-0.347 (0.294)	-0.365 (0.297)
Controls	no	yes	no	yes
Observations	5,508	5,508	5,508	5,508

Notes: Dependent variables as indicated by column titles. For further notes, see Table 2.

Data source: LPP, balanced employee panel.

Table 4
Minimum wage effect on wages

	(1)	(2)
	Log wage	Log wage
Objectively affected	0.204*** (0.030)	
Positively affected		0.044 (0.09)
Adversely affected		0.002 (0.037)
Controls	yes	yes
Observations	5,292	5,292

Notes: Dependent variables as indicated by column titles. For further notes, see Table 2.

Data source: LPP, balanced employee panel.

Table 5
Minimum wage effects on differently affected employees

	(1)	(2)
	Pay satisfaction	Job satisfaction
Objectively and subjectively affected	0.997*** (0.385)	0.529** (0.285)
Only subjectively affected	1.130*** (0.329)	0.615** (0.282)
Only objectively affected	0.543 (0.344)	-0.120 (0.298)
Controls	yes	yes
Observations	5,508	5,508

Notes: Dependent variables as indicated by column titles. For further notes, see Table 2.

Data source: LPP, balanced employee panel.

Table 6
Robustness checks

	(1)	(2)	(3)	(4)
	Pay satisfaction		Job satisfaction	
Panel A: Exclusion of spillover groups				
Objectively affected	0.725*** (0.259)		0.196 (0.212)	
Positively affected		1.168*** (0.262)		0.694*** (0.235)
Adversely affected		-0.270 (0.252)		-0.365 (0.296)
Observations	5,366	5,142	5,366	5,142
Panel B: Own treatment effect for spillover groups				
Objectively affected	0.734*** (0.258)		0.179 (0.211)	
Positively affected		1.167*** (0.262)		0.702*** (0.235)
Adversely affected		-0.265 (0.252)		-0.366 (0.297)
Spillover effect	0.111 (0.249)	0.301** (0.146)	0.313 (0.210)	-0.009 (0.118)
Observations	5,508	5,508	5,508	5,508
Panel C: Exclusion of individuals with initial wages above € 20				
Objectively affected	0.685*** (0.257)		0.135 (0.213)	
Positively affected		1.097*** (0.265)		0.685*** (0.237)
Adversely affected		-0.315 (0.253)		-0.388 (0.299)
Observations	2,764	2,764	2,764	2,764

Notes: Dependent variables as indicated by shared column titles. For further notes, see Table 2.

Data source: LPP, balanced employee panel.

Table 7
Minimum wage effect on job satisfaction controlling for pay satisfaction

	(1)	(2)
	Job satisfaction	Job satisfaction
Objectively affected	-0.029 (0.200)	
Positively affected		0.398* (0.218)
Adversely affected		-0.292 (0.288)
Pay satisfaction	0.270*** (0.023)	0.265*** (0.022)
Controls	yes	yes
Observations	5,508	5,508

Notes: Dependent variables as indicated by column titles. For further notes, see Table 2.

Data source: LPP, balanced employee panel.

Table 8
Minimum wage effect on work engagement and turnover intention

	(1)	(2)	(3)	(4)
	Work engagement		Turnover intention	
Objectively affected	0.031 (0.071)		0.013 (0.112)	
Positively affected		-0.033 (0.071)		-0.123 (0.116)
Adversely affected		0.048 (0.083)		-0.019 (0.147)
Controls	yes	yes	yes	yes
Observations	5,508	5,508	5,508	5,508

Notes: Dependent variables as indicated by shared column titles. For further notes, see Table 2.

Data source: LPP, balanced employee panel.

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