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# Minimum Wages and Work Pressure

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## Abstract

A large literature investigates the employment effects of minimum wages, with comparatively little evidence on other adjustment margins. In this paper, we analyze the impact of a nationwide introduction of minimum wages in Germany on employer-induced work pressure, using detailed worker-level survey data. Applying a difference-in-differences approach, we show that the introduction of minimum wages increased work pressure in occupations more exposed to the minimum wage. The increase in work pressure cannot be explained by compositional changes in terms of demographics, job complexity, or hours worked.

## JEL classification

J28, J31, J32, J33, J81, H80, I31, I38, K31

## Keywords

minimum wage, work pressure, non-wage amenities, working conditions, compensating differentials

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# 1 Introduction

Several decades of minimum wage research primarily dealt with potential employment effects of minimum wages. Many papers show that the employment effects of minimum wage increases are limited, although estimates differ (e.g., Dube and Lindner, 2024; Neumark and Shirley, 2022; Azar et al., 2024; Dube and Zipperer, 2024). Other adjustment margins, however, are far less studied (Clemens, 2021). In particular, there is very limited evidence on the question whether minimum wages reduce the provision of non-wage amenities, i.e., the non-wage component of compensation. This gap is due to a lack of data on non-wage amenities, especially over time and across more and less affected workers (Clemens, 2021). Yet, this gap is painful given the high value workers place on job attributes (e.g., Maestas et al., 2023; Mas, 2025).

In this paper, we study the impact of the introduction of minimum wages in Germany in 2015 on employer-induced work pressure. We focus on work pressure for various reasons. First, it is an important non-wage amenity that comes with a sizable wage differential in the labor market and that has been on the rise in recent decades (Nagler et al., 2025; Maestas et al., 2017; Buser et al., 2025). Second, work pressure leads to various economically relevant health outcomes (e.g., Goh et al., 2016; Nekoei et al., 2025; Kivimäki et al., 2018). And third, it is an amenity which is easily adjustable by employers, in contrast to other job-inherent amenities (e.g., De Schouwer et al., 2025; Schneider et al., forthcoming; Burbano et al., 2023).

Our approach relies on survey data in which workers provide a detailed account about the characteristics of their workplace, the exact nature of their job, as well as personal information (Hall et al., 2020). We use the survey to create a ("bite"-)measure to which extent occupations were exposed to minimum wage increases. As expected, the professions most exposed to minimum wages are those in the low-paid service sector, including occupations in body care, cleaning services, and gastronomy.

To conceptualize work pressure, we rely on previous work where we built an index comprised of whether workers often face tight deadlines or pressure to perform, often need to work on several important tasks at the same time (multitasking), are frequently interrupted in their work, and face minimum requirements of output (Nagler et al., 2025). We validated our measure by, e.g., showing that workers employed in high-pressure jobs report worse health outcomes on various margins. We also showed sizable hedonic pay premia for high-pressure jobs and found that the patterns of these premia are consistent with theories of compensating wage differentials (Rosen, 1986).

To study the impact of the 2015 introduction of nationwide minimum wages in Germany on work pressure, we then compare the development of work pressure between more and less affected occupations in a difference-in-differences approach. We use the 2006, 2012, and 2018 waves of the survey, allowing us to investigate the

pre-introduction development of work pressure across subsequently more- and less affected occupations.

We find that the introduction of minimum wages led to an increase in work pressure in affected occupations. The magnitude of the effect amounts to around 21% of a cross-sectional standard deviation or to 4-12% of the value of the wage increase induced by the minimum wage using the estimates in Nagler et al. (2025).[1] Work pressure increases across several elements of the pressure index. Our results can neither be explained by changes in worker composition or in task complexity nor by changes in work hours. There is no pre-trend in work pressure between more- and less affected occupations before the introduction of minimum wages, though we caution that a data limitation is that we only observe two waves before the minimum wage introduction. Our results are robust across different sample definitions and specifications.

Our paper contributes to a large literature on the labor market effects of minimum wages. This literature has primarily focused on employment responses to minimum wages (for recent contributions, see, e.g., Cengiz et al., 2019, 2022; Harasztosi and Lindner, 2019; Dube, 2019; Faia et al., 2026). There are still heated debates in this literature, but many papers find limited employment effects of minimum wages, including in Germany (e.g., Dube and Lindner, 2024; Bossler and Gerner, 2020; Dustmann et al., 2022; Bossler and Schank, 2023). These findings have sparked interest in other potential margins of adjustment (Clemens, 2021; Clemens et al., 2021). Yet, this literature is still small, especially regarding a potential impact on other job aspects since data on these are rare. This is especially true for non-wage amenities, although there are some very recent exceptions.[2] Liu et al. (2024) find that following large state-level minimum wage increases in the US, workplace injuries increase. Similarly, Davies et al. (2024) show that in California, minimum wage increases led to more workplace injuries, in particular through physical strain. Their results suggest increased employer demands, something we directly provide evidence for in this paper. In another rare exception, Farkas (2025) shows that following minimum wage increases, undesirable schedule flexibility rises. Dube et al. (2022) find no adverse effect of minimum wages on workplace dignity and other amenities among Wal-Mart workers.

[1] The impact of a one SD increase in minimum wage bite on log earnings and log hourly wages is around 0.02-0.03 in these specifications. To arrive at the estimate, we then multiply our treatment effect on work pressure with our hedonic wage estimates for the first and the treatment effect on deadlines with our estimated valuation for tight deadlines in Nagler et al. (2025) for the second estimate.

[2] There is some work on the effects of minimum wages on fringe benefits (e.g., Simon and Kaestner, 2004; Meiselbach and Abraham, 2023). There is also one paper for Germany investigating the self-reported health effects of the minimum wage introduction immediately after its introduction (Hafner and Lochner, 2022). Using a matching procedure, they find positive effects on self-reported health and no effects on self-reported time pressure at work until the PASS-ADIAB survey data wave 2015/16.

Our paper contributes to this literature in that we show the impact of minimum wages on an important employer-provided non-wage amenity in a large and relevant labor market. Relative to the existing literature, we provide direct evidence on a broad variety of different facets of work pressure, including tight deadlines and pressure to perform, need for multitasking, and a fast work pace. This is relevant since different aspects of work pressure may be relevant across different occupations.

The recent literature also provides some evidence on productivity effects of minimum wages. Ku (2022) and Coviello et al. (2022) study the impacts of minimum wage increases in specific firms or occupations on worker productivity. Ku (2022) studies the increase in minimum wages in Florida and finds that tomato pickers with low baseline productivity became more productive. Coviello et al. (2022) study sales persons at a retail firm and finds that those with low baseline productivity became more productive. Both papers interpret their results as reflecting endogenous worker responses to the introduction of minimum wages. An important aspect of our paper is that the survey questions we use to proxy for work pressure are phrased such that we believe the shift in pressure reflects employer demands instead of endogenous worker effort responses. Our findings therefore suggest a complementary interpretation of productivity increases after a rise in minimum wages: observed productivity gains may, at least in part, reflect employer-induced work pressure.

Our paper also contributes to the literature on non-wage amenities and their role in the labor market. A long-standing literature uses observational approaches to study compensating wage differentials, i.e., the causal link between earnings and non-wage (dis-)amenities (e.g., Brown, 1980; Stern, 2004; Lavetti and Schmutte, 2018; Sorkin, 2018; Sockin, 2022). This literature highlights the difficulty to identify compensating wage differentials due to various issues such as endogenous mobility, omitted variable bias, and search frictions (Brown, 1980; Lavetti, 2023; Bell, 2025).[3] This makes convincing observational approaches to study the link between pay and non-wage amenities very rare (for exceptions, see, e.g., Lavetti, 2020; Wissmann, 2022; Ahammer et al., 2025).

