Incomplete Take-up of Subminimum Wages*

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Abstract

We analyze the effects of subminimum wage policy for young workers on their earnings and employment. We focus on the take-up of subminimum wages by firms and incidence of the policy. We use a nationwide reform that temporarily allowed subminimum wages for newly hired individuals under 25 years of age in Finnish retail trade and restaurant and accommodation industries between 1993 and 1998. Utilizing this reform we identify eligible and control groups for subminimum wages. We find that being eligible for subminimum wages reduces earnings, but at the same time the take-up of these policies by firms were far from complete. Strikingly, this prevails despite the fact that at the time of the policy there was economic depression. We find evidence that firm characteristics are important and the composition of employees within a firm matters for the take-up. Moreover, firms that lower the wages of their young workers seem to pass-through the incurred cost reduction to consumers in lower prices.

Keywords: Subminimum wage, wage incidence, employment, firms

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1 Introduction

The primary motivation behind minimum wage policies is to reduce the income inequality. At the same time a worry in the policy debate is that minimum wages create binding constraints for firms in their wage setting and thus lead to efficiency losses, for example resulting in lower employment (Card and Krueger 2015, Neumark and Wascher 2007). Empirical studies based on natural experiments have shown that broad minimum wage increases often had on average small or no statistically and economically significant negative employment effects (Cengiz et al. 2019). Despite of this, the above considerations have led to policy proposals to have temporarily lower minimum wages for particularly vulnerable groups, such as young workers who are entering the labor market, labeled subminimum wages. The idea then would be to have the lower minimum wages for these groups in order to facilitate the entry to the labor market and have better chances finding employment when the scheme ends. Evidence from Kreiner et al. (2019) suggest that sometimes the kind of scheme improves employment of the eligible group. Despite this evidence, it still remains a central question to what extent and in which instances minimum wages actually work as constraints to wages firms want to pay. Thus, a key policy question is to know how firms respond in their wages to subminimum wages.

We examine the take-up and effects on actual wages of temporarily lower minimum wages, i.e. subminimum wages, by firms in the service sector. Our results are based on a reform that allowed subminimum wages for workers under 25 years of age in Finnish retail trade and restaurant and accommodation industries over period of six years. On top of the age and industry restrictions the young employees needed to have no previous work history in the industry. These restrictions allow us to construct groups of individuals that either were or were not eligible to receive the subminimum wage, but are otherwise reasonably similar in terms of their labor market characteristics. These treatment and control groups allow us to analyze the causal effects of the subminimum wage policy on wages and employment. Our special interest is in whether or not eligible young workers were paid the subminimum wage

during the reform.

We apply this econometric design using comprehensive administrative data on annual earnings of the full population of the Finnish workforce. In these comprehensive data we also observe when each worker started to work for which firm. For a subsample of workers we also observe their hourly wages that allow us to study the wage effects more precisely. We have a rich set of characteristics from the linked employer-employee data for both firms and workers, which are helpful in order to analyze the mechanisms behind the potential non-take up of the policy.

We find that being eligible for subminimum wages leads to lower actual earnings and hourly wages for some workers in the treatment group. The average reductions in earnings were between 4-8% at largest. We are able to establish parallel time trends between our treatment and control groups before the reform took place in 1993. Moreover, the earnings of the treatment group seems to recover to the same level with the control group after the policy of subminimum wages ends in 1998. A closer examination of the hourly wage and personal minimum wage data confirms that the effect arises through lower hourly wages, not due to reduction in annual working time. This is because in the distribution of wages relative to own minimum wage we see a new mass appearing at the time of the reform around 20% lower than the normal minimum wage, which is the subminimum wage.

However, strikingly, the take-up of subminimum wages is incomplete given that the subminimum wage policy allowed the paid wage to be 20% lower than the normal minimum wage. In the hourly wage distribution we observe very transparently that much larger share of the eligible group received minimum wages than subminimum wages. This is intriguing given that the eligible group are young new hires, i.e. firms hired a new employee to to which they could have paid a lower wage for a period of time. Moreover, this is despite the fact that at the time of the reform there was economic depression and unemployment rose to a historically high level (almost 20 percent) implying that there was no shortage of labor for firm to hire. Our results highlight that firms may be reluctant to pay temporarily

lower wages for their workforce even during the times of exceptionally poor macroeconomic performance.

We then use the information on firm characteristics and outcomes to shed light on the mechanisms leading to incomplete take-up of the policy. Our hypotheses are that either firms see lowering the wages beyond minimum wages costly due to e.g. fairness considerations between workers or that firms having differential incentives to induce this cost-saving policy due to financial difficulties or lower productivity. Our results support these notions. We find that firms with lower wage differential between their younger and older workers have especially pronounced reduction in the earnings of the treatment group. Moreover, firms with lower productivity measured as their annual sales per number of workers and small firms do seem to lower the annual earnings of workers in the eligible group more. When we run a set of regressions comparing the relative significance of different firm characteristics in explaining the reduction in wages, especially the former, the low wage differential seem to be contributing to the overall reduction most. This result suggests that the non-take-up might be explained by firm managers not wanting to reduce the wages of their new young hires in a situation where they already receive lower wages than other workers in the firm and supports the hypothesis of fairness considerations playing a role here.

Additionally, we study the incidence of minimum wages in similar vein to Harasztosi and Lindner (2019) by examining what happens to revenues of affected firms to which had differential exposure to minimum wages. As a first pass we use as the exposure measure the small or large wage differential between young and old workers measured in the pre-reform years. As described above, the policy seems to have clearly larger effect on earnings when the wage differential is small. When looking at revenues of such firms, we find that they decline more in firms with small wage differential than large but only in the reform years. This preliminary result suggests that the incidence of minimum wages is largely on consumers, supporting the finding in Harasztosi and Lindner (2019). This highlights that an additional mechanism for the take-up of the policy at the firm level is that those firms that need to

lower the prices of their products and services are more likely to reduce their wages.

This is still work in progress and we intend soon to include more analysis to the paper by developing an alternative control group from other service sector industries not affected by the reform. This will allow us to analyze the effects of subminimum wages on labor demand by firms as well as a closer examination of other relevant firm outcomes. In similar vein to Saez et al. (2019) we will also analyze how the ability to pay subminimum wages to some workers affect the other workers in the firm.

Our results relate in an interesting way to large and lately growing literature on minimum wages (Card and Krueger 2015). Many previous studies are on institutional settings that increase minimum wages, sometimes quite dramatically as in Hungary (Harasztosi and Lindner 2019). Also, the minimum wages of especially low-wage jobs have gained increasing policy interest, such as the service sector jobs studied here (Cengiz et al. 2019). The recent studies based on credible quasi-experimental designs typically yield low or no discernible effects on employment, although wages do clearly increase. However, the specific motivation for the policy studied here relates to targeted minimum wage reductions for young workers.[1] Kreiner et al. (2019) study such a scheme in the Danish setting, where all under 18 years of age are eligible for lower than normal minimum wages. They find that the actual wages of those eligible are clearly lower than those older than 18. Moreover, Kreiner et al. (2019) find large reductions in employment for those turning 18, an effect at least consistent with substitution by firms to younger workers.

It could be more challenging to lower wages than to increase them. Despite the extensive literature on various effects of minimum wage legislation, there does not seem to exist many studies that look at impacts of policies that drastically lower minimum wages, and especially policies that do that for specific groups of people such as the young new hires here. Our institutional setting can provide different results from e.g. Kreiner et al. (2019) because the

[1]Böckerman and Uusitalo (2009) provide an earlier study of the same scheme as here, but with much more limited scope with no focus on relevant firm characteristics and incidence of subminimum wage policy. Another relevant difference is that Böckerman and Uusitalo (2009) use a broader definition of the eligible group that may not able to pin down the full effects of the policy.

scheme is for different age group, upper age limit in our setting is 25 while in Denmark it was 18. Moreover, the lowering of wages can be more difficult when not all workers in a specific types of jobs and tasks are eligible for the subminimum wage. Thus, our contribution to the literature is to show that this type of scheme might be surprisingly ineffective in reducing wages and supporting employment even during the times of economic depression. Moreover, the responses by different types of firms provide interesting insights into the decision making of firms in terms of whether they want to cut costs by lowering wages and thus potentially facing fairness costs (Falk et al. 2006).

The paper proceeds as follows. Section 2 describes the key institutions and economic conditions around the subminimum wage policy. Section 3 introduces the data. Section 4 presents our identification strategy. Section 5 reports the effects of the policy and Section 6 provides concluding remarks. Additional results are presented in Appendix 6.

2 Setting

Institutions.—Wage bargaining in Finland is characterized with a high degree of co-ordination between the trade unions and the corresponding employer organizations. The industry-specific collective labour agreements are binding for non-union members in sectors where the union contract is considered to be "representative". Most industries have a representative contract, because the union density in Finland is approximately 70 percent (Böckerman and Uusitalo 2006). Consequently, the coverage of collective labour agreements in Finland is among the highest in the OECD countries (Nickell and Layard 1999).

