MINIMUM WAGE SPIKE AND INCOME UNDERREPORTING: A BACK-OF-THE-ENVELOPE-WAGE ANALYSIS

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Minimum wage spike and income underreporting: a back-of-the-envelope-wage analysis [*]

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Abstract

The labor markets of many transition countries are characterized by two features: a spike at the minimum wage in wage distribution and widespread use of so-called envelope wages, i.e., non-declared cash coming in addition to the official wage. In this paper, we present a body of suggestive evidence highlighting the prevalence of wage underreporting among minimum wage earners. We study two minimum wage hikes implemented in Latvia in 2014 and 2015, and show that (i) minimum wage employees are more likely to survive these minimum wage hikes than employees earning slightly more, and (ii) minimum wage employees are more likely to switch to part-time work within the same firm than their peers earning slightly more. These effects are present in the sample of small (more prone to tax evasion) firms and are not found in the sample of big (less prone to tax evasion) firms. In addition, we show that minimum wage earners switching from employment in a small to a big firm enjoy a significantly larger wage gain than employees earning slightly more. Taken together, these results are consistent with tax evaders being overrepresented among minimum wage earners and are hard to rationalize otherwise.

Keywords: Minimum wage, wage underreporting, tax evasion
JEL: H26, J08, J46

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1 Introduction

Labor markets in transition and post-transition countries are characterized by the prevalence of payroll tax evasion in the form of envelope wages, i.e., non-declared cash coming in addition to the official wage (e.g., Gorodnichenko et al. (2009) and Braguinsky and Mityakov (2015) in Russia, Paulus (2015) and Kukk and Staehr (2014) in Estonia, Putniņš and Sauka (2015) in Latvia, Bíró et al. (2021) and Elek et al. (2012) in Hungary, Asatryan and Gomtsyan (2020) in Armenia).

Another defining characteristic of this set of countries is a very large peak at exactly the minimum wage in the wage distribution. To explain this phenomenon, Tonin (2011) argues that the mass of individuals at the minimum wage is composed to a large extent of workers receiving envelope wages: employers and employees collude and agree on reporting only the minimum wage in order to minimize tax liabilities while remaining under the radar of the tax authorities. In this setup, minimum wage policy becomes an enforcement tool for the fiscal administration, as it pushes non-compliant firms to convert part of the envelope wage into an official wage so that it reaches the new minimum wage.

However, only scarce concrete evidence shows that payroll tax evaders are over-represented among minimum wage earners. Considering the regular minimum wage hikes in the region (e.g., a 69% increase in Latvia in 2010-2020, a 5-fold increase in Ukraine, a 2.6-fold increase in Russia and a twofold increase in Hungary over the same period), understanding the interaction between minimum wage policy and labor tax evasion is crucial.

In this paper, we present a body of suggestive evidence highlighting the prevalence of wage underreporting at *exactly* the minimum wage. We use Latvian administrative employer-employee data covering the full Latvian employed population at a monthly rate between 2011 and 2015. Our analysis relies on a comparison of i) labor market outcomes of employees earning exactly the minimum wage against employees earning slightly more and ii) comparing this difference between employees of small and large firms, as the literature suggests that smaller firms are more likely to engage in payroll tax evasion (see, for example, Kleven et al. (2016) and Kumler et al. (2020)). Ultimately, this results in a triple-difference design.

Our analysis proceeds in three steps. In the first step, we exploit a series of two minimum wage hikes implemented in Latvia in 2014 and 2015 to study the probability of an employee remaining in the same job over time. Standard labor

market models predict that low-productivity jobs are the first to disappear following a minimum wage hike. If the wage distribution reflects productivity, we should observe a higher probability of an employee earning exactly the minimum wage losing their job compared to an employee earning slightly more. On the other hand, if minimum wage employees are more likely to receive envelope wages, underreporting can act as a shock absorber. In this case, minimum wage workers should on average have a higher probability of having kept their jobs. We show that this is indeed the case: in small firms, minimum wage workers are more likely to retain their jobs compared to workers earning slightly more.[1] In large firms, which we assume do not evade or evade less, minimum wage workers are less likely to keep their jobs after a hike. We argue that the observed response is consistent with tax evaders being overrepresented among minimum wage earners, and is hard to rationalize otherwise.

In the second step, we use a similar setup to analyze switches from full-time to part-time work within the same firm. We assume that firms engaged in wage underreporting are also more likely to misreport hours of work and hence can use reduced reported hours as an adjustment mechanism to minimum wage shocks. Our results confirm that minimum wage employees in small firms are more likely to switch to part-time work than employees earning slightly more.

Finally, in the third step, we exploit a period with no minimum wage changes and analyze individuals who changed employers during this period and switched from a small to a big firm or vice versa. We show that employees earning exactly the minimum wage have a significantly larger wage gain when switching from a small to a large firm, compared to employees earning slightly more than the minimum wage, while no such effect applies to minimum wage employees initially working in big firms. We interpret this as additional evidence that minimum wage earners are more likely to receive part of their income in cash than other employees.

Latvia is a good case to examine the prevalence of envelope wages among minimum wage workers. First, considerable evidence suggests that envelope wages are a major issue in the Latvian labor market. More than one in ten employees in Latvia admitted to having received envelope wages, which is the highest share in the EU (European Commission, 2014). Putniņš and Sauka (2015) estimate that 34% of total wages in the Latvian private sector were paid in envelopes in 2009. Second, the share of minimum wage workers is very high. In 2011, more than 10% of full-time jobs in the private sector and more than 30% of full-time jobs in small private firms

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[1]We do not mean that underreporting does not concern non-minimum wage workers, but that envelope wages are relatively more prevalent among minimum wage workers.