Our main contribution to this literature is to show that the introduction of minimum wages in Germany affected the provision of a relevant non-wage amenity. This paper is also one of only few papers focusing on firm level determinants of non-wage amenities (for other contributions, see, e.g., Stern, 2004; Adams-Prassl et al., 2023).

[3]In the past years, the focus of this literature shifted to worker valuations of non-wage amenities, leveraging hypothetical choice experiments (e.g., Eriksson and Kristensen, 2014; Mas and Pallais, 2017; Wiswall and Zafar, 2018; Maestas et al., 2023; Nagler et al., 2024, 2025).

# 2 Setting, Data, Empirics, and Measuring Work Pressure

## 2.1 Setting: The German National Minimum Wage

Before 2015, there was no nationwide minimum wage in Germany, although some sectors were covered through industry-specific minimum wages (e.g., Aretz et al., 2013; Gregory and Zierahn, 2022; Gregory et al., 2024). In July 2014, after intensive campaigning by unions, the German parliament passed a law introducing a minimum wage of 8.50 Euros per hour that became effective in 2015 (Jäger et al., 2022). At the time, this amounted to around 48% of the median wage in the year before introduction (Dustmann et al., 2022), affecting around 12% of workers (Bossler and Schank, 2023; Bossler et al., 2025). The minimum wage was subsequently increased to 8.84 Euros in 2017, to 9.19 Euros in 2019, and in several steps to 12 Euros in 2022 (Bossler et al., 2024). After 2022, gradual increases took place, raising the minimum wage to 12.82 Euros in 2025. In 2026, it rose to 13.90 Euros and it is set to rise to 14.60 Euros in 2027.

Research on the impacts of the introduction of the minimum wage in Germany shows that employment effects were limited (and mostly took place among so-called mini-jobs), that the minimum wage induced reallocation towards more productive establishments, that its introduction reduced wage inequality in Germany substantially, and that there was substantial (although not full) pass-through of wage increases to prices (see, inter alia, Caliendo et al., 2018, 2019, 2022, 2025; Caliendo and Wittbrodt, 2022; Dustmann et al., 2022; Bossler and Gerner, 2020; Bossler et al., 2025; Bossler and Schank, 2023; Link, 2024).

## 2.2 Data: The BIBB/BAuA employment surveys

To investigate the impact of minimum wages on work pressure, we rely on the BIBB/BAuA employment surveys (Hall et al., 2020; Spitz-Oener, 2006; Gathmann and Schönberg, 2010; Nagler et al., 2025; Gathmann et al., 2025).[4] These surveys are provided by the German Federal Institute for Vocational Education and Training (BIBB) and the Federal Institute for Occupational Safety and Health (BAuA). They cover a representative sample of 0.1 percent of all workers who are at least 15 years old and who work at least 10 hours per week. There are seven survey waves to date, starting in 1979. In the survey, workers give a detailed account about their socioeconomic background, the characteristics of their workplace, the nature of the job and the tasks they are performing, as well as detailed information about their health status and their satisfaction with several aspects of their job.

[4]This section is very close to the corresponding section in Nagler et al. (2025).

The BIBB/BAuA employment surveys are very suitable to study the link between minimum wages and work pressure for two main reasons. First, the survey includes a variety of questions on different facets of work pressure in the respondent's current job, as explained below in section 2.2.2. Second, the nature of the data allows us to analyze workplace and job characteristics between *and* within narrowly defined occupations.[5] This is important since our research question focuses on changes in work pressure within narrowly defined occupations over time. The key downside of this data is that we only have survey waves every six years. This limits the pre-period in our analysis and prohibits us from analyzing the time patterns in which our effects arise.

In our main empirical specification, we restrict our attention to individuals aged between 18 and 65 and working at least 20 hours per week. We drop civil servants, self-employed individuals, and apprentices, focusing on the private sector. Our results are, however, robust to alternative sample definitions. We focus on the most recent three survey waves 2006, 2012, and 2018.[6] This allows us to investigate pre-trends. With these sample restrictions, we end up with 27,977 worker-wave observations in total, aggregated to a balanced panel of 121 3-digit occupations by wave. When aggregating the individual-level data to the occupation level, we use survey weights provided in the dataset. For summary statistics at the occupational level, please see Online Appendix Table A.1.

### 2.2.1 Empirical specification

Our approach leverages variation in the extent to which the minimum wage was binding across narrowly defined occupations. The idea behind the approach is that some parts of the labor market were more affected by the minimum wage than others (in the spirit of typical "bite" measures in the minimum wage literature, see Dube and Lindner 2024). Specifically, we estimate the following regression at the three-digit occupation level:

$$Pressure_{ot} = \beta_o + \sum_t \gamma_t D_t + \sum_t \delta_t Bite_o D_t + \epsilon_{ot} \quad (1)$$

The dependent variable $Pressure_{ot}$ reflects the value of our pressure index (as defined in the following section) in occupation $o$ in survey wave $t$. The variable $Bite_o$ represents a variable capturing the degree of exposure to minimum wages of the occupation to the nationwide minimum wage introduction of 2015, normalized to have

[5]For example, a focus on the within-occupation dimension is not possible in the commonly used O*NET data, which is based on surveys among experts about the characteristics of different occupations (Autor, 2013). A well-known limitation of the O*NET database is that experts tend to underestimate the change in job characteristics in an occupation over time. This, however, is not a problem in the BIBB/BAuA data, in which workers directly report the characteristics of their job and their workplace.

[6]While these three survey waves are well-harmonized, survey items differ more substantially in earlier waves.

standard deviation of one and mean of zero. The coefficient of interest is $\delta$ and denotes how average pressure responds to a one-standard increase in minimum-wage "bite". We include occupation fixed effects $\beta_o$, investigating the impact of the minimum wage introduction on the *change* in occupational work pressure. Note that these fixed effects absorb any other fixed occupational characteristics such as demographic composition, task content, sectoral and firm size composition.[7] We also include survey wave fixed effects to absorb common year-specific shocks. The standard errors $\epsilon_{ot}$ allow for clustering at the three-digit occupation level. In the regression, we use the number of underlying worker observations in an occupation as weights.

The key assumption of our approach is that, absent the introduction of minimum wages in 2015, occupations with higher and lower exposure would have developed similarly between 2012 and 2018. While we inherently cannot test this assumption, we below show that in the period between 2006 and 2012, these occupations indeed developed similarly in key dimensions of our analysis including earnings, wages, hours, and work pressure.

### 2.2.2 Definition of work pressure

Work pressure is a concept that is inherently difficult to measure. First, pressure and workplace stress are qualitative concepts that workers subjectively perceive, but that are hard to define objectively. This potentially also comes with issues of social desirability bias when workers respond to direct questions about these perceptions, which may also change over time. Second, any specific measure of work pressure will necessarily only cover parts of what workers perceive as pressure since work pressure likely shows up in different forms across jobs. Ideally, we would thus like to have a measure of work pressure that is less prone to social desirability bias, that is common to different jobs, and that plausibly measures important determinants of work pressure.