Minimum wages are determined in Finland in each industry in the collective labor market contracts between the unions and the employer organizations. These contracts are almost always binding for non-union workers. The union contracts specify task-specific minimum wages, i.e. minimum wages vary across seniority groups and regions (Böckerman and Uusitalo 2009). Incomplete compliance is not an issue in the Finnish context, because the unions have

sufficiently strong bargaining power to enforce minimum wage regulations also in the service sector where the union density is much lower than in the manufacturing sector.

Macroeconomic conditions.—There was an unprecedented collapse in aggregate economic activity in Finland during the early 1990s (Honkapohja and Koskela 1999). Output fell by 14 percent in the years 1990–1993. The unemployment rate increased in three years (1991–1993) to almost 20 percent from an average of around 5 percent during the 1980s. Thus, Finland suffered its worst depression of the twentieth century not in the 1930s but in the early 1990s.

Subminimum wage policy.—The great depression of the early 1990s led to substantial pressures to increase flexibility in wage formation. As a result, in the spring of 1993, the then ruling center-right government proposed a bill that would have made it possible to pay under 25 years old workers wages lower than the prevailing industry-specific minimum wages in order to promote youth employment. However, this proposal was later withdrawn due to pressure from labour market parties with the commitment from these parties that this matter would be handled by them outside the legislative process. From June 1993 onwards, trade unions in certain industries made agreements that allowed firms to pay subminimum wages to young workers. These agreements largely followed the initial government proposal and the later general framework that was set by the central organizations from the employer and union sides of the table.

Sectors.—Our analysis focuses on the retail trade and restaurant and accommodation industries that were largest sectors where subminimum wages for young workers were agreed upon. These industries are also the prominent low-wage industries in Finland and they employ a larger than average share young workers. In addition, firms in these industries were hit hard during the severe economic downturn creating a potentially strong financial incentive for firms to pay subminimum wages for those who were under 25 years of age.

In the retail trade sector the labour union and the employer's association reached an agreement on youth subminimum wages in early June 1993. This agreement took effect on June 15th 1993 and was planned to last for two years. However, in 1995 the agreement was

extended to be in effect until February 28th 1998. The minimum wages of unexperienced workers younger than 25 were reduced to 80 percent of the lowest task- and region-specific tariffs for the first 8 months of their employment.[2] The agreement also lowered minimum wages of trainees and summer workers but we mainly focus our analysis on unexperienced new recruits under the age of 25. The agreement did not directly affect the terms of employment of those workers who were already employed by the firm were they over or under 25 years old.

The agreement in the restaurant and accommodation industry was reached later in 1993 and took effect on December 1st 1993. The subminimum wages were in effect until June 15th 1995 and the agreement largely followed the one in the retail trade sector with some exceptions. Most notably, the subminimum wage was possible only for the first 6 months of employment for eligible workers.

3 Data

We utilize comprehensive Finnish administrative data. The core dataset is linked employer-employee data that covers all firms and is linked to all employees in them. The data are in panel form, meaning that we can follow the same firms and/or employees over time in the data. The years we utilize in this study are 1988-2001.

The firm-side information includes the specific industry the firm is in, number of employees, annual sales and other accounting variables. Importantly, we observe when each worker started or ended working for a particular firm. We observe for employees their annual earnings, educational achievements and age, among other things. Due to the panel structure of the data, we can construct work histories for each employees, which is important given that only those were eligible to receive subminimum wage that had no previous work history in the industry.

[2]The agreement in the retail trade sector states that under 25 year old workers who are either graduating from a vocational school or from higher education or who have no vocational training and have less than one year of occupation-related work experience were eligible to subminimum wages.

We are able to link other information to our core dataset. The most important one is information on hourly wages for a subsample of workers. These data are from the firms that are members of Finnish employers' association (EK). All major retail trade chains and most large independent retailers are members of the employers' association. The advantage of these data from payroll records are the precise measure for wages with minimum amount measurement error, but the disadvantage is smaller sample size than in the core data.

We also link to all this information the precise agreed wages using collective labor agreements to identify which individuals were eligible for the subminimum wages. This information combined with the variables in the core dataset allows us to evaluate accurately who exactly are eligible for the subminimum wages and what are the normal minimum wages for each worker.

In our estimations the main dependent variable is log annual earnings of those fulfilling the full-time employment condition. The idea is to overcome the variation coming from lower working time in the analysis with annual earnings data. This is defined as having at least 60% of earnings that would accrue by working 12 months with a minimum wage. In retail trade the number for working full-time with a minimum wage is 10,800 euros in 1993, and thus the working condition threshold is having earnings of at least 6,360 euros per year. The main outcome variable excludes those that have earnings less than this threshold.

Table 1 presents the key summary statistics from the data discussed above. In the linked employer-employee data we have 101,519 observations in retail trade in 1992, from which 20,511 are in the control group and 4,107 in the treatment group. The number of observations in the payroll data are about one third of the full data. The average log earnings were about 14,000 in the control group and 7,700 in the treatment group. Mean hourly wages in the payroll data were 7.57 and 6.13 euros in the control and treatment groups, respectively.

4 Identification strategy

The aim of this study is to identify the causal effect of subminimum wages on number of outcomes. We are able to utilize the reform that allowed subminimum wages to be paid to only a subset of workers and only in three different industries covered by two binding collective bargaining agreements. This creates a quasi-experimental research setting where we examine the effects of the policy by comparing the development of treatment and control groups before and after the policy change.

Treatment and control groups.—We define as our treatment group those who are eligible to receive subminimum wages. These are those workers under the age of 25 years old who do not have previous work history in the industry in question. The control group is (at this stage of the project) defined as those between 25 and 34 years of age without any restriction on the work history. Note that we could have used also those under 25 years of age that have previous work history, but a worry there is that we could somehow misclassify the work history and thus create a control group which is in fact eligible for the subminimum wage policy.

Empirical specifications.—Using these groups we estimate the effects of subminimum policy on number of outcomes first by using event-study design. This is based on the following regression equation.

$$y_{it} = \alpha + \sum_t \eta_t Year_t + \alpha Treat_i + \sum_k \beta_k Treat_i Year_k + \varepsilon_{it} \tag{1}$$

where y_{it} is the outcome for individual i at time t. We control for differences between treatment and control group with $Treat_i$. β_k identifies the main effects of interest, that is, the difference between the treated and control groups each year.

The main identification assumptions are that the control group represents the treatment group in the absence of the reform and that the reform is exogenous from the point of view of the firms and workers. Moreover, the policy should be exogenous to economic development.

We test the first assumption by examining the pre-reform trends, which should be parallel in order to establish that the groups would develop together also after the reform if it had not happened. The second assumption is fulfilled by the fact that the reform was negotiated at a higher industry level with the support from the government. Thus, from the point of view of individual firm or worker, they had no other chance than to face the policy. The third assumption is more difficult to defend in principle, because the social partners negotiated the policy. However, if anything the fact that the employer confederation was part of the negotiations that led to the agreement should work in favor of increasing the take-up of the policy. Thus, this should work against our main variable of interest, the non take-up.

Moreover, we are interested in the average effect of the policy and additionally the effects among specific subgroups of firms. To estimate these we run a generalized differences-in-differences regression and take interaction the terms of the firm dummies representing the firm groups of interest with the DiD variable. Formally, we run regressions of the following form:

$$y_{it} = \alpha + \zeta After_t + \beta Treat_i + \gamma Treat_i After_t + \sum_g \eta_g Firm D_g Treat_i After_t + \epsilon_{it} \qquad (2)$$

where y_{it} is the outcome for individual i at time t. We control for general changes in outcomes in the after period with dummy $After_t$ and differences between treatment and control group with $Treat_i$. γ identifies the main effect of being eligible for subminimum wage on the studied outcome. We additionally include interactions with the treatment effect that are firms-level dummies dividing firms into two groups according to different pre-reform characteristics. η_g coefficients identify the effects of these interaction terms. We also include the main effects of all interaction terms that are shown in the appendix.

5 Results

Descriptive evidence.—We begin the analysis with graphical examination of log earnings in the treatment and control groups. As explained in the institutional section, the treatment group are the eligible workers, i.e. those under 25 years of age that start a new job in the retail trade or restaurant and accommodation industries and that do not have previous work history in the industry. The control group consists of those who are slightly older, between 25 and 34 and who do have previous work history in the industry. We examine the development of these groups for different outcomes before and after the period when the subminimum wages were in place, that is over the period 1993 - 1998.

Figure 2 shows the development of log earnings in the retail trade sector and Figure **??** in the restaurant and accommodation sector. Both figures show that we can establish parallel pre-trends between the groups before the reform in 1993. Moreover, both figures reveal that the earnings of the treatment group on average drop during the reform period, when they we allowed to receive subminimum wages. Especially in retail trade the average earnings of those eligible catch up the earnings of the control group right after the policy was abolished in 1998.

Main effects of the policy.—Figure 3 shows the result of the event-study specification presented in equation (1), that is, the difference between the treatment and control groups for retail trade to show more clearly the quantitative size of the effect. In the graph the estimated effect seems quite constant at about 4% from 1994 onwards until the end of the policy. Given that the full subminimum wage is 20% lower than the otherwise prevailing minimum wage and that we are analyzing the development of earnings of those strictly eligible here, the estimated modest reduction in earnings suggest that only around one fifth of those in the eligible group received the subminimum wage. The result highlights one of our main results, that the take-up of the subminimum wages is incomplete. This is intriguing given especially that financial conditions were very unfavorable at the time of the implementation of the policy, as discussed in Section 2.