(with less than 10 workers) were paid exactly the minimum wage. Third, completely unreported employment is not widespread. Only 2% of respondents in Latvia said that they were employed without a formal written contract (European Commission, 2014). Hazans (2012) finds that the share of employees having worked without a formal contract in Latvia in 2010 was 3.4-3.5%.

Several policy implications are derived from our findings. Insofar as minimum wage workers survive minimum wage hikes, the minimum wage policy represents an effective tax enforcement tool in countries where wage underreporting is an issue. Our results also provide a rationale for the fiscal authorities to specifically target tax audits to focus on firms with a large share of minimum wage workers. The positive fiscal effect, however, comes at the expense of possible employment losses in tax compliant firms employing low-wage workers and closures of such firms. The fiscal gains can also be limited if minimum wage hikes encourage firms to seek alternative avoidance strategies, e.g. switching to part-time employment or transition to full informality. Our results suggest that payroll tax evasion is *especially* prevalent among minimum wage earners, but by no means point to an absence of evasion in the rest of the wage distribution.

The rest of the paper is organized as follows. Section 2 outlines the institutional context, Section 3 describes the dataset and offers some initial insights into the data, Section 4 describes our empirical strategy and results, and Section 5 concludes.

2 Institutional background

Latvia has had a minimum wage since 1991. The minimum wage covers all employees and is set in monthly terms for full-time jobs. For part-time jobs, the minimum wage is paid in proportion to the number of hours worked each month. There is no differentiation of the minimum wage between regions, occupations, and, until recently, industries. As of November 2019, the construction sector sets a higher minimum wage covering all employees in the construction sector.[2]

The minimum wage is set in special government regulations. The government decides annually on the minimum wage for the next calendar year after consultations with social partners. There are no rules as to how often the minimum wage should

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[2]As of 2019, the minimum wage in the construction sector is set in a general agreement covering construction firms. Since our paper focuses on the period around minimum wage increases implemented in 2014-2015, this change does not affect our analysis.

be revised or the requirements of its mandatory indexation. Yet in the last 20 years, there were only 7 years when the minimum wage was not raised: 2002, 2005, 2010, 2012-2013, and 2019-2020. Since 2002, the minimum wage has been increased from 85 to 500 euro, but the ratio of the minimum wage to the average wage has grown from about 25% to almost 40% (see Figure A.1). Minimum wage increases have had a relatively strong biting effect: the share of jobs affected in the private sector has never been below 8%, in some years reaching almost 25% (see Table A.1). Minimum wage hikes normally become effective on January 1.

Our period of interest in this paper is between 2011 and 2015. This period covers two minimum wage hikes: 2014, when the minimum wage was raised from 284.57 to 320 euro, and 2015, when it was further raised to 360 euro. The reason for focusing on this period is threefold. First, both the 2014 and the 2015 minimum wage increases were quite sizable. Second, the minimum wage increase of 2014 was preceded by a 3-year period with no change in the minimum wage (2011-2013), which leaves us with a reasonably long period to study pre-reform developments and to study the wages of employees who change employers. Finally, this period was characterized by stable economic growth with no major macroeconomic shocks that could interfere with our estimations of the minimum wage effects.

Discussions on the potential minimum wage increase in 2014 started in February 2013, when the Ombudsman proposed raising the minimum wage from 284.57 to 430-512 euro. The government did not support this initiative and in April 2013 achieved an agreement with social partners, which foresaw raising the minimum wage to 320 euro. On June 11, 2013, this was approved by the government. In 2014, the decision on the minimum wage increase in 2015 was taken much later, not until after the parliamentary elections that took place in October 2014. On November 10, the new coalition government agreed in principle to raise the minimum wage to 360 euro as of January 2015, and then took the final decision on December 2.

The Latvian government advocates regular minimum wage increases along two dimensions. On the one hand, income inequality in Latvia is high by European Union standards, and the minimum wage is seen as an effective instrument to reduce wage inequality. Another rationale is to use the minimum wage as a fiscal tool because of widespread wage underreporting. Available survey evidence suggests that more than 20% and in some years more than 30% of wages in the private sector are not reported (Putniņš & Sauka, 2015, 2021). According to the Eurobarometer survey, the share of respondents admitting to having ever received salary in cash in Latvia is 11%, which is the highest share in the EU (European Commission, 2014). Gavoille

and Zasova (2021b) find that 37% of firms (covering 24% of employees) are engaged in wage underreporting, but Gavoille and Zasova (2021a) find that households where the head is an employee of a domestically owned firm underreport about 26% of their earnings.

Latvia has a rather high tax burden on low wages, including on the minimum wage, which increases potential gains from wage underreporting. In 2011-2015, the average tax wedge for minimum wage earners was 40-42% (assuming no dependents). Two taxes are applied to wages: personal income tax (PIT) and social security contributions (SSC).[3] Both taxes are deducted and remitted by the employer at the moment wages are paid to the employee. SSC are applied to wages from the first euro, but PIT is not paid until the wage exceeds a non-taxable PIT allowance. During the period we consider in our analysis several changes occurred in PIT and SSC rates, as well as in the non-taxable PIT allowance. However, the resulting change in the tax burden was rather small, and - most importantly for our purposes - it was very similar for both minimum wage earners and employees earning slightly more than the minimum wage (see Table A.2 and Figure A.2).