To measure work pressure, we thus rely on a proxy index that arguably meets many of the above criteria. Specifically, we rely on prior work (Nagler et al., 2025) where we developed an index of work pressure covering the following questions from our data set:

1. How often do you have to work under tight deadlines or pressure to perform?
2. How often do you have to carry out several tasks at the same time?
3. How often are you being interrupted, for example by colleagues, telephone calls, bad material, or machine malfunctions?

[7] In Section 3.4 below, we show that the introduction of the minimum wage did not affect occupational composition in a meaningful way.

4. How often are you given targets regarding a minimum requirement in terms of quantity or a maximum time to carry out a given task?

Note that these questions are phrased such that they reflect employer-induced work pressure rather than picking up potential endogenous worker effort increases.[8]

In Nagler et al. (2025), we picked these four questions because they were arguably related to work pressure and because these survey items were consistently available across all waves of the data since 1979. In this paper, we add the two remaining questions that are available for the survey waves we study (but not for all waves before) and that are also related to work pressure, namely:

5. How often do you have to work very fast?

6. How often are you being pushed to your personal limits?

When answering the pressure-related questions, survey participants have the choice between four options: 'often', 'sometimes', 'seldom', or 'never'. We create an index of work pressure for each worker $i$, which is given by the share of all questions to which the individual responds with 'often'. $Pressure_{ot}$ can thus take values between 0 and 1.

Relative to self-reported measures of feelings of stress, we consider it an advantage that our index captures more objective elements of the job that respondents may not directly link to whether they experience feelings of workplace stress. Therefore, response behavior may be less prone to social desirability issues.

In Nagler et al. (2025), we show that alternative ways of constructing a work pressure proxy result in similar measures. For example, all four survey questions enter positively into the first principal component with very similar loadings. In Nagler et al. (2025), we also show an extensive validation of this proxy for work pressure. Most importantly, we show that our index is closely associated with workers' self-reported health outcomes, validating our work pressure index by using a random forest algorithm to predict the health index by our work pressure index as well as by demographic and job characteristics. This validation exercise shows that our work pressure index is by far the most important predictor of health outcomes. Among the underlying measures, frequent deadlines are the most important predictor of adverse health outcomes. We also show that the work pressure index is associated with a higher number of sick days, lower job satisfaction, and adverse family outcomes. While workers in high-pressure jobs are more likely to be in the upper level of hierarchies

[8]Note that our translations in this paper differ slightly from those in Nagler et al. (2025). The reason is that we worried more about whether this was employer- or employee-induced in this setting and thus went back to the original questions to make sure the semantic meaning was as accurately translated as possible.

and more likely to be a team leader and to have budget responsibility, work pressure also arises in jobs that are likely to be affected by minimum wage increases. Overall, these results suggest that our index indeed captures work environments defined by a high degree of work pressure.

All in all, our index for work pressure seems to largely reflect actual work pressure and is associated with a sizable earnings differential in the German labor market. This makes it a good proxy to study the impacts of the minimum wage introduction on work pressure.

# 3 Minimum Wages and Work Pressure

## 3.1 Descriptive Statistics

We begin by showing descriptive results at the occupation level in Table 1. Panel (a) shows the three-digit occupations with the highest minimum wage bite before the introduction in 2015. Unsurprisingly, low-paid service occupations such as occupations in body care and cleaning services, as well as occupations in gastronomy, lead the table. Panel (b) shows the occupations with the lowest bite. Column (1) shows the average exposure to the minimum wage introduction, aggregated at the occupational level. Column (2) shows the average value of the pressure index in the first survey wave we use. Column (3) shows the average difference in the pressure index between the first two survey waves (between 2006 and 2012), i.e., in the period before the introduction of the minimum wage. Column (4) then shows the average change between 2012 and 2018, i.e., following the introduction of minimum wages in 2015. The final column shows the number of observations underlying each occupation.

## 3.2 Impact of Minimum Wage on Earnings and Wages

To see the extent to which our bite-measure actually captures the impact of minimum wages on wages and earnings, we first investigate its time-varying impacts on (deflated) earnings and hourly wages in Figure 1. This can be interpreted as a "first stage". Occupations with higher and lower bite of the minimum wage developed similarly regarding these dimensions in the period between 2006 and 2012. This pre-treatment development in real earnings and wages is in line with our identification assumption. The slight decrease in average hourly wages and average monthly earnings between 2006 and 2012 is in line with evidence for this time period using administrative data (Dustmann et al., 2014).

After the minimum wage introduction, occupations with higher exposure see an increase in their monthly earnings and hourly wages. Specifically, a one SD increase

Table 1: Descriptive statistics

| Occupation | Bite | Pressure 2006 | Δ Pressure 2006 → 2012 | Δ Pressure 2012 → 2018 | N |
|---|---|---|---|---|---|
| (a) Occupations with highest bite | | | | | |
| Occupations in body care | 0.64 | 0.50 | -0.06 | -0.01 | 107 |
| Occupations in cleaning services | 0.46 | 0.39 | -0.05 | 0.05 | 424 |
| Gastronomy occupations | 0.41 | 0.48 | -0.01 | 0.00 | 268 |
| Occupations in advertising and marketing | 0.28 | 0.53 | -0.08 | 0.01 | 374 |
| Cooking occupations | 0.27 | 0.52 | -0.01 | 0.03 | 416 |
| Sales occupations (retail) selling foodstuffs | 0.26 | 0.38 | 0.01 | 0.07 | 610 |
| Occupations in hotels | 0.24 | 0.45 | -0.05 | 0.06 | 108 |
| Occupations in plastic- and rubber-making | 0.23 | 0.47 | -0.07 | -0.00 | 121 |
| Housekeeping and consumer counselling | 0.18 | 0.32 | 0.05 | -0.03 | 206 |
| Doctors' receptionists and assistants | 0.17 | 0.46 | -0.00 | 0.01 | 500 |
| (b) Occupations with lowest bite | | | | | |
| Laboratory occupations in medicine | 0.00 | 0.47 | 0.03 | 0.01 | 175 |
| Software development and programming | 0.00 | 0.45 | -0.06 | -0.07 | 176 |
| Occupations in IT-network engineering | 0.00 | 0.45 | -0.05 | -0.04 | 216 |
| Occupations in insurance and financial services | 0.01 | 0.48 | -0.04 | -0.02 | 975 |
| Human res. management and personnel service | 0.01 | 0.49 | 0.01 | 0.00 | 190 |
| Occupations in metal-making | 0.02 | 0.43 | -0.00 | 0.04 | 142 |
| Painters, varnishers, and plasterers | 0.02 | 0.43 | -0.00 | -0.13 | 163 |
| Legal services and jurisdiction | 0.02 | 0.48 | -0.04 | 0.04 | 132 |
| Trading occupations | 0.02 | 0.41 | 0.02 | 0.05 | 218 |
| IT system analysis, application consulting and sales | 0.02 | 0.45 | -0.01 | -0.06 | 133 |