The log annual earnings as a proxy for wages has the problematic feature that changes in it could also reflect changes in annual working time. To make sure that the above documented changes arise due to eligible workers actually receiving subminimum wages, we turn to the subsample for which we have the hourly wages and information about their own minimum wage. We calculate for each worker the minimum wage he or she is entitled to based on occupation and tenure. We then take the log difference between the actual hourly wage and the minimum wage. When receiving subminimum wage this difference should be negative, but absent measurement error should not be negative otherwise.

Figure 4 shows the distributions of these differences in 1992 (before) and 1996 (during the policy) for the control group. The two distributions have very low mass in the negative side and have relatively large spikes close to zero indicating that many workers do receive the minimum wage. Figure 5 then repeats this exercise for the eligible group. In the 1996 distribution there appears a mass close to the subminimum wage threshold, -0.2 log points that is not visible in the before distribution (or the control group distribution). This mass on the negative side highlights the impact of the policy on actual wages, some workers were indeed paid lower than minimum wages, i.e. the subminimum wage. At the same time evidently many eligible workers received either the minimum or a higher wage showing that the take-up of the subminimum wage by firms were far from complete.

Figures 6 and 7 present distributions of log earnings in 1992 (before) and 1994 (during the policy) for control and treatment groups, respectively. These are not as precise measures of wages as above, but confirm that also for this variable we see more mass at lower earnings for the eligible group than for the control group. Moreover, the feature that many still earn similar earnings than before the policy is similar than for the hourly wages. This is evidence of non take-up of the policy given that the distributions are cross sections of new hires for the treatment group.

Mechanisms.—Given that there seems to be notably incomplete take-up of the subminimum wage policy by firms, we proceed our analysis by looking into mechanisms as to why

firms do not want to pay lower wages to their young new hires despite the obvious gain in profits this might yield. The two main hypothesis we have relate to profitability of firms and fairness considerations relative to other workers in the firm. The fairness consideration is that if there are many other workers receiving higher wages in the same firm, it might be more difficult to pay lower wages for only some workers (Falk et al. 2006). This is especially relevant given that the eligible are only those having no work history in the industry, and thus there could be other workers of the same age than the eligible workers in the same firms. The obvious profitability mechanism is that perhaps firms have same fairness considerations or other reasons for why they do not want to pay lower than minimum wages, but when they have low profitability they have stronger incentive to overcome these considerations and pay the subminimum wage whenever possible. Additionally, it could be that some firms are not that aware of the policy.

To shed light on these mechanisms, we perform number of split sample estimations. First, Figure 8 divides the worker population into those working in high or low wage differential between younger and older workers. The wage differential is first calculated as the average in the pre-reform years per firm, and then firms are split into high or low wage differential. Figure 8 shows that the drop in earnings for those in eligible group is much larger when the pre-reform wage differences were small than when they were large. In the large wage differences group the impact of the policy seems to be only about 2% lower wages while in the small wage differences group the effect peaks at about 12% lower wages. This result supports the hypothesis that it is more difficult to pay subminimum wages when in the same firm other workers are receiving higher wages, measured here with the wage differential between older and younger workers. Interestingly, in the low wage differential group the wages seem to remain at a lower level relative to the control group in the same firms also after the subminimum wage policy has ended.

Given the significance of the wage differential between young and old workers, it is important to describe these firms more. Figures 17 and 18 show the hourly wage distributions

for young and old workers in 1992 for firms that have small and large wage differences, respectively. Evidently the most significant difference across these firms is that when the differences are large many of the old workers receive higher wages than young workers. When the differences are small, the wage distributions of young and old workers are much closer together. Moreover, to show the change in hourly wages in these two firm groups, Figures 13 and 14 show the wage distributions in 1992 and 1996 among the eligible. The mode in the 1996 distributions has moved to the right compared to the 1992 distribution because the collectively agreed binding minimum wage has increased. However, there is also more mass at lower wages than in the 1992 distribution, and especially so in the firm group with small wage differences in the pre-reform period. This distributional examination of hourly wages again supports the idea that the effect arises precisely because young new hires receive subminimum wages.

Figure 9 studies the productivity aspect. The productivity measure is sales per worker measured in the pre-reform period. The figure shows that the earnings reducing effect is notably larger when the productivity is lower. This also supports the hypothesis that firms take-up the subminimum wages when they have higher financial incentives to do so.

Figure 10 divides the firm population by size measured by the number of workers in the pre-reform period. The hypothesis here is that larger firms may be more aware of the existence of subminimum wage policy and thus would be more likely to take it up. This is because larger firms on average hire more workers and thus would be more aware of the legal practices and relevant agreements. The results, however, do not support this hypothesis. In fact, the earnings reducing effect is larger in the smaller firms. In fact, this result supports the one above, that the smaller firms have higher incentive to pay the subminimum wage. They hire less workers and the wage of a new hire can be a large share of the total wage budget in the firm. Thus, reducing the wage leads to larger relative cost savings in small firms.

Incidence of the policy.—We are also interested in the final incidence of the subminimum

wage policy. As an outcome informative about the extent to which consumers bear the incidence we use firm revenues. These decline if firms lower the prices of their products and services as a response to lower wage bill. To make a comparison across firms we use the division factor that seemed to affect most for the earnings of employees, the firm-level wage differences between young and old workers in the pre-reform period. It constitutes sort of an exposure measure. Figure 12 shows the development of the difference between small and large wage differential firms over time. Although the confidence intervals are quite large in this preliminary figure, the pattern is clear, those firms having small wage differential have lower revenue in the years when the subminimum wage policy is in place but not otherwise. Since these are also the firms were the wages were significantly lower, the preliminary result here suggests that the subminimum wage policy has fairly large incidence on consumers.

Disentangling contributing factors.—Finally, to identify the most important drivers of our results we run a set of regression models comparing the relative significance of different firm characteristics in explaining the reduction in wages. The regressions are based on equation (2) presented in Section 4.

The estimates based on this regression are summarized in Table 2 without individual-level controls and in Table 3. The results show that the average differences-in-differences estimate without controls of the policy on eligible workers is 3% lower earnings and with controls 5%. From the different interaction estimates the small wage differences dummy has an additional 7% reduction in wages on top of the main effect of 5%. Being in a small firm also has a small negative effect on earnings on top of the main effect when added individually. The other firm dummies interacted are being in a low productive firm and having a high share of under 25 years olds from all new hires, but these do not show up as statistically significant. When adding all these interactions in the same regression in column (6) only the main DiD effect and the having small wage differences indicator are significant. This suggests that the composition of workers and what kind of wages are paid to them is the most important driver for the sometimes low take-up of the subminimum wage policy.

6 Conclusion

Minimum wage legislation remains a highly controversial labor market institution. We examine the effects of temporary subminimum wage policy for young workers on their earnings and employment in Finnish retail trade and restaurant and accommodation industries. The policy was implemented during the great depression of the early 1990s.

Using comprehensive linked employee-employer data on earnings and firm characteristics combined with information on collective labor agreements, we establish three main results. First, being eligible for subminimum wages leads to lower actual earnings for some workers in the treatment group. The average reductions in earnings were between 4-10% at largest. Strikingly, the take-up of the policy was incomplete despite the severe financial difficulties that the firms in the sectors faced during the economic depression. Second, the effects of the policy were notably heterogeneous in terms of firm characteristics. Wage structure of the firm plays a particularly important role in the response to the policy. We find that the wage reduction was much larger in firms with narrow wage differential between younger and older workers. Our interpretation of this finding is that the non-take-up of the policy might be explained by firm managers not wanting to reduce the wages of their new young hires in a situation where they already receive lower wages than other workers in the firm. Third, we examine relatively under-researched topic in the empirical literature on minimum wages that has important implications for public policy i.e. the incidence of the subminimum wage. We find that those firms having a small wage differential between younger and older workers have lower revenue in the years when the subminimum wage policy was implemented. Since these are also the firms were the wages were significantly lower, the preliminary result here suggests that the subminimum wage policy has fairly large incidence on consumers.

Our preliminary results highlight the limitations of policy proposals that aim to support employment by cutting minimum wages only for some groups of workers. Our results also point out that firms that lower the actual wages in response to the subminimum wage policy seem to pass-through the incurred cost reduction to consumers in lower prices. We will

evaluate the potential effects of the policy on labor demand and other relevant firm-level outcomes in ongoing research.