An important change was implemented in September 2010 with the passing of the law on micro enterprises. The law introduced a new simplified tax regime for small firms with the aim of stimulating economic recovery after the financial crisis. There were three thresholds to qualify as a micro enterprise: annual sales could not exceed 100,000 euro, the number of employees had to be 5 or less, and gross monthly wages paid to employees could not exceed 720 euro each. The only tax that micro enterprises had to pay was the micro enterprise tax, which was applied to sales at the rate of 9%. An immediate reaction to this reform was that many firms which complied with the criteria registered as micro enterprises (by 2015, micro enterprises accounted for 34% of all private sector firms). Anecdotal evidence suggests that the micro enterprise tax regime was often used as a vehicle for tax evasion and a tax avoidance instrument. In the context of this paper it is important to emphasize that micro enterprises have different reporting incentives: since their tax obligations do not directly depend on reported employee wages, micro enterprises do not have incentives to report the minimum wage and pay the rest "in an envelope". Instead they have incentives to pay wages that do not exceed 720 euro, the wage threshold for micro enterprises. For this reason, we exclude from the analysis micro enterprises

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[3]In 2016, Latvia introduced another tax that was applied to wages, a solidarity tax. The new tax is applied to wages that exceed the cap on social security contributions, which is about 11 times the minimum wage. Our analysis concentrates on wages at the bottom of wage distribution; hence the introduction of the new tax or its anticipation does not affect our results.

and firms that became micro enterprises during our sample period.

# 3   Data and descriptive evidence

3.1   Data

In this paper, we rely on (anonymized) matched employer-employee data covering the whole employed population of Latvia in 2011-2015. The data is provided by the Latvian State Social Insurance Agency. The dataset contains information on all employees' gross wages at monthly frequency, information on employees' gender, year and month of birth. We also observe the legal form of ownership of firms, which allows us to exclude public sector employees, and an identifier for micro enterprises that we also exclude from the analysis.

The dataset has two important limitations. First, we do not observe hours worked and hence cannot directly distinguish between full- and part-time workers. Second, we have very limited information on firms – apart from the legal form of ownership, we only know firm size.

3.2   Descriptive evidence

Figure 1 plots distribution of wages in the range 0-800 euro in the private sector in January 2011. The dashed vertical lines in the figure mark the minimum wage (284.57 euro) and 50% of the minimum wage. We divide firms into two groups: smaller firms that employ 30 employees or less, and larger firms employing more than 30 employees (as of January 2011). The threshold of 30 employees was chosen to divide observations into roughly equal groups (in 2011, 42% of wages were paid by firms employing less than 30 employees). Since we cannot distinguish between full-time and part-time employees, in Figure 1 we depict the wages of all employees, including those earning less than the minimum wage.

Figure 1: Gross wage distribution in the private sector by 10-EUR wage bins, small (30 employees or less) and big (more than 30 employees) firms, January 2011
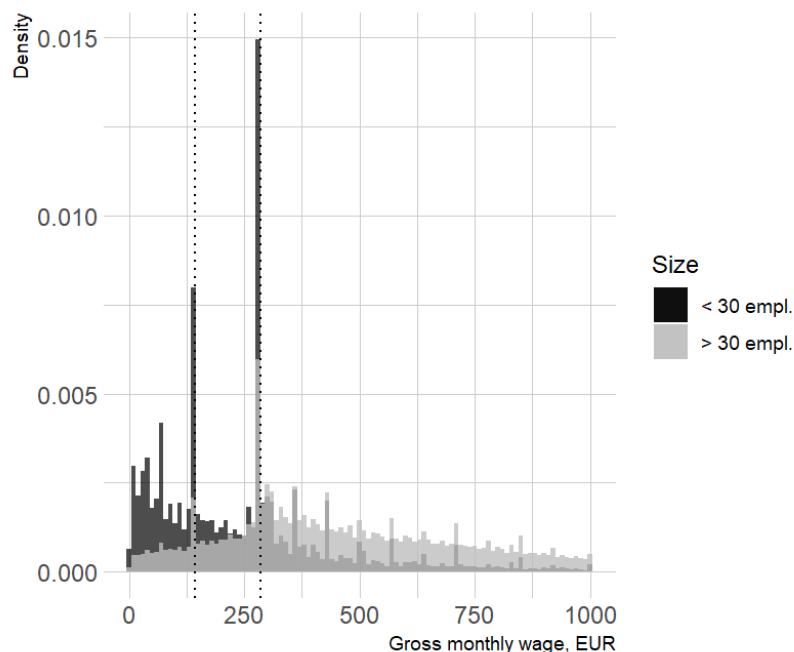
Note: Micro enterprises are excluded.

There are clear spikes at the minimum wage and half of the minimum wage. The standard model of competitive labor markets predicts that workers whose marginal productivity is below the minimum wage should not be employed; hence there should be no spike around the minimum wage. More sophisticated models provide explanations for the spike. Clemens (2021) argues that a binding minimum wage can lead to cuts in non-wage compensation (such as health insurance, see results in Clemens et al. (2018) for the US), or adjustment in other job characteristics, such as job safety. Literature on less developed and post-transition countries provides an alternative explanation and shows that the spike around the minimum wage can be a sign of tax evasion (Tonin, 2011, 2013). It is shown that in markets with weak tax enforcement it might be optimal for firms to register in the formal segment and to honestly report employment, at the same time underreporting wages, which results in a spike around the minimum wage.

Existing evidence documents widespread wage underreporting and a much less widespread practice of completely informal employment in Latvia, which is consistent with the tax evasion explanation of the spike. And notably, the observed spike

is much more pronounced in firms employing less than 30 employees, which is in line with another strand of literature which finds that tax evasion is more prevalent in small firms (Kleven et al., 2016; Kumler et al., 2020).