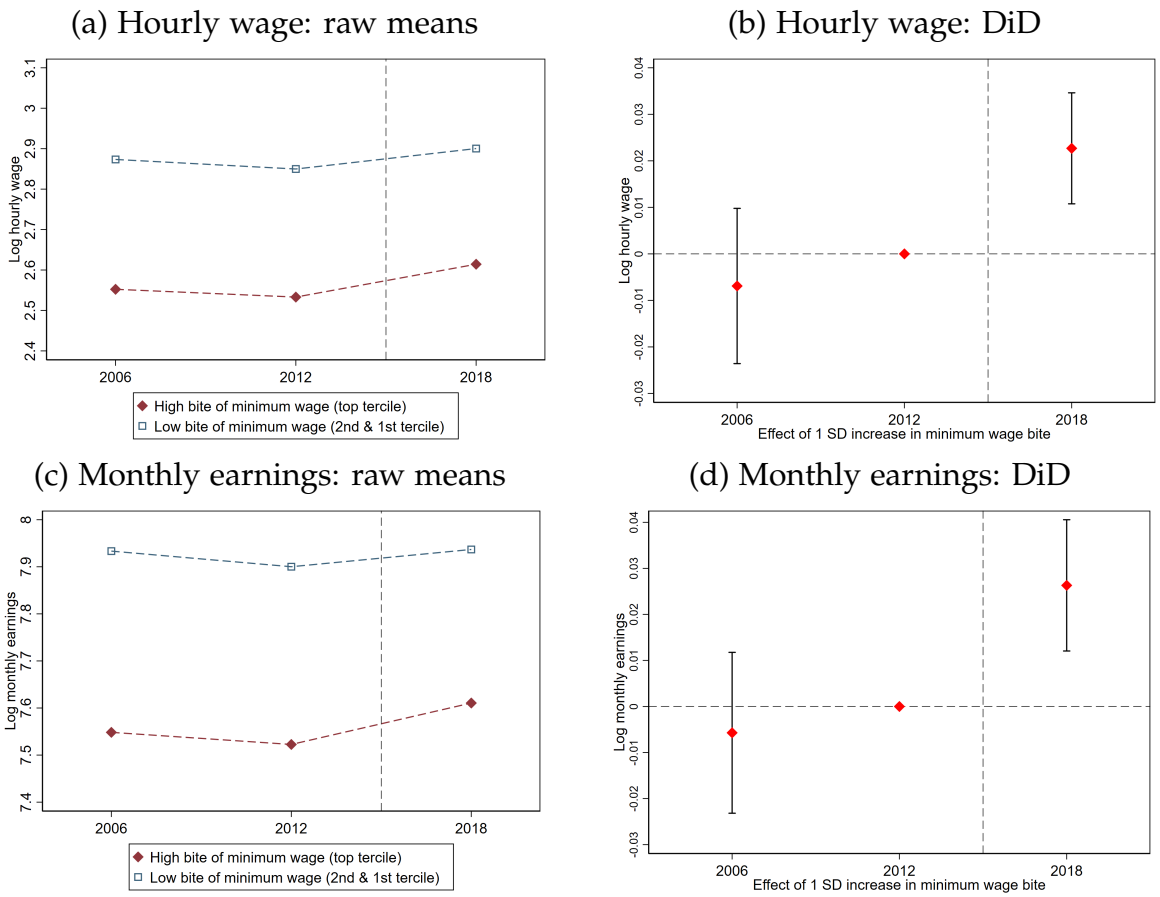
*Notes*: The table provides descriptive statistics on the 3-digit occupations with the highest and lowest bite of the minimum wage, respectively. The bite is defined as the share of workers within an occupation in 2012 with a nominal hourly wage below 8.50 EUR. See section 2.2.2 for a definition of work pressure. The last column reflects the number of person-year observations across all survey waves. The Table focuses on occupations with at least 100 person-year observations.

in minimum wage bite (corresponding to around 9pp increase in bite) is associated with a 0.02-0.03 log points increase in hourly wages and earnings. The magnitude of the effects is consistent with research on the wage effects of the 2015 minimum wage introduction in Germany (Dustmann et al., 2022; Bossler et al., 2025). Thus, our occupational bite measure seems to capture the occupational exposure to minimum wages well in our context. In Online Appendix Figure A.1, we show that there is no impact on work hours, mirroring the similar effects on earnings and wages. To us, this similarity in magnitudes also lends credibility to our identification strategy.

## 3.3 Minimum Wages Increase Work Pressure

We next turn to our key results in Figure 2. Panel (a) of this figure shows the average development of our pressure index over time for occupations with high (top tercile

Figure 1: The impact of minimum wages on wages and earnings

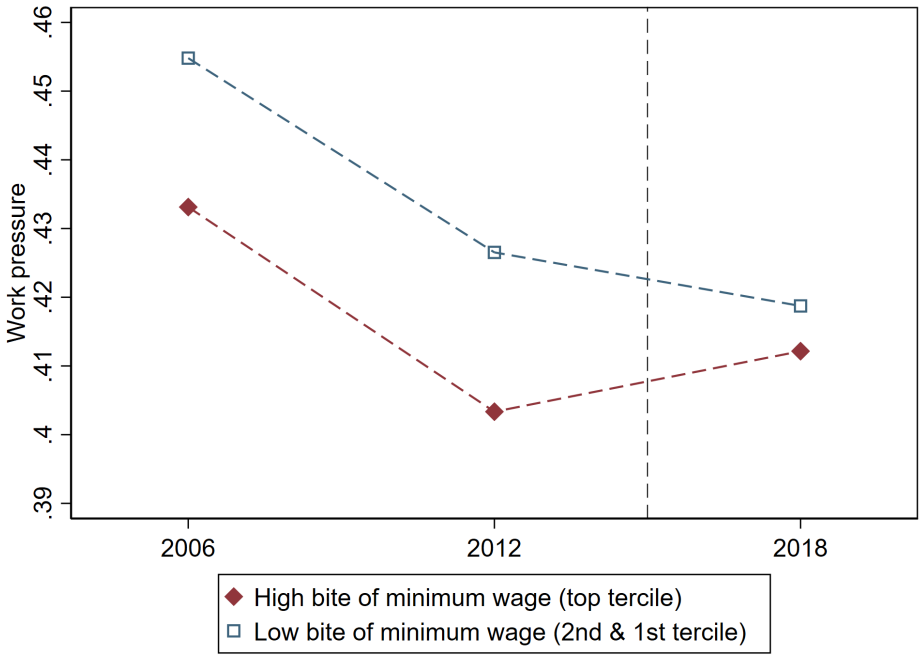



*Notes*: Panel (a) of this figure shows trends in log hourly wages by groups of occupations with high (top tercile) and low (bottom two terciles) minimum wage bite over time. We use contractual hours as our measure of hours. Panel (b) shows corresponding difference-in-differences estimates using Equation 1 along with 95% confidence bounds. It shows the impact of a one standard deviation increase in minimum wage bite (around 9pp increase in occupational bite). Panel (c) shows trends in log earnings again by groups of occupations with high and low minimum wage bite over time. Panel (d) shows corresponding difference-in-differences estimates using Equation 1 along with 95% confidence bounds. It shows the impact of a one standard deviation increase in minimum wage bite (around 9pp increase in occupational bite). All standard errors allow for clustering at the 3-digit occupational level.