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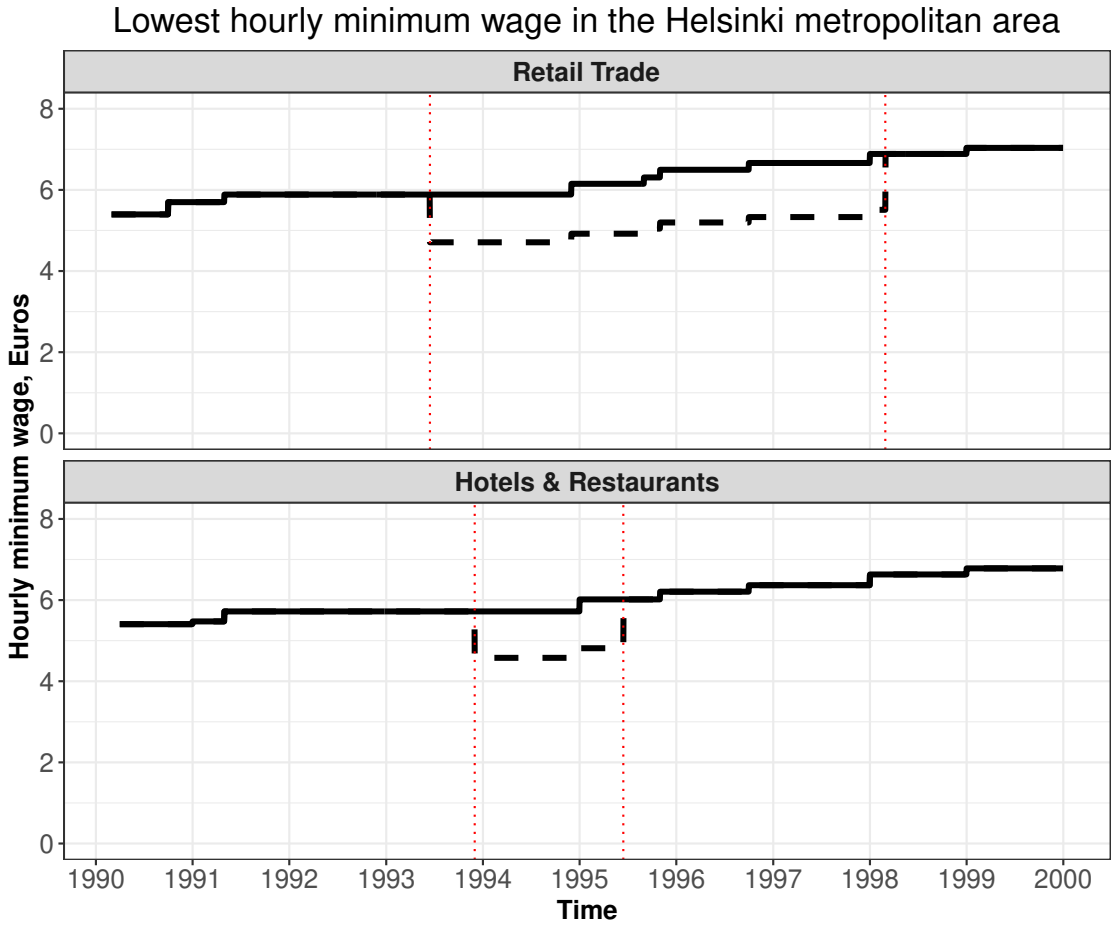
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Figures

Figure 1: An illustration of the subminimum wage policy.



Notes: The solid line describes the development over time of the statutory minimum wage in Euros in the Helsinki metropolitan area. The dashed lines shows to what extent the lowest possible wages were affected due to the subminimum wage policy, which is 80% of the normal minimum wage. The calculations are based on the official agreed wages.

Figure 2: Log earnings in the treatment and control groups in the retail trade industry over the period 1989-2002



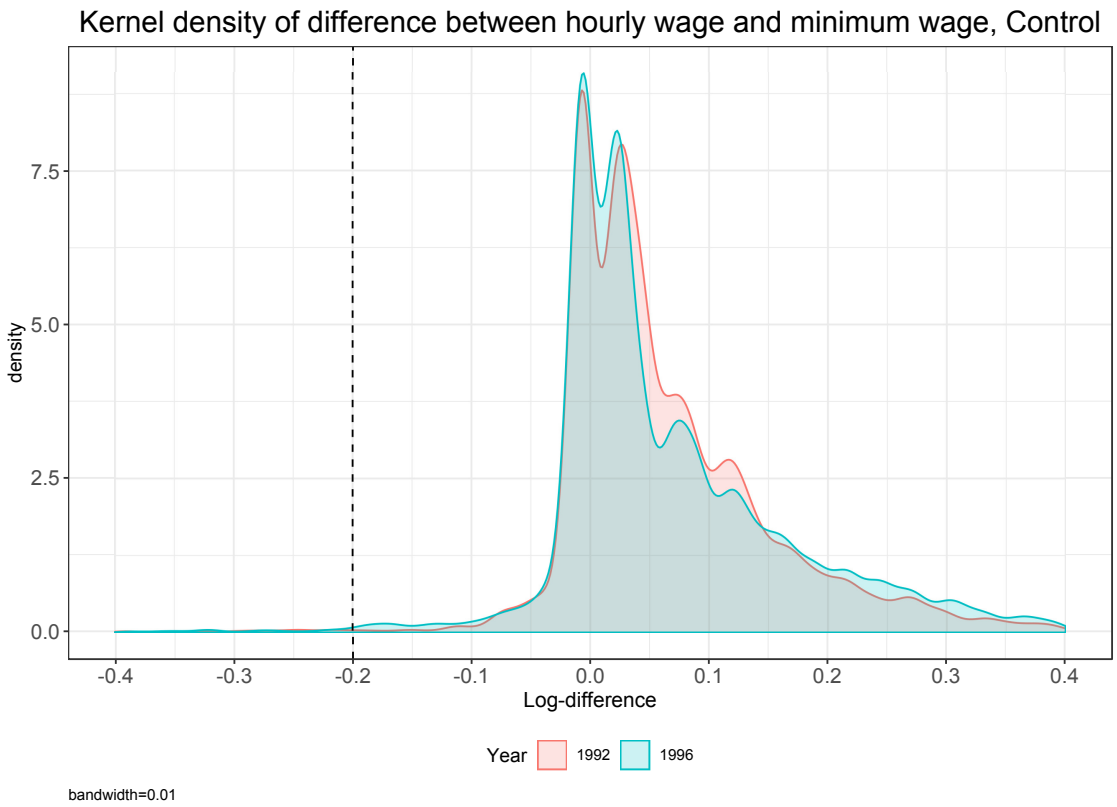
Notes: The graph shows development of log earnings in the eligible and control groups. The eligible consists of new hires under the age of 25 who have no previous experience in the industry. The control group consists of those who are between the ages of 26 and 34. The outcome is log earnings for those fulfilling the full-time employment condition.

Figure 3: Differences of log earnings between the treatment and control groups for all workers in retail trade



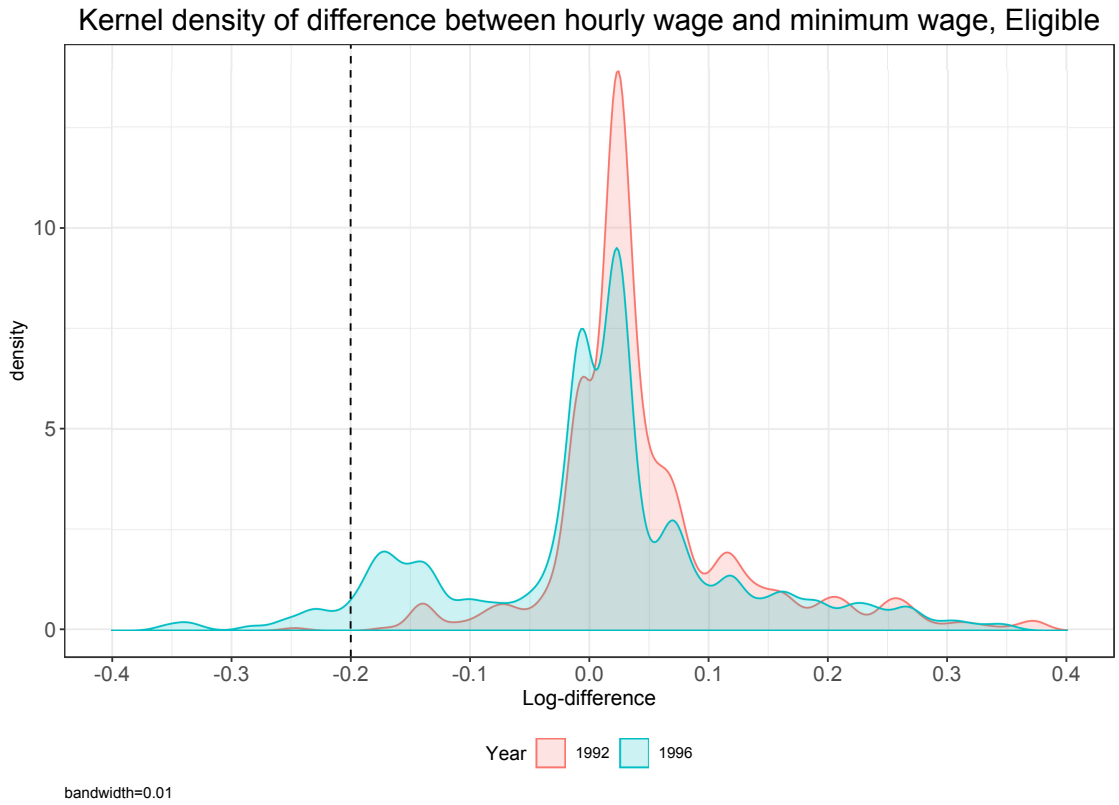
Notes: The graph shows the event-study style difference of log earnings between the eligible and control groups over time. The plotted differences are coefficients from a regression presented in equation (1). The eligible group consists of new hires under the age of 25 who have no previous experience in the industry. The control group consists of those who are between the ages of 26 and 34.