Next we look at changes in the proportion of minimum wage recipients and recipients of wages between pre- and post-reform minimum wages in 2011-2015. Figure 2 plots the proportion of employees receiving 285 euro (minimum wage in 2011-2013), 320 euro (minimum wage in 2014), 360 euro (minimum wage in 2015) and wages in the intervals in between (285-320 euro and 320-360 euro). There are two main takeaways from this figure. First, an important observation is that there seems to be no adjustment in anticipation of minimum wage increases, as there are no clear changes in the share of minimum wage recipients prior to minimum wage hikes. In particular, despite the fact that the minimum wage increase of 2014 was announced six months in advance (in June 2013), the fall in the share of employees receiving 285 euro kicks in exactly in January 2014, when the minimum wage was raised from 285 to 320 euro.

The second important takeaway is that the share of workers receiving exactly the pre-reform minimum wage falls to levels very close to zero right after a minimum wage increase. This suggests that the share of part-time workers receiving exactly the full-time minimum wage is likely to be very small, because for most part-time employees earning the minimum wage the minimum wage hikes would not be binding (unless they work very close to full-time hours). In other words, among individuals receiving exactly the minimum wage, the vast majority are full-time employees, and not part-time employees who happen to earn the equivalent of a full-time minimum wage. This is important for our analysis, because, as explained above, we do not have information on hours worked. The observed fall in the share of minimum wage employees right after minimum wage increases allows us to assume that minimum wage employees are mainly full-time workers.

Figure 2: Proportion of employees paid at the minimum wage and wages between new and old minimum wage in small and big firms in 2011-2015
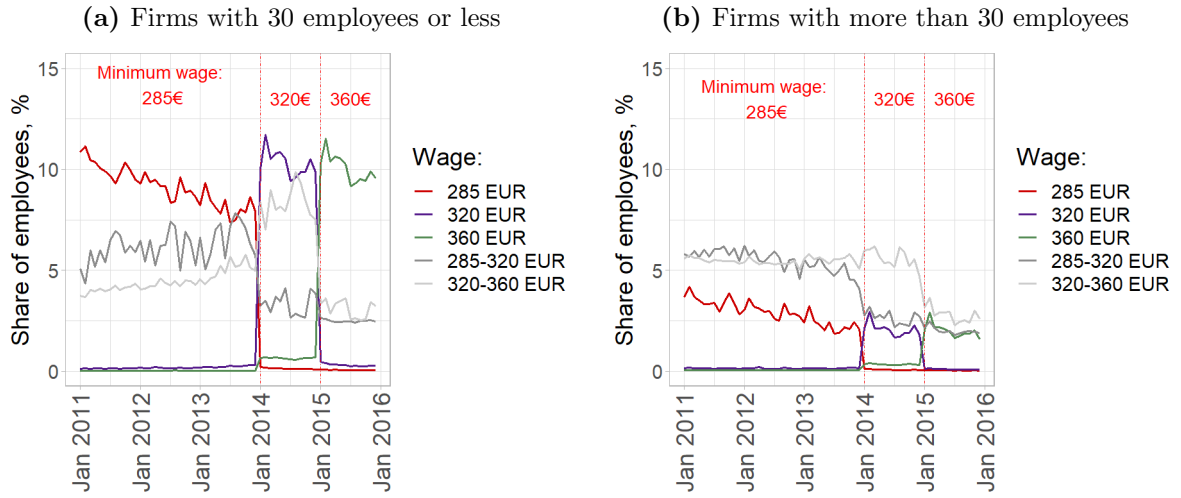
(a) Firms with 30 employees or less
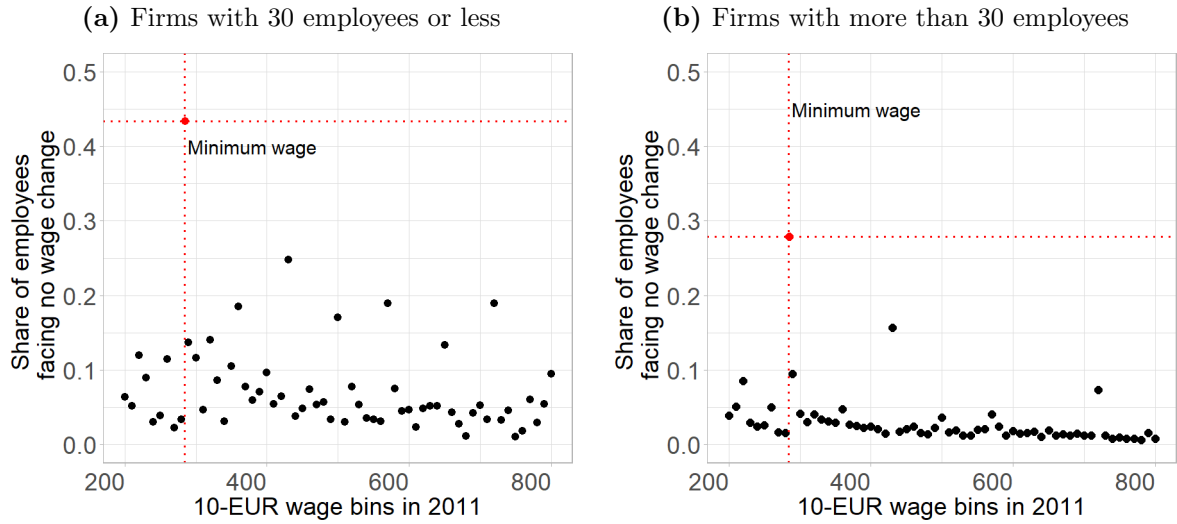
(b) Firms with more than 30 employees

Note: Micro enterprises and public sector firms are excluded. Firm size is computed based on the number of employees in 2011.