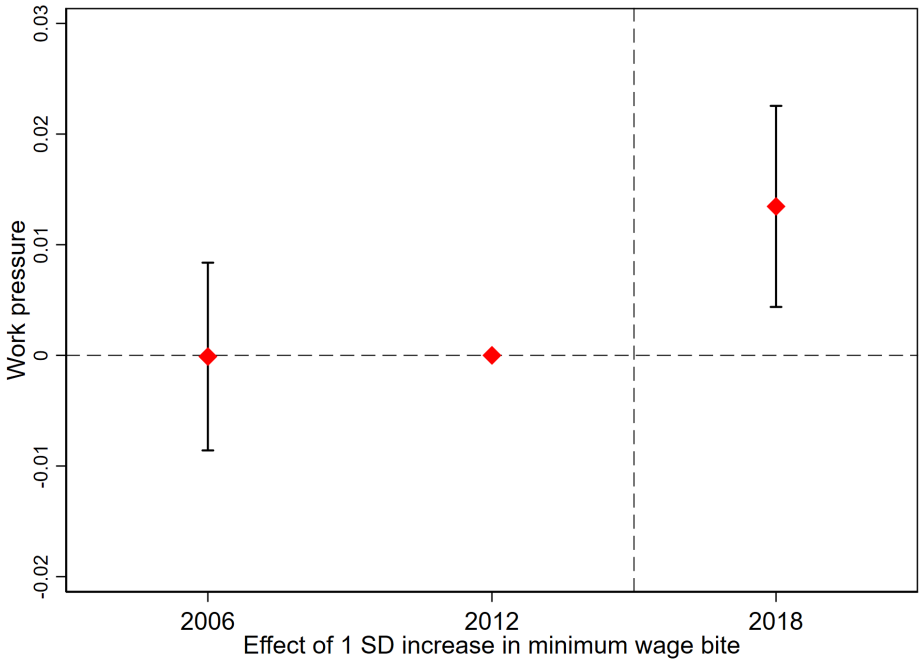
of occupations regarding our bite measure) and low exposure (all others). The panel shows that occupations with high subsequent minimum wage bite have lower average pressure than occupations with low bite before the introduction of minimum wages, in line with results by Nagler et al. (2025). Both groups of occupations also develop similarly between 2006 and 2012, in line with our identification assumption. The downward trend in average occupational work pressure came after a large increase in work pressure between 1979 and the early 2000s (Nagler et al., 2025). After the introduction of minimum wages in 2015, the average work pressure between the two groups then narrows. This suggests that minimum wages led to an increase in work pressure in occupations that were highly exposed to it.

Figure 2: Minimum wages and work pressure: baseline results

(a) Raw means




(b) DiD estimation




*Notes*: Panel (a) of this figure shows trends in work pressure as defined in Section 2.2.2 by groups of occupations with high (top tercile) and low (bottom two terciles) over time. Panel (b) shows corresponding difference-in-differences estimates using Equation 1 along with 95% confidence bounds. It shows the impact of a one standard deviation increase in minimum wage bite (around 9pp increase in occupational bite). Standard errors allow for clustering at the 3-digit occupational level.

Panel (b) then shows time-varying impacts of the minimum wage bite on the work pressure index, adapting Equation 1 and controlling for occupation fixed effects. In line with our identification assumption, there is no differential change in work pressure between more and less exposed occupations in the pre-minimum-wage period. After the introduction of minimum wages, more exposed occupations see an increase in work pressure, in line with the descriptive result in Panel (a).

Regarding the magnitude, a one SD increase in minimum wage exposure increases work pressure by around 21% of a cross-sectional standard deviation or by around 50% of the pre-treatment decrease in work pressure between 2006 and 2012. Yet, when weighted by the average hourly wage difference associated with this increase in work pressure in the German labor market (from Nagler et al., 2025), it only erases around 4% of the wage impact that we show in Figure 1.[9] If we instead use the willingness-to-pay estimates to avoid tight deadlines from Nagler et al. (2025) and our estimated treatment effects on tight deadlines in Figure A.2, the effects amount to up to 12% of the wage increase induced by the minimum wage. These estimates are similar in magnitude to the back-of-the-envelope welfare effects of increasing workplace injuries following minimum wage increases in Davies et al. (2024).

In Appendix Table A.2, we finally show that these results are driven by small and large firms alike. In relative terms, the effect is slightly larger for small firms, given that baseline pressure values are slightly lower in small firms. We also find stronger wage effects of the minimum wage introduction in small firms (also shown in this table). These results are consistent with lower collective bargaining coverage as well as lower works council prevalence and thus higher monopsony power among small firms, also in Germany (Jäger et al., 2022; Azar et al., 2024; Kohaut and Schnabel, 2025). Unfortunately, our data does not include consistent information on these dimensions.

**Robustness.** In Table 2, we provide several robustness checks to plausible alternative approaches. First, we use an alternative "gap" measure as regressor that takes into account the average distance between hourly wages and the new minimum wage. Second, we drop small occupations. Third, we run our regression at the two-digit occupation level. Fourth, we use full-time workers only. Fifth, we drop our sample restriction regarding working hours. Sixth, we include workers that have a higher education degree. Seventh, we show that our specification is robust to the inclusion of 1-digit-occupation-time fixed effects that accounting for potential endogeneity issues when using "bite"-approaches arising from heterogeneous treatment effects across occupations (Krueger, 1994; Dube and Lindner, 2024). Eighth, we allow for clustering

[9]To arrive at this number, we multiply our main treatment effect with the average wage premium in hedonic regressions from Nagler et al. (2025) and divide this number by the wage effect of minimum wages shown in Figure 1.

Table 2: Robustness checks

| Dep. var.: | Log hourly wage | Pressure index |
|---|---|---|
| (0) Baseline estimate | 0.023*** | 0.013*** |
| | (0.006) | (0.005) |
| (1) Gap measure | 0.020*** | 0.012** |
| | (0.006) | (0.005) |
| (2) Drop small occupations | 0.019*** | 0.013*** |
| | (0.006) | (0.005) |
| (3) 2-digit occupation level | 0.017*** | 0.012* |
| | (0.006) | (0.006) |
| (4) Full-time workers | 0.024** | 0.017*** |
| | (0.011) | (0.005) |
| (5) No hours restriction | 0.021*** | 0.014*** |
| | (0.007) | (0.005) |
| (6) Include high-educated | 0.014* | 0.014*** |
| | (0.008) | (0.004) |
| (7) 1-dig. occupation x time FEs | 0.024*** | 0.010* |
| | (0.007) | (0.006) |
| (8) Cluster at 2-digit occ. level | 0.023*** | 0.013** |
| | (0.007) | (0.005) |
| (9) Controls x time effects | 0.031*** | 0.013* |
| | (0.009) | (0.007) |
| (10) Actual work hours | 0.020*** | 0.013*** |
| | (0.007) | (0.005) |
| (11) Add occasional pressure | 0.023*** | 0.014*** |
| | (0.006) | (0.004) |
| (12) Burdensome pressure | 0.023*** | 0.012** |
| | (0.006) | (0.005) |

*Note:* (0) corresponds to the baseline specification, see equation 1. In (1), we use a gap measure as the main treatment variable. It is defined as the mean distance between actual hourly wages and 8.50EUR in the year 2012. In (2) we drop occupations with less than 100 observations. In (3), we run the analysis at the 2-digit level. In (4), we restrict the sample to full-time workers with at least 35 work hours/week. In (5), we impose no hours restriction. In (6), we include university-educated individuals. In (7), we include 1-digit occupation x year effects. In (8), we cluster the standard errors at the 2-digit instead of the 3-digit level. In (9), we include controls (measured in 2012) interacted with year dummies. These include shares of low-educated, women, non-Germans, average age, manufacturing share, primary sector share, 3 firm size categories (0-49, 50-249, >=250), and the share of temp agency workers. In (10), we use actual instead of contractual work hours to compute hourly wages. In (11), we define work pressure in case of frequent or occasional occurrence of an item. In (12), we use the question whether a person feels burdened by a specific pressure item to construct the pressure index.

of standard errors at the 2-digit occupational level. Ninth, we control for several occupation-level characteristics (demographics, sectoral and firm size composition, and the share of temporary agency workers) measured in 2012 and interacted with the time dummies. Tenth, instead of using contractual hours to compute hourly wages, we use self-reported actual hours. Eleventh, we include worker reports of occasional occurrence of the specific item to compute our work pressure index. Twelfth, we employ an index of burdensome pressure as the dependent variable. To run this analysis, we use a follow-up question in the data. After answering that a specific pressure item occurs frequently, workers are asked whether they consider this as burdensome. We construct an index of burdensome work pressure in an analogous fashion, averaging the number of times a person replies 'yes'. In all cases, our results remain qualitatively identical to the baseline specification.