Figure 4: Log difference to own minimum wage in the control group in 1992 and 1996



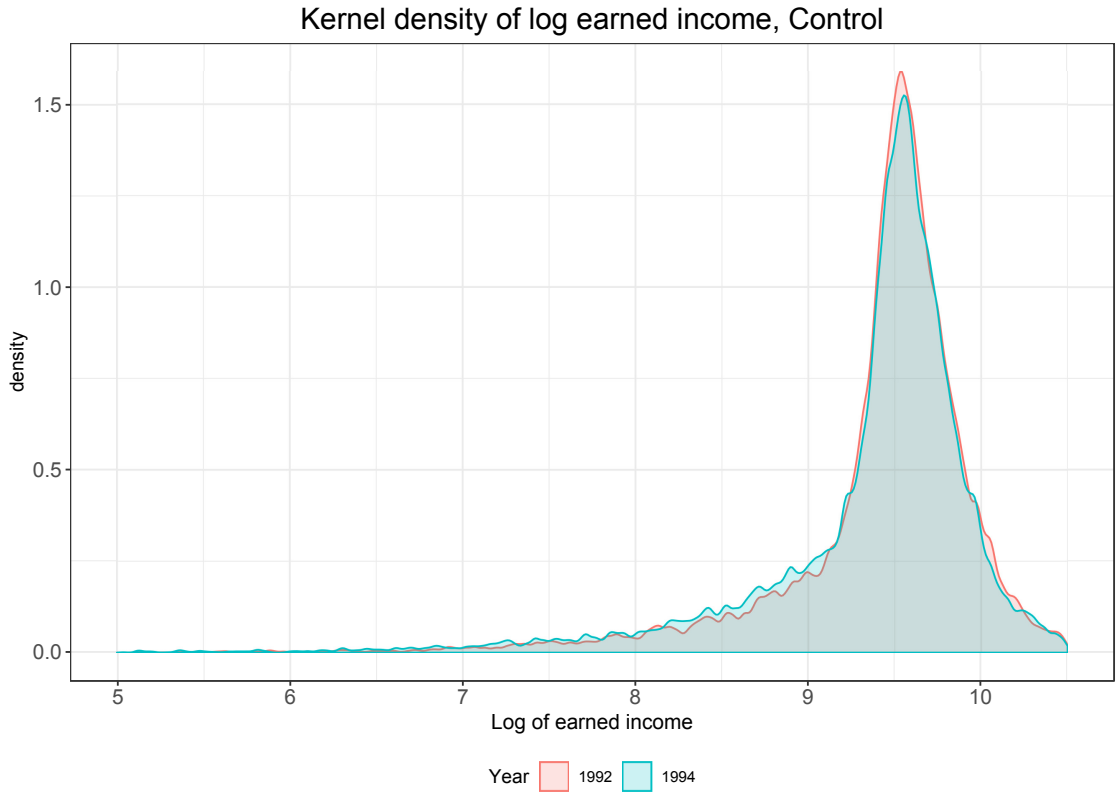
Notes: The graph shows the log of difference between the actual hourly wage and own minimum wage in 1992 and 1996 for the control group. The own minimum wage is based on occupation and tenure. The hourly wage is observed in the payroll data.

Figure 5: Log difference to own minimum wage in the eligible group in 1992 and 1996



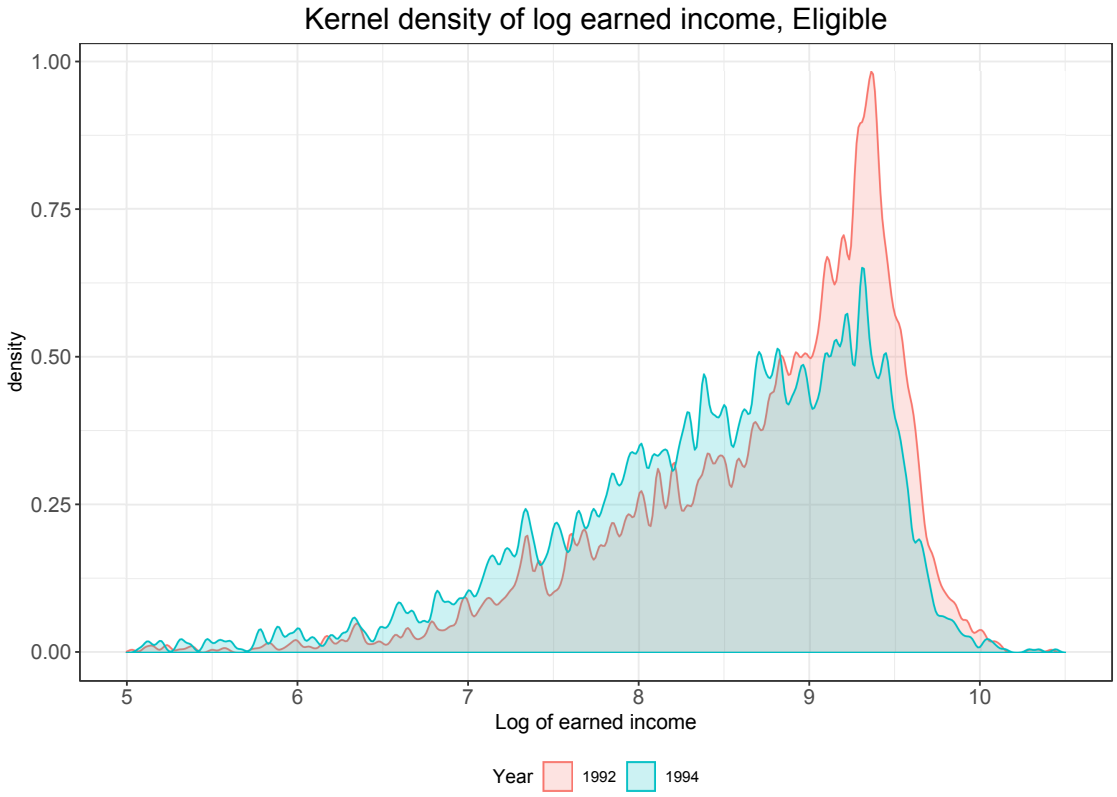
Notes: The graph shows the log of difference between the actual hourly wage and own minimum wage in 1992 and 1996 for the treatment group. The own minimum wage is based on occupation and tenure. The hourly wage is observed in the payroll data.

Figure 6: Distributions of log earnings in the control group



Notes: The graph shows the log earnings from the employer-employee data in 1992 and 1994 for the control group.

Figure 7: Distributions of log earnings in the eligible group



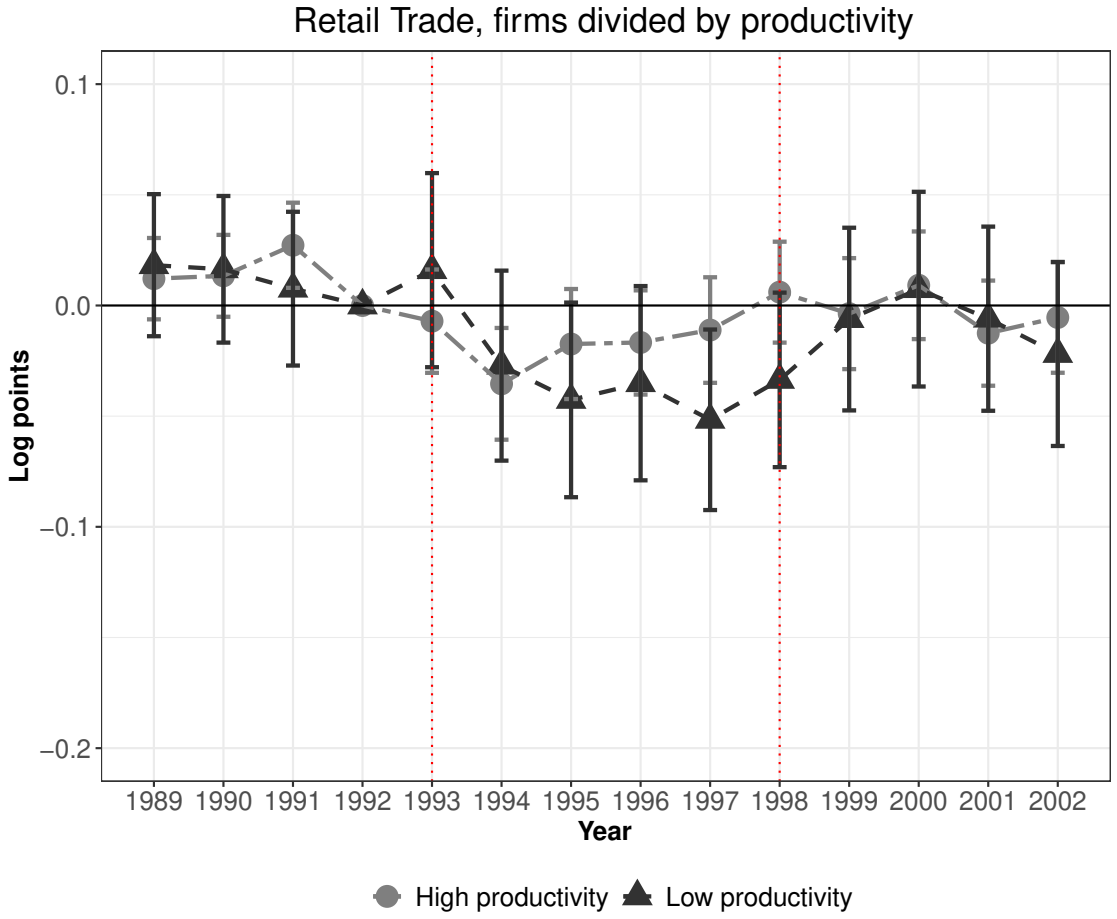
Notes: The graph shows the log earnings from the employer-employee data in 1992 and 1994 for the treatment group.