Wages are expected to grow with tenure, but if minimum wage earners receive part of their income in cash, their reported wage can remain unchanged even after years of employment with a firm. To check if this is the case, we exploit a period when there were no changes in the minimum wage (January 2011 - December 2013), select employees who were employed by the same firm in all months of 2011-2013, assign them to wage bins according to their wage in 2011, and in each wage bin compute the share of workers whose wage in 2013 was the same as in 2011. We assign workers to 10-euro bins, with the exception of minimum wage earners, whom we assign to a bin of 1 euro.

Figure 3 presents the results. Minimum wage earners clearly stand out from other employees. In small firms, almost 45% of employees earning the minimum wage in 2011 had the same reported wage in 2013. There is also a spike at the minimum wage in big firms, but it is less pronounced than in small firms.

Figure 3: Proportion of continuously employed workers facing no wage growth in 2013 compared to 2011, by 10-EUR wage bins in 2011

(a) Firms with 30 employees or less   **(b)** Firms with more than 30 employees

Note: Micro enterprises and public sector firms are excluded. Firm size is computed based on the number of employees in 2011. Continuously employed workers are workers employed in all months of 2011, 2012 and 2013.

An alternative explanation for the large share of minimum wage earners who experience no wage growth could be that for many of them the minimum wage is binding. To rule this out, we perform the same calculations on a sample of young employees (24 or younger in 2011). Workers in the early stages of their career tend to have higher returns to experience and tenure; thus young workers are less likely to have no wage growth after three years of employment with the same firm. Figure 4 plots the results for young workers. In big firms, the spike at the minimum wage is more than twice as small as for the full sample of workers (12% vs. 28%), but in small firms it remains very high (33%).

Figure 4: Proportion of continuously employed young workers (aged 24 or less) facing no wage growth in 2013 compared to 2011, by 10-EUR wage bins in 2011
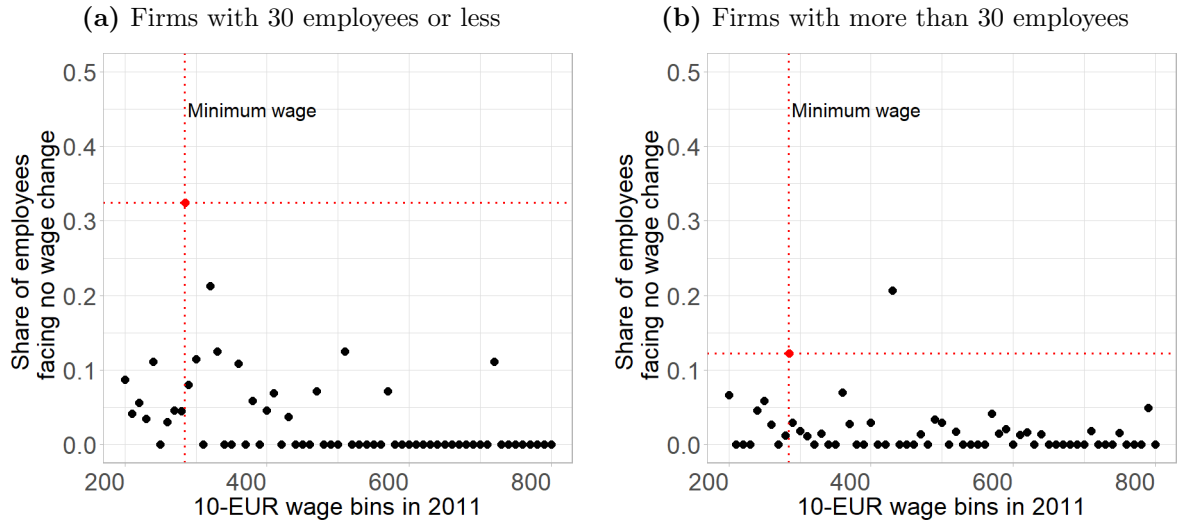
(a) Firms with 30 employees or less   **(b)** Firms with more than 30 employees

Note: Micro enterprises and public sector firms are excluded. Firm size is computed based on the number of employees in 2011. Continuously employed workers are workers employed in all months of 2011, 2012 and 2013.

Finally, we compare minimum wage earners with other workers in terms of probability of job retention. Jobs offering lower wages and lower wage growth tend to have higher rates of firm-worker separations and worker turnover (Jovanovic, 1979; Munasinghe, 2000); hence minimum wage workers should be less likely to retain their jobs for long periods than workers higher up in wage distribution. Figure 5 plots the share of workers who remained employed by the same firm in 2011-2013 by wage bins calculated as before. In both small and big firms, employees earning higher wages are more likely to retain their jobs than employees earning lower wages. But again, there is a visible spike in the probability of retaining a job for minimum wage earners, which can signal that minimum wage recipients in fact earn more than they get on paper.