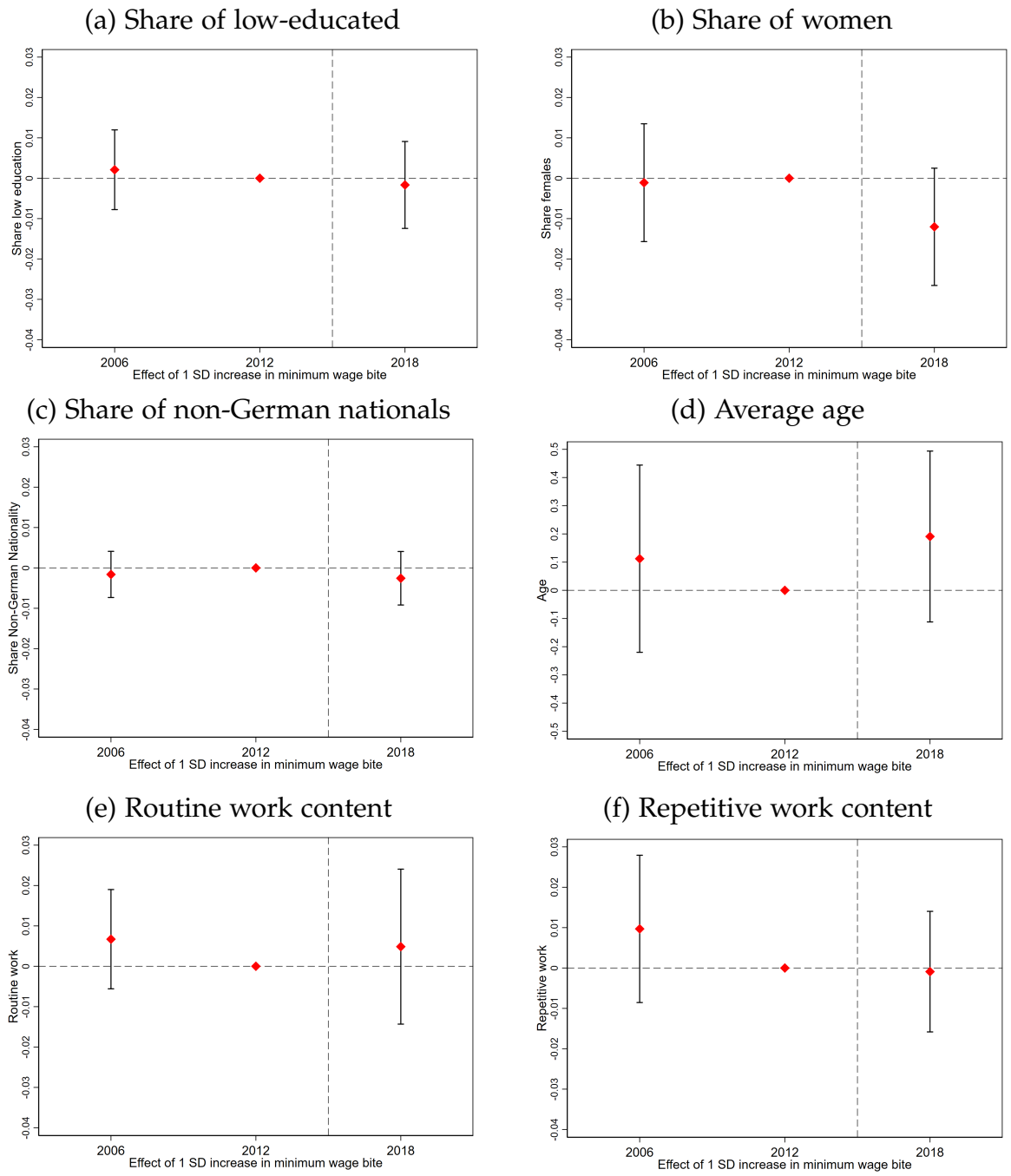
In Online Appendix Figure A.2, we finally investigate whether specific elements of our index drive these results. We find that several elements in the index see similar proportional increases, including the items of deadlines and pressure to perform and multitasking. We do not find detectable effects for working fast (positive point estimate, but marginally insignificant), being pushed to one's limit (positive point estimate, but insignificant), and minimum requirements. Given the nature of the measurement, to us it is unsurprising that we do not find effects for all individual items to the same extent. Overall, our results suggest that work pressure increased in several dimensions.

## 3.4 No Impact on Occupational Composition and Task Content

To what extent could these occupational changes be driven by or be associated with changes in worker composition within occupations over time? In Figure 3, we show adaptations of Equation 1 but using the share of low-educated, the share of women, the share of non-Germans, average worker age, and the task content on the occupational level as dependent variables. Across the board, there are no meaningful impacts on worker composition. If anything, we find a small (but statistically insignificant) decrease in the share of women and a small (but statistically insignificant) increase in average age. The point estimates, however, amount to only 4% and 10% of a cross-sectional standard deviation. All in all, compositional effects can therefore not explain shifts in worker-reported work pressure.[10]

[10]Regressing occupational changes in work pressure on changes in demographics and tasks for the pre-treatment years 2006 and 2012, we obtain an $R^2$ below 5% and no explanatory variable is statistically significant. Changes in the age structure or other compositional changes therefore are unlikely to explain changes in pressure in this setting.

Figure 3: The impact of minimum wages on occupational composition




*Notes*: This figure shows difference-in-differences estimates of the impact of a one SD increase in minimum wage bite on different dependent variables using Equation 1 along with 95% confidence bounds. Panel (a) of the figure uses the occupational share of low-educated (no completed degree) as dependent variable. Panel (b) uses the share of women in the occupation as dependent variable. Panel (c) uses the share of foreign workers as dependent variable. Panel (d) uses average worker age in the occupation as dependent variable. Panel (e) uses the average worker-reported prevalence of routine tasks as dependent variable. Panel (f) uses the average worker-reported prevalence of repetitive tasks as dependent variable. All standard errors allow for clustering at the 3-digit occupational level.

# 4 Conclusion

Little is known about how minimum wages affect the provision of non-wage amenities by firms. This is despite the fact that non-wage amenities strongly influence job quality for many workers. In this paper, we analyzed the impacts of the nationwide introduction of minimum wages in Germany in 2015 on work pressure, an important non-wage amenity for many workers. Drawing on individual worker-level survey data, we compared the development of proxies for work pressure in highly exposed relative to less exposed occupations over time.

Our key result is that work pressure increased in occupations that were highly affected by the minimum wage introduction. We interpret our results as evidence that firms offer worse non-wage amenities in response to forced increases in wages. Yet, when weighted against the wage increases induced by the minimum wage, our evidence suggests that workers are still better off after the minimum wage introduction, at least when including this amenity in the welfare assessment. Note, however, that data restrictions prohibit us to analyze other possible adjustment margins that may further affect worker welfare. Investigating additional potential margins of adjustment thus remains a fruitful avenue for future research.