Figure 8: Differences of log earnings between the treatment and control groups for workers in firms divided into two groups by wage differences between old and young workers in the firm



Notes: The graph shows the event-study style difference of log earnings between the eligible and control groups over time for two separate groups divided by pre-reform wage differences between old and young workers. The plotted differences are coefficients from a regression presented in equation (1). The pre-reform within firm wage difference is calculated as the log-difference between the mean earnings of under 25 year old and over 35 year old workers who are at least in their second year in the firm. Firms where over 35 year old workers earn less than 0.2 log points more than under 25 year old workers on average are classified as firms with small wage differences.

Figure 9: Differences of log earnings between the treatment and control groups for workers in firms divided into two groups by firm productivity



Notes: The graph shows the event-study style difference of log earnings between the eligible and control groups over time for two separate groups divided by pre-reform productivity of the firm. The plotted differences are coefficients from a regression presented in equation (1). The pre-reform productivity is calculated as revenue per worker and divides the population of workers in groups of equal size.

Figure 10: Differences of log earnings between the treatment and control groups for workers in firms divided into two groups by firm size



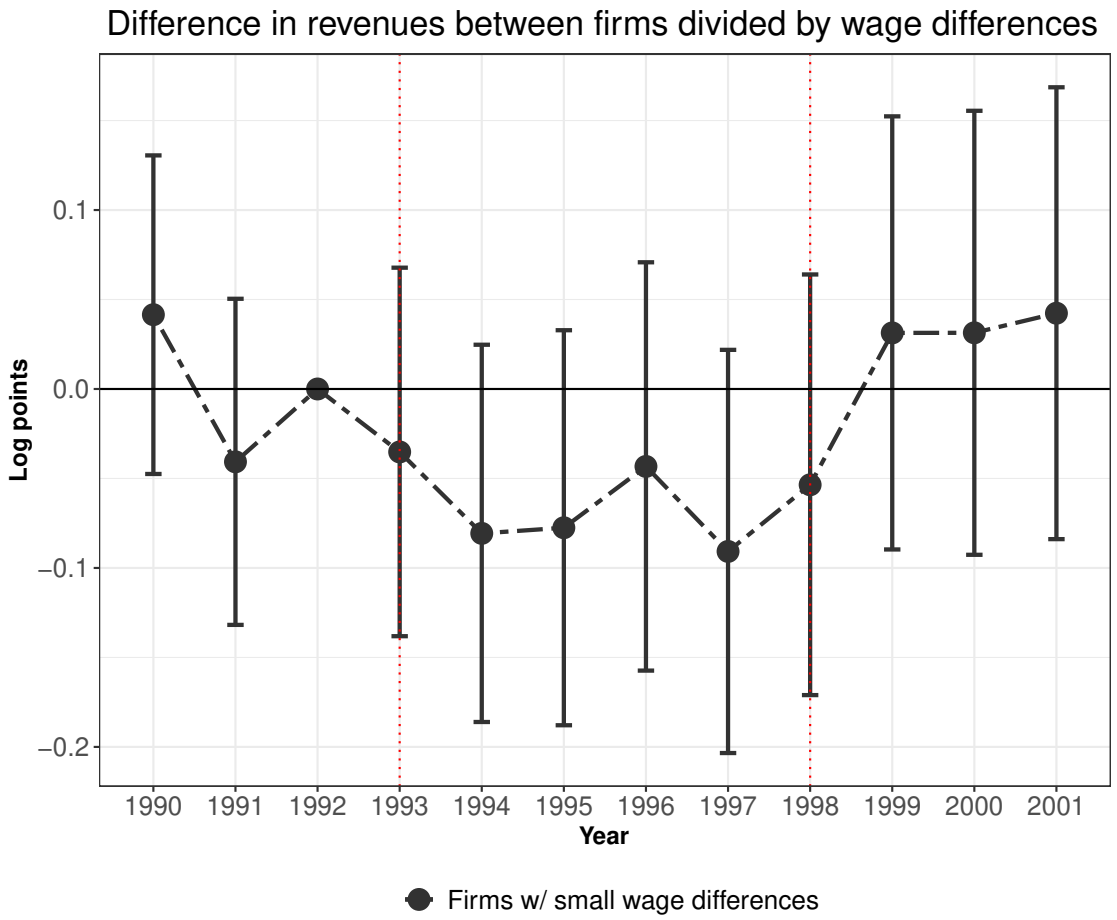
Notes: The graph shows the event-study style difference of log earnings between the eligible and control groups over time for two separate groups divided by pre-reform size of the firm. The plotted differences are coefficients from a regression presented in equation (1). The population of workers is split in half by the size of their firm with the cut-off value of firm size (measured as number of workers) being 57.

Figure 11: Differences of log earnings between the treatment and control groups for workers in firms divided into two groups by the share of under 25 year olds in new recruits



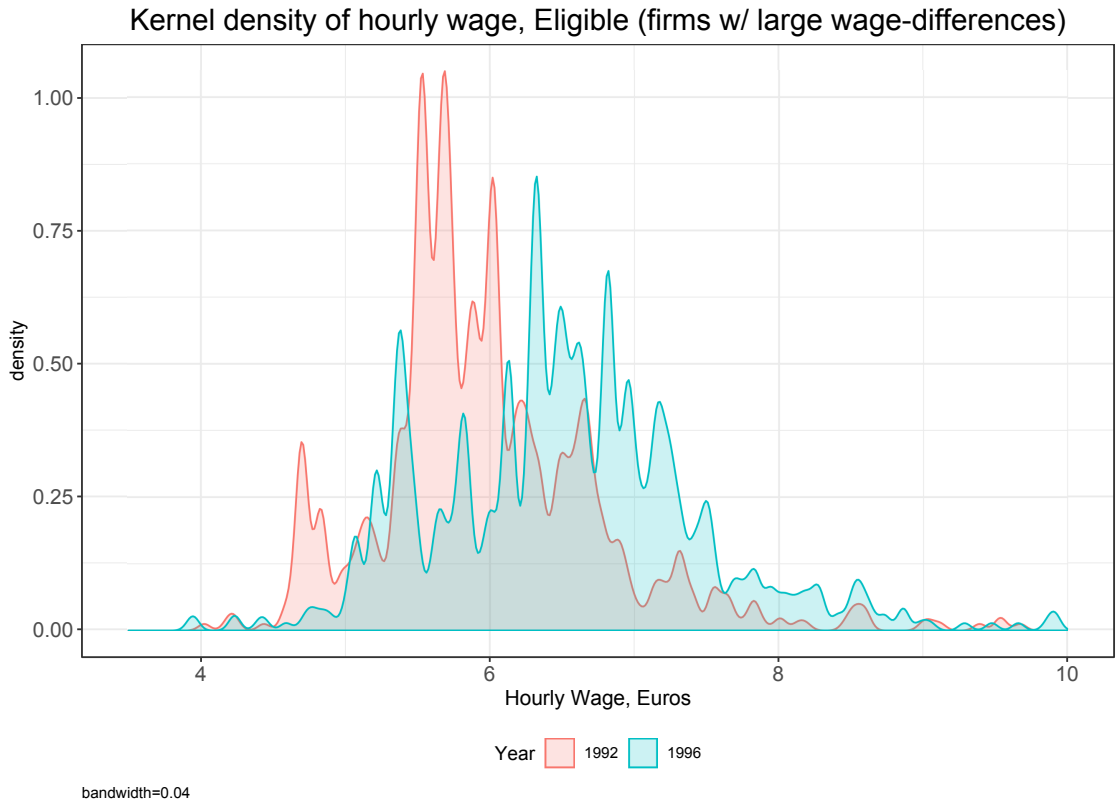
Notes: The graph shows the event-study style difference of log earnings between the eligible and control groups over time for two separate groups divided by share of young recruits in the firm. The plotted differences are coefficients from a regression presented in equation (1). Firms are grouped by the share of (pre-reform) new recruits who are under 25 years of age out of all recruits with the cut-off value being 50%.