Figure 5: Proportion of employees retaining their jobs in 2011-2013, by 10-EUR wage bins in 2011
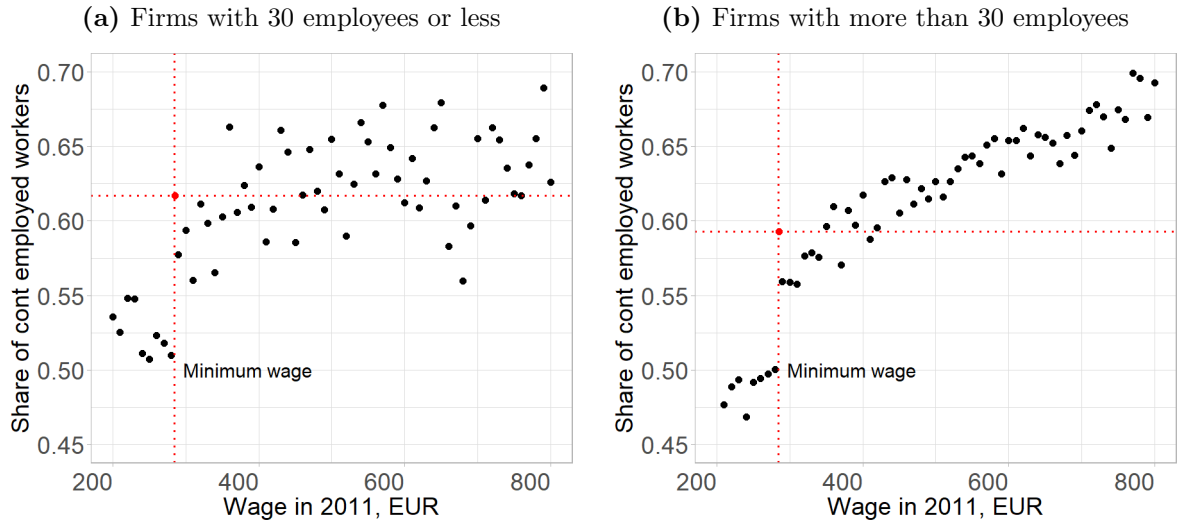
(a) Firms with 30 employees or less   **(b)** Firms with more than 30 employees

Note: Micro enterprises and public sector firms are excluded. Firm size is computed based on the number of employees in 2011. Continuously employed workers are workers employed in all months of 2011, 2012 and 2013.

As it is well documented in the literature that job mobility among young workers is higher than among older workers (Farber, 1999; Topel & Ward, 1992), we again repeat the calculations on the sample of workers aged 24 or less. Comparison of Figures 6 and 5 suggests that on average young workers are indeed less likely than older employees to stay with the same employer. In big firms the spike at the minimum wage for young workers is slightly less pronounced than for the full sample (compare panels (b) of Figures 5 and 6), but in small firms the spike is larger (panels (a) of Figures 5 and 6).

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Figure 6: Proportion of young employees workers (aged 24 or less) remaining in employment with a firm in 2011-2013, by 10-EUR wage bins in 2011
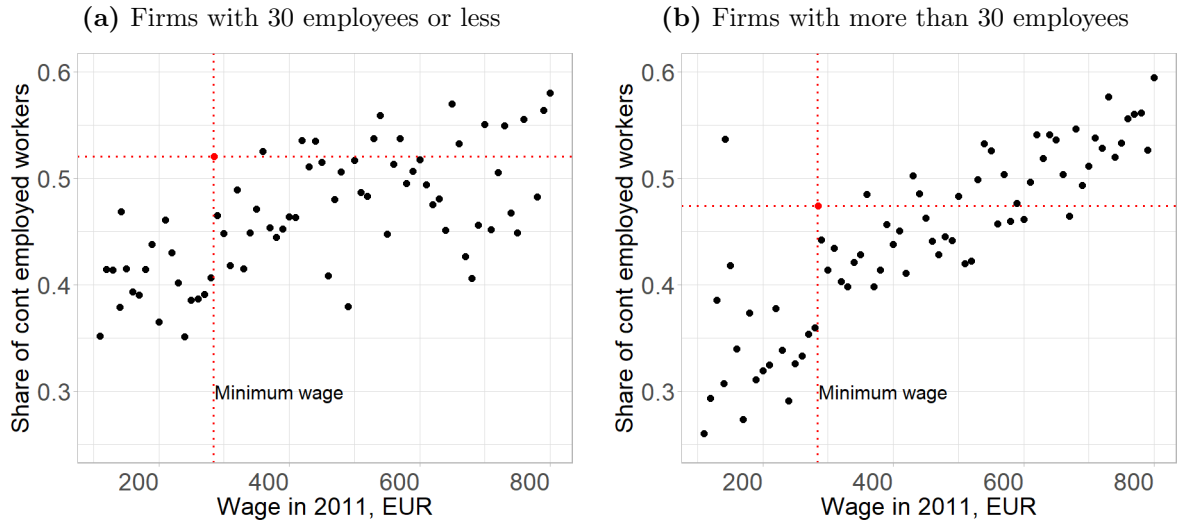
(a) Firms with 30 employees or less   **(b)** Firms with more than 30 employees

Note: Micro enterprises and public sector firms are excluded. Firm size is computed based on the number of employees in 2011. Continuously employed workers are workers employed in all months of 2011, 2012 and 2013. Young workers are workers aged 24 or less in 2011.

To sum up, our descriptive analysis prompts several important observations. First, wage distribution in the private sector has a notable spike around the minimum wage, which the previous literature found to be a likely sign of wage underreporting at the minimum wage. The spike is larger in small firms, which is also in line with the literature demonstrating that small firms are more likely to engage in tax evasion.

Second, we explore a three-year period when the minimum wage remained unchanged, and show that minimum wage earners who retained their jobs throughout this period were much more likely than their peers earning slightly more to have no wage growth: more than 40% of workers earning the minimum wage in small firms in 2011 earned the minimum wage in 2013. We also show that minimum wage earners were more likely to retain their jobs. These results also hold for employees aged 24 or less, despite young workers tending to change jobs more frequently and tending to enjoy higher wage growth. All the evidence presented in this section is consistent with the idea that tax evaders are overrepresented among minimum wage earners, and is hard to rationalize if minimum wage earners truly earn what they get on paper. We next turn to a regression analysis to verify the relevance and robustness of this set of observations.