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# A Appendix

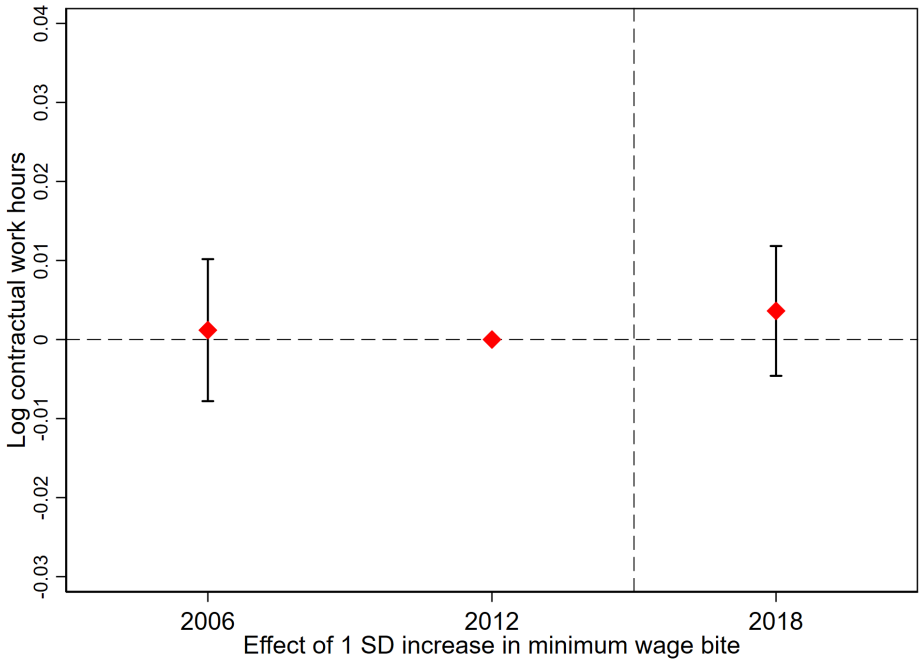
Table A.1: Descriptive statistics

| Occupation | Bite | Hourly wage (deflated) 2006 | 2012 | 2018 | Work pressure 2006 | 2012 | 2018 | Demographics (measured in 2012) Low-skilled | Female | Age | German | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (a) Occupations with highest bite | | | | | | | | | | | | |
| Occupations in body care | 0.64 | 8.25 | 8.73 | 10.17 | 0.50 | 0.44 | 0.43 | 0.03 | 0.94 | 40.28 | 0.86 | 107 |
| Occupations in cleaning services | 0.46 | 10.06 | 10.34 | 11.45 | 0.39 | 0.34 | 0.39 | 0.29 | 0.86 | 48.90 | 0.94 | 424 |
| Gastronomy occupations | 0.41 | 11.11 | 10.66 | 12.07 | 0.48 | 0.47 | 0.47 | 0.13 | 0.80 | 42.51 | 0.95 | 268 |
| Occupations in advertising and marketing | 0.28 | 19.53 | 18.03 | 19.90 | 0.53 | 0.45 | 0.46 | 0.09 | 0.53 | 43.36 | 0.99 | 374 |
| Cooking occupations | 0.27 | 13.18 | 12.20 | 13.39 | 0.52 | 0.51 | 0.54 | 0.14 | 0.64 | 46.31 | 0.94 | 416 |
| Sales occupations (retail) selling foodstuffs | 0.26 | 11.55 | 11.97 | 12.24 | 0.38 | 0.38 | 0.46 | 0.08 | 0.91 | 44.31 | 0.98 | 610 |
| Occupations in hotels | 0.24 | 10.94 | 12.85 | 14.57 | 0.45 | 0.40 | 0.46 | 0.18 | 0.71 | 41.76 | 0.87 | 108 |
| Occupations in plastic- and rubber-making | 0.23 | 16.00 | 15.13 | 16.41 | 0.47 | 0.39 | 0.39 | 0.23 | 0.20 | 43.30 | 0.91 | 121 |
| Housekeeping and consumer counselling | 0.18 | 11.05 | 13.90 | 12.93 | 0.32 | 0.38 | 0.35 | 0.14 | 0.99 | 48.88 | 0.96 | 206 |
| Doctors' receptionists and assistants | 0.17 | 12.24 | 12.66 | 14.24 | 0.46 | 0.46 | 0.47 | 0.02 | 0.99 | 42.58 | 0.99 | 500 |
| (b) Occupations with lowest bite | | | | | | | | | | | | |
| Software development and programming | 0.00 | 23.11 | 23.63 | 24.28 | 0.45 | 0.40 | 0.33 | 0.18 | 0.06 | 42.20 | 0.98 | 176 |
| Occupations in IT-network engineering | 0.00 | 22.80 | 24.29 | 24.93 | 0.45 | 0.40 | 0.36 | 0.09 | 0.18 | 43.66 | 0.98 | 216 |
| Laboratory occupations in medicine | 0.00 | 17.73 | 18.77 | 19.42 | 0.47 | 0.51 | 0.52 | 0.00 | 0.94 | 45.98 | 1.00 | 175 |
| Occupations in insurance and financial services | 0.01 | 21.85 | 21.75 | 22.84 | 0.48 | 0.44 | 0.42 | 0.04 | 0.66 | 46.30 | 0.99 | 975 |
| Human res. management and personnel service | 0.01 | 21.73 | 21.29 | 21.24 | 0.49 | 0.50 | 0.50 | 0.01 | 0.83 | 44.51 | 1.00 | 190 |
| Occupations in metal-making | 0.02 | 20.27 | 18.64 | 21.56 | 0.43 | 0.43 | 0.47 | 0.18 | 0.12 | 45.57 | 0.91 | 142 |
| Painters, varnishers, and plasterers | 0.02 | 15.95 | 13.67 | 13.17 | 0.43 | 0.43 | 0.30 | 0.02 | 0.09 | 43.66 | 0.98 | 163 |
| Legal services and jurisdiction | 0.02 | 16.11 | 15.96 | 16.84 | 0.48 | 0.43 | 0.48 | 0.02 | 0.94 | 44.45 | 1.00 | 132 |
| Trading occupations | 0.02 | 17.47 | 18.78 | 20.43 | 0.41 | 0.43 | 0.48 | 0.04 | 0.50 | 43.66 | 0.97 | 218 |
| IT system analysis, application consulting and sales | 0.02 | 26.56 | 27.81 | 25.78 | 0.45 | 0.44 | 0.38 | 0.09 | 0.26 | 44.51 | 0.98 | 133 |
| (c) All occupations | | | | | | | | | | | | |
| | 0.09 | 17.33 | 16.92 | 17.86 | 0.45 | 0.42 | 0.42 | 0.07 | 0.51 | 45.35 | 0.97 | 27977 |