Figure 12: Differences of log revenue between firms with large or small wage differences



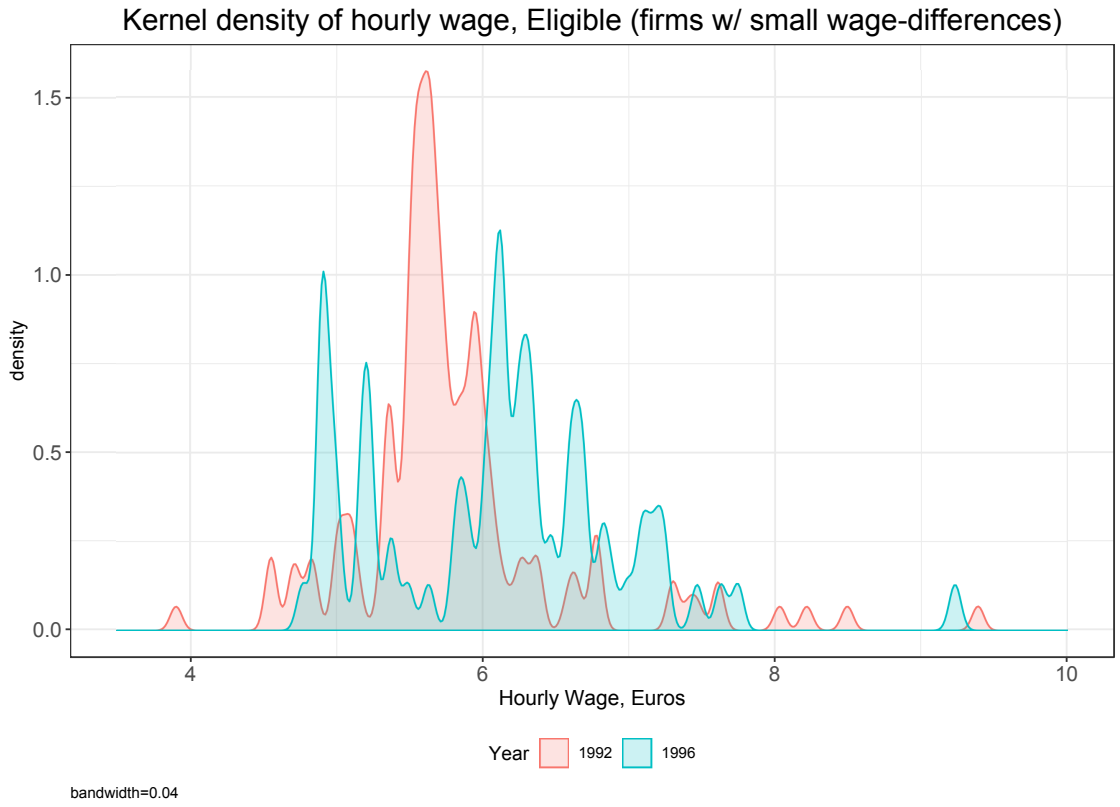
Notes: The graph shows the event-study style difference of log revenue between the firms having high or low pre-reform wage difference between old and young workers over time. The plotted differences are coefficients from a regression presented in equation (1). The pre-reform within firm wage difference is calculated as the log-difference between the mean earnings of under 25 year old and over 35 year old workers who are at least in their second year in the firm. Those firms were this difference is less than 0.2 log points are defined as low wage difference and the rest as high wage difference firms.

Figure 13: Hourly wage distributions among eligible in firms with large wage differences in 1992 and 1996



Notes: The graph shows the distribution of hourly wages in Euros from the payroll data in the firms with large pre-reform wage differences between old and young workers in 1992 and 1996.

Figure 14: Hourly wage distributions among eligible in firms with small wage differences in 1992 and 1996



Notes: The graph shows the distribution of hourly wages in Euros from the payroll data in the firms with small pre-reform wage differences between old and young workers in 1992 and 1996.

Tables

Table 1: Summary table using 1992 data.

	Retail Trade			Hotels & Restaurants		
	All	Control	Eligible	All	Control	Eligible
Number of observations	101519	20511	4107	40672	4188	1894
Mean earnings (in Euros)	13662	14077	7739	14000	14131	11735
Standard deviation of earnings	7917	6430	4593	7671	5966	5067
N. employed	81718	17693	2306	32104	3550	1523
N. in payroll data	44456	8385	1101	15255	1680	593
Mean hourly wage (in Euros)	7.56	7.57	6.13	7.66	7.71	6.68
Standard deviation of hourly wage	3.55	3.95	2.18	3.51	5.85	0.91

Notes: The number of employed is calculated as the number of workers whose earnings are above a threshold value of 60% of a full-time employee earning the lowest minimum wage.

Table 2: Differences-in-differences regression on the effect of subminimum wage policy

	Dependent variable: Log earnings					
	(1)	(2)	(3)	(4)	(5)	(6)
DiD	-0.032^{***}	-0.014^{**}	-0.017^{**}	-0.033^{***}	-0.029^{***}	-0.015
	(0.005)	(0.007)	(0.008)	(0.007)	(0.007)	(0.010)
Treat	-0.302^{***}	-0.337^{***}	-0.333^{***}	-0.313^{***}	-0.321^{***}	-0.335^{***}
	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)	(0.006)
After	0.128^{***}	0.112^{***}	0.114^{***}	0.117^{***}	0.126^{***}	0.102^{***}
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
DiD * Wage differences		-0.080^{***}				-0.084^{***}
		(0.015)				(0.018)
DiD * Firm size			-0.034^{***}			0.009
			(0.011)			(0.015)
DiD * Productivity				-0.006		0.008
				(0.013)		(0.014)
DiD * Share under 25 yo					-0.014	-0.011
					(0.012)	(0.013)
Observations	162,751	109,557	125,027	124,592	122,534	108,274
R^2	0.118	0.130	0.124	0.122	0.123	0.132
Adjusted R^2	0.118	0.130	0.124	0.122	0.123	0.132
Residual Std. Error	0.314	0.311	0.311	0.312	0.312	0.311

*p<0.1; **p<0.05; ***p<0.01

Notes: Models are based on equation (2) and include year fixed effects.

Table 3: Differences-in-differences regression on the effect of subminimum wage policy

	Dependent variable: Log earnings					
	(1)	(2)	(3)	(4)	(5)	(6)
DiD	-0.051^{***}	-0.043^{***}	-0.046^{***}	-0.061^{***}	-0.057^{***}	-0.051^{***}
	(0.005)	(0.006)	(0.008)	(0.006)	(0.007)	(0.009)
Treat	-0.660^{***}	-0.718^{***}	-0.680^{***}	-0.662^{***}	-0.698^{***}	-0.711^{***}
	(0.060)	(0.064)	(0.060)	(0.060)	(0.061)	(0.064)
After	0.112^{***}	0.097^{***}	0.100^{***}	0.103^{***}	0.110^{***}	0.091^{***}
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
DiD * Wage differences		-0.063^{***}				-0.069^{***}
		(0.015)				(0.018)
DiD * Firm size			-0.025^{**}			0.012
			(0.011)			(0.014)
DiD * Productivity				0.005		0.022
				(0.012)		(0.013)
DiD * Share under 25 yo					-0.006	-0.001
					(0.012)	(0.013)
Observations	162,751	109,557	125,027	124,592	122,534	108,274
R^2	0.179	0.199	0.192	0.190	0.192	0.201
Adjusted R^2	0.179	0.199	0.192	0.190	0.191	0.200
Residual Std. Error	0.303	0.298	0.299	0.300	0.300	0.298

*p<0.1; **p<0.05; ***p<0.01

Notes: All models include year, age in years and degree fixed effects.

Appendix A. Additional Results

Figure 15: Log earnings in the treatment and control groups in the restaurant and accommodation industry over the period 1989-1999



Notes: The eligible consists of new hires between ages 21 to 24 who have no previous experience in the industry. The control group consists of those who are between the ages of 26 and 29.

Figure 16: Difference between treatment and control groups of log earnings in the accommodation and restaurant industries



Notes: The eligible consists of new hires between ages 21 to 24 who have no previous experience in the industry. The control group consists of those who are between the ages of 26 and 29.

Figure 17: Hourly wage distributions for those under 25 and over 35 among firms with small wage differences