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4 Empirical strategy and results

4.1 Within-firm job retention and switches to part-time work

The first part of our empirical analysis relies on the following assumption: if reported wages reflect true relative productivity, or if the probability of wage underreporting is similar across the wage distribution, minimum wage employees' adjustment to a minimum wage hike should be stronger compared to employees earning a bit more. If on the other hand minimum wage employees are more likely to evade, wage underreporting can cushion the negative effect of a minimum wage hike, leading to a stronger adjustment among employees earning slightly more than the minimum wage. We focus on the minimum wage hikes of 2014 and 2015 and analyze two margins of adjustment to these hikes: (i) losing their job in a firm where an individual worked before the minimum wage increase, and (ii) switching to part-time employment in the same firm.

We expect that due to more prevalent wage underreporting among minimum wage employees their probability of losing their job is lower than that of employees earning slightly more. Switches to part-time employment in response to a minimum wage hike can also be used to identify tax evasion, because it can signal underreporting of hours. We assume that firms engaged in wage underreporting are also more likely to misreport hours and therefore expect that if tax evaders are overrepresented among minimum wage earners, minimum wage earners are also more likely to switch to part-time employment in the same firm. We perform this analysis separately for small (presumably evading) and big (presumably clean) firms. Identification of the effect of tax evasion comes from comparing the difference in job exits and switches to part-time employment between minimum wage employees and employees earning slightly more in small and big firms.

We assign workers to three wage bins defined in the 2012 wage distribution and estimate workers' probability of retaining their jobs or probability of switching to part-time employment in 2013 (a year with no minimum wage change), 2014 (minimum wage increase from 284.57 to 320 euro) and 2015 (minimum wage increase from 320 to 360 euro).

The three wage bins are defined as follows:

- Bin 1 (treated group): Workers earning exactly the minimum wage in 2012 (284.57 euro);

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- Bin 2 (treated group): Workers earning slightly more than the minimum wage in 2012, but less than the minimum wage in 2014 and 2015 (290-310 euro);

- Bin 3 (control group): Low-wage workers who in 2012 were earning more than the minimum wage in 2014 and 2015 (360-400 euro).

Wage bins are defined very strictly to capture only those workers who consistently earn wages in the chosen intervals. We assign an individual to Bin 1 only if they earned exactly the minimum wage (284.57 euro) in at least 11 months of 2012.[4] Workers are assigned to Bin 2 and Bin 3 if in 11 months of 2012 they earned wages in the range of 290-310 and 360-400 euro, respectively. We assume that Bin 1 and Bin 2 workers are affected by both the 2014 and 2015 minimum wage hikes, as their wage in 2012 is below the minimum wage set in 2014. Bin 3 workers are assumed to be not affected by any of the hikes, because their wage in 2012 exceeded the minimum wage in 2015, and hence represent our control group. We define wage bins in wage distribution of 2012. Despite the absence of change in the minimum wage in 2012, we do not use 2011 to define wage bins, because assigning workers to wage bins using their earnings three years before a minimum wage hike would increase the probability that they would no longer be in the same wage bins by 2014, making the definition of treated and control groups less precise.

We start by presenting a simple comparison of job survival and switches to part-time work between workers in different wage bins. Figures A.3 and A.4 plot the cumulative survival probability for employees in different wage bins in small firms, small continuing firms (firms that existed throughout the period 2012-2015), big firms and big continuing firms. In big firms, consistent with what we would expect for clean firms, job survival was lowest for the minimum wage earners, and the highest for employees earning 360-400 euros. In small firms, the pattern is completely different – minimum wage earners were more likely to survive than employees earning slightly more, and the difference is especially large in continuing firms.

Figure A.5 shows the cumulative probability of switching to part-time work for workers in different wage bins. We define part-time workers as workers receiving 50% of the minimum wage or less, given that there is a clear spike around 50% of the minimum wage (see Figure 1). In small firms the probability of switching to part-time work is generally higher for workers in all wage bins compared to big firms. But minimum wage earners clearly stand out from other employees – about

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[4]We leave out one month to allow for bonuses or other irregular payments, annual leave, sickness leave, etc.

5% of minimum wage workers switched to part-time employment by 2015 and there are notable increases in this proportion after both minimum wage hikes.

To more formally identify the differences in job survival probability we estimate the following specification:

$$y_{ijt} = \sum_{t \neq 2012} \beta_1^t Bin1_{ij} Year_t + \sum_{t \neq 2012} \beta_2^t Bin2_{ij} Year_t + \eta_i + \xi_t + \epsilon_{ijt} \qquad (1)$$

Where y_{ijt} equals 1 if person i is employed in firm j in year t and 0 otherwise, $Bin1_{ij}$ equals 1 if in 2012 person i earned the minimum wage in firm j and 0 otherwise, $Bin2_{ij}$ equals 1 if in 2012 person i earned a wage in the range of 290-310 euro in firm j. $Year_t$ equals 1 in years 2013, 2014 or 2015 and 0 otherwise, η_i and ξ_t denote person and year fixed effects.

First we estimate specification 1 on the full sample of private sector employees who were employed in all months of 2012 and were assigned to Bin 1, Bin 2 or Bin 3.[5] The control group in this specification consists of employees in Bin 3, who we assume were not affected by any of the minimum wage hikes. Then we split the sample and estimate specification 1 on the sample of firms that in 2012 employed 30 employees or less (small firms) and more than 30 employees (big firms), and then further restrict the samples of small and big firms to firms that survived until 2015 to eliminate employment effects arising from firm closures. Our coefficients of interest are β_1 and β_2 in years when the minimum wage was increased.