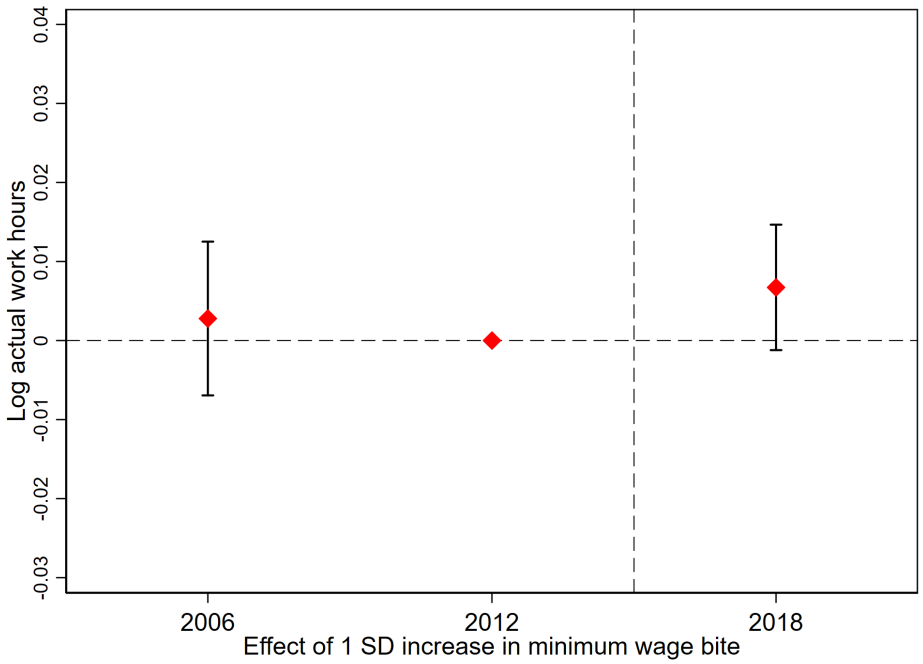
*Notes*: This table shows descriptive statistics (at the occupational level) for the three digit occupations that were most and least exposed to the introduction of minimum wages as well as for the entire sample. Panels (a) and (b) focus on occupations with at least 100 worker-year observations. Hourly wages are deflatedwith respect to the year 2015.

Figure A.1: The impact of minimum wages on hours worked

(a) Contractual work hours




(b) Actual work hours



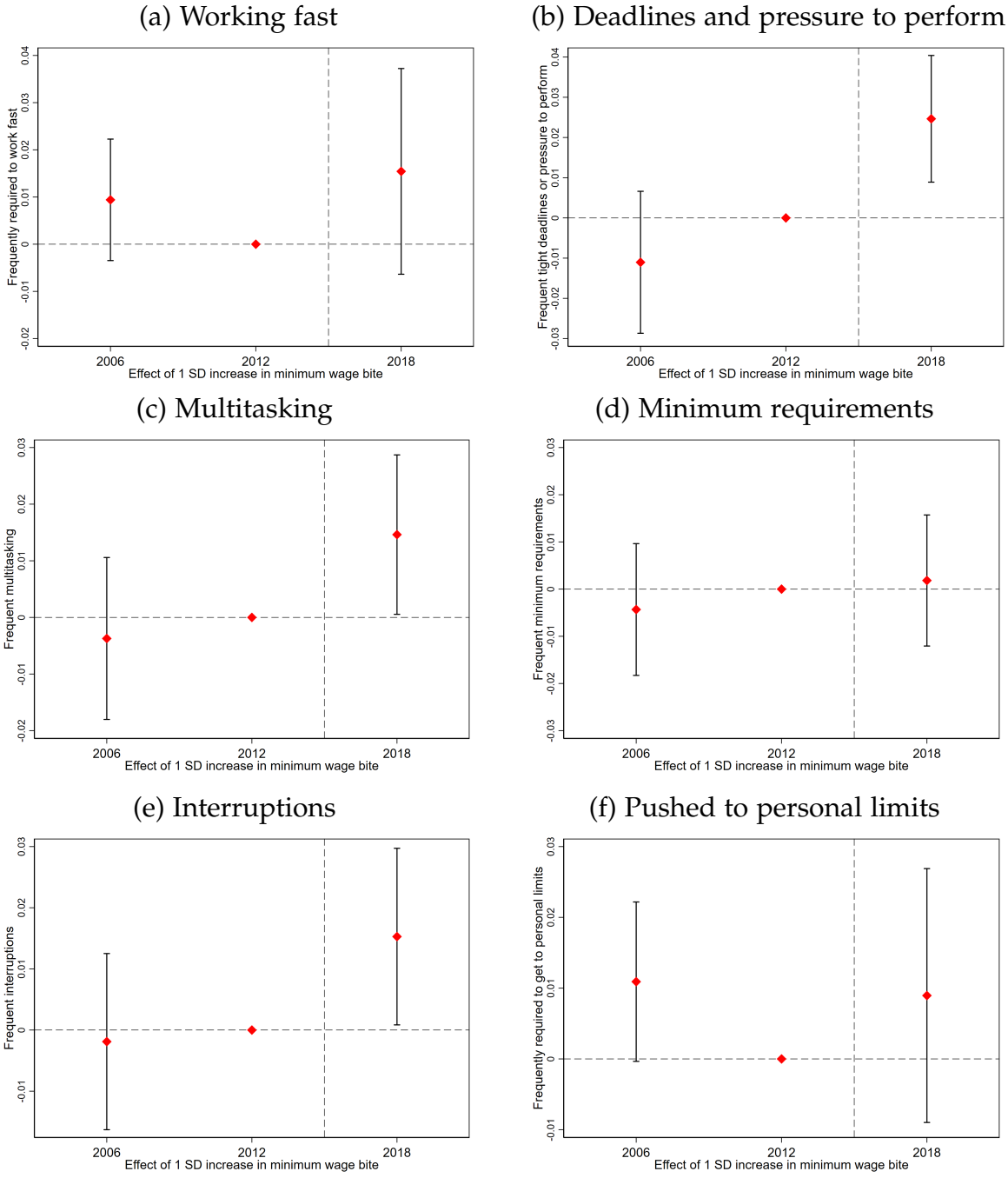

*Notes*: This figure shows corresponding difference-in-differences estimates of a one standard deviation increase in minimum wage bite (around 9pp increase in occupational bite) on log contractual work hours (Panel a) and log self-reported work hours (Panel b) using Equation 1 along with 95% confidence bounds. Standard errors allow for clustering at the 3-digit occupational level.

Table A.2: Heterogeneity by firm size

| Dep. var.: | Log hourly wage (1) | Pressure index (2) |
|---|---|---|
| Small firms (<100 employees) | 0.033*** | 0.014** |
| | (0.008) | (0.005) |
| Large firms (>=100 employees) | 0.026*** | 0.013** |
| | (0.009) | (0.006) |

*Note:* This table shows difference-in-differences estimates of a one-standard deviation increase in minimum wage bite (around 9pp increase in occupational bite) on log hourly wages (Column 1) and on work pressure (as defined in Section 2.2.2, Column 2) by firm size. Small firms are defined as having less than 100 employees. All other firms are large firms. Standard errors allow for clustering at the three-digit occupational level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.2: The impact of minimum wages on individual pressure items




*Notes*: This figure shows difference-in-differences estimates of the impact of a one SD increase in minimum wage bite on different dependent variables using Equation 1 along with 95% confidence bounds. The different dependent variables comprise all elements of the work pressure index as defined in Section 2.2.2. Panel (a) of the figure uses the prevalence of having to work fast as dependent variable. Panel (b) uses the prevalence of frequent deadlines and pressure to perform as dependent variable. Panel (c) uses the prevalence of having to handle multiple important tasks at the same time as dependent variable. Panel (d) uses the prevalence of minimum requirements for tasks as dependent variable. Panel (e) uses the prevalence of interruptions as dependent variable. Panel (f) uses the prevalence of being pushed to personal limits as dependent variable. All items are self-reported by workers on Likert scales. We use the reply "frequent" to these questions as indicating the prevalence of these work pressure dimensions. All standard errors allow for clustering at the 3-digit occupational level.