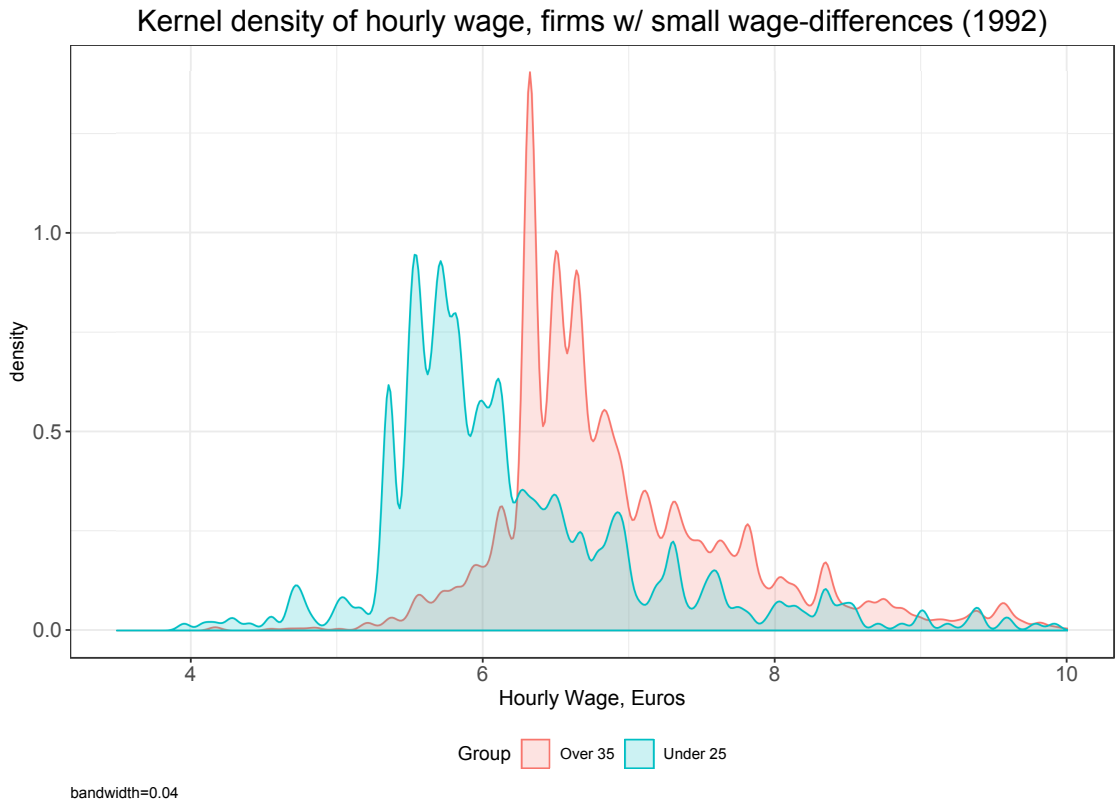


Figure 18: Hourly wage distributions for those under 25 and over 35 among firms with large wage differences

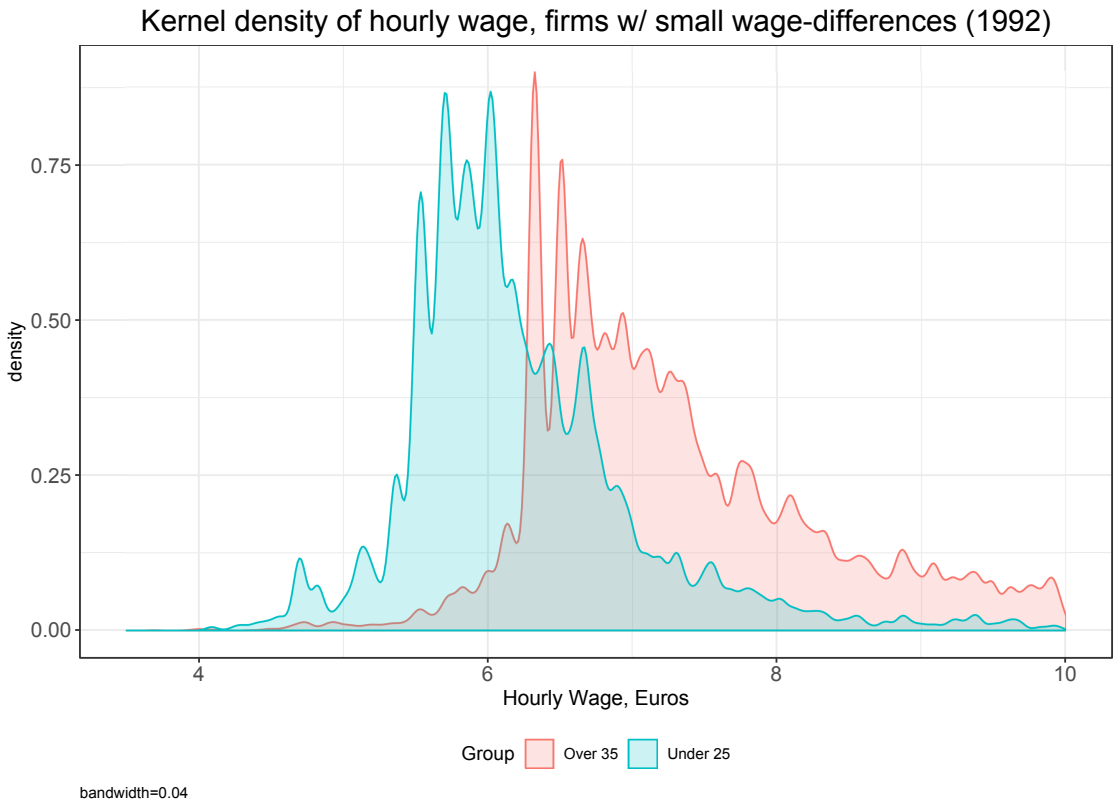


Table 4: DiD regression on the effect of subminimum wage policy including all variables

	Dependent variable: Log earnings					
	(1)	(2)	(3)	(4)	(5)	(6)
DiD	−0.032***	−0.014**	−0.017**	−0.033***	−0.029***	−0.015
	(0.005)	(0.007)	(0.008)	(0.007)	(0.007)	(0.010)
Treat	−0.302***	−0.337***	−0.333***	−0.313***	−0.321***	−0.335***
	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)	(0.006)
After	0.128***	0.112***	0.114***	0.117***	0.126***	0.102***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
DiD * Wage differences		−0.080***				−0.084***
		(0.015)				(0.018)
Treat * Wage differences		0.079***				0.085***
		(0.009)				(0.010)
After * Wage differences		0.032***				0.032***
		(0.005)				(0.006)
Wage differences		−0.059***				−0.049***
		(0.004)				(0.004)
DiD * Firm size			−0.034***			0.009
			(0.011)			(0.015)
Treat * Firm size			0.038***			−0.013
			(0.007)			(0.009)
After * Firm size			0.019***			0.004
			(0.004)			(0.005)
Firm size			−0.046***			−0.014***
			(0.003)			(0.004)
DiD * Productivity				−0.006		0.008
				(0.013)		(0.014)
Treat * Productivity				0.004		−0.007
				(0.008)		(0.008)
After * Productivity				0.033***		0.033***
				(0.004)		(0.005)
Productivity				−0.004		0.006*
				(0.003)		(0.003)
DiD * Share under 25 yo					−0.014	−0.011
					(0.012)	(0.013)
Treat * Share under 25 yo					0.021***	0.011
					(0.007)	(0.008)
After * Share under 25 yo					0.001	−0.003
					(0.004)	(0.004)
Share under 25 yo					−0.017***	−0.009***
					(0.003)	(0.003)
Constant	9.545***	9.579***	9.584***	9.560***	9.566***	9.585***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Observations	162,751	109,557	125,027	124,592	122,534	108,274
R^2	0.118	0.130	0.124	0.122	0.123	0.132
Adjusted R^2	0.118	0.130	0.124	0.122	0.123	0.132
Residual Std. Error	0.314	0.311	0.311	0.312	0.312	0.311

*p<0.1; **p<0.05; ***p<0.01

Notes: All models include year fixed effects

Table 5: DiD regression on the effect of subminimum wage policy including all variables

	Dependent variable: Log earnings					
	(1)	(2)	(3)	(4)	(5)	(6)
DiD	−0.051***	−0.043***	−0.046***	−0.061***	−0.057***	−0.051***
	(0.005)	(0.006)	(0.008)	(0.006)	(0.007)	(0.009)
Treat	−0.660***	−0.718***	−0.680***	−0.662***	−0.698***	−0.711***
	(0.060)	(0.064)	(0.060)	(0.060)	(0.061)	(0.064)
After	0.112***	0.097***	0.100***	0.103***	0.110***	0.091***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
DiD * Wage differences		−0.063***				−0.069***
		(0.015)				(0.018)
Treat * Wage differences		0.066***				0.071***
		(0.008)				(0.010)
After * Wage differences		0.031***				0.033***
		(0.005)				(0.006)
Wage differences		−0.050***				−0.043***
		(0.003)				(0.004)
DiD * Firm size			−0.025**			0.012
			(0.011)			(0.014)
Treat * Firm size			0.034***			−0.011
			(0.007)			(0.008)
After * Firm size			0.016***			0.0005
			(0.004)			(0.005)
Firm Size			−0.043***			−0.010***
			(0.003)			(0.003)
DiD * Productivity				0.005		0.022
				(0.012)		(0.013)
Treat * Productivity				−0.001		−0.013*
				(0.007)		(0.008)
After * Productivity				0.026***		0.024***
				(0.004)		(0.004)
Productivity				−0.009***		0.002
				(0.003)		(0.003)
DiD * Share under 25 yo					−0.006	−0.001
					(0.012)	(0.013)
Treat * Share under 25 yo					0.016**	0.004
					(0.007)	(0.008)
After * Share under 25 yo					0.002	−0.003
					(0.004)	(0.004)
Share under 25 yo					−0.020***	−0.011***
					(0.003)	(0.003)
Constant	9.574***	9.607***	9.609***	9.588***	9.595***	9.614***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	162,751	109,557	125,027	124,592	122,534	108,274
R^2	0.179	0.199	0.192	0.190	0.192	0.201
Adjusted R^2	0.179	0.199	0.192	0.190	0.191	0.200
Residual Std. Error	0.303	0.298	0.299	0.300	0.300	0.298

*p<0.1; **p<0.05; ***p<0.01

Notes: All models include year, age in years and degree fixed effects throughout.