Table 1 presents the results for specification 1 estimated on the sample of all firms, small firms and big firms. In small firms, minimum wage earners are as likely to survive the 2014 minimum wage hike as Bin 3 workers, who were not affected by the hike. There was a significant negative effect in 2015, but it is 1.5 times as small as the effect for Bin 2 workers, whose probability of survival is negatively affected by both 2014 and 2015 minimum wage increases. In big firms, both minimum wage earners and those earning 290-310 euro were less likely to survive even before the minimum wage hikes, but in 2014 the coefficient for minimum wage earners is almost twice as large as in 2013 and twice as large as for those earning 290-310 euro. Taken together, these results are consistent with tax evaders being overrepresented among minimum wage earners.

Next, we restrict the sample to firms which survived until 2015. Table 2 presents

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[5]We use OLS with clustered standard errors.

the results. We find that in small continuing firms, both minimum wage earners and those earning wages 290-310 were as likely to survive minimum wage hikes as those earning 360-400 euro. This implies that the negative effects on employees earning slightly more than the minimum wage, identified from the full sample, are driven by firms that closed down in 2013-2015. In big continuing firms, the coefficients for minimum wage earners remain significant, implying that the negative effect on job survival probability for these workers is driven by both layoffs and firm closures. The effects for those in the wage bin 290-310 are not significant.

Lastly, we conduct a placebo check, replacing Bin 1 and Bin 2 with 10-euro wage bins covering earners of wages twice as high as in the baseline specification. Instead of minimum wage earners (Bin1), we use workers receiving double the minimum wage and use a 10-euro interval to increase the number of observations in the bin (570-580 euro); instead of the 290-310 euro bin (Bin 2), we use a 10-euro interval covering wages twice as high (580-590 euro); but instead of the control bin (360-400 euro, Bin 3), as in our baseline specification, we use a bin that is 50 euro above the second bin (640-650 euro). We find no significant effects for the probability of retaining a job in any of the bins (see Table A.3).

Table 1: Probability of retaining a job

Dependent Variable:		Employed	
Model:	All firms	Small firms	Big firms
Variables			
Minwage x 2013	-0.018***	-0.007	-0.033***
	(0.005)	(0.007)	(0.007)
Minwage x 2014	-0.033***	-0.019	-0.062***
	(0.009)	(0.012)	(0.014)
Minwage x 2015	-0.043***	-0.040***	-0.064***
	(0.010)	(0.014)	(0.017)
(290-310 EUR) x 2013	-0.021***	-0.007	-0.039***
	(0.006)	(0.008)	(0.010)
(290-310 EUR) x 2014	-0.039***	-0.035**	-0.037**
	(0.012)	(0.015)	(0.018)
(290-310 EUR) x 2015	-0.056***	-0.063***	-0.044**
	(0.014)	(0.018)	(0.022)
Fixed effects			
Individual	Yes	Yes	Yes
Year	Yes	Yes	Yes
Fit statistics			
Observations	228,512	167,504	61,008
Adjusted R^2	0.53076	0.53219	0.52765

Standard errors clustered at individual level in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Note: OLS estimates of Equation 1. The sample consists of individuals continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 360 - 400 EUR in 2012.

Table 2: Probability of retaining a job, sample of continuing firms

Dependent Variable:		Employed	
Model:	All firms	Small firms	Big firms
Variables			
Minwage x 2013	-0.0004	0.009	-0.016**
	(0.004)	(0.006)	(0.007)
Minwage x 2014	-0.0002	0.014	-0.045***
	(0.008)	(0.012)	(0.014)
Minwage x 2015	-0.0001	0.004	-0.046***
	(0.010)	(0.013)	(0.016)
(290-310 EUR) x 2013	-0.001	0.007	-0.010
	(0.006)	(0.008)	(0.009)
(290-310 EUR) x 2014	-0.010	-0.006	-0.015
	(0.011)	(0.015)	(0.017)
(290-310 EUR) x 2015	-0.020	-0.023	-0.026
	(0.013)	(0.017)	(0.021)
Fixed-effects			
Individual	Yes	Yes	Yes
Year	Yes	Yes	Yes
Fit statistics			
Observations	203,328	146,352	56,976
Adjusted R^2	0.51054	0.51301	0.50781

Standard errors clustered at individual level in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Note: OLS estimates of Equation 1. The sample consists of individuals continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 360 - 400 EUR in 2012. Continuing firms are firms that survived until 2015.

As the next step, we estimate the probability of switching to part-time employment by modifying the outcome variable in specification 1 so that y_{ijt} equals 1 if person i in firm j in year t works part-time and 0 if they work full-time. Assuming that firms that underreport wages are also more likely to use hours underreporting as an adjustment mechanism, we expect the absolute magnitude of β_1 to be larger than β_2.

An important limitation to our analysis is that we do not have information on hours worked, so we assume that all individuals initially earning the minimum wage or more work full time. This is a strong assumption, because for part-time workers earning the (full-time) minimum wage or slightly more, the new minimum wage may be non-binding. As we show in Section 3, Figure 2, the share of individuals receiving the minimum wage drops to levels very close to zero right after the minimum wage is raised, which suggests that the share of part-time workers among full-time equivalent minimum wage earners is likely to be small. At the same time, the share of employees whose earnings are between the old and the new minimum wage remains non-negligible after minimum wage increases, which means that the share of part-time employees in this wage interval is likely to be higher.

What this implies for our analysis of employment and switch to part-time work is that the response of workers in Bin 2 can be weaker than the response of workers in Bin 1 on account of a larger proportion of part-time workers in Bin 2. For analysis of job retention this does not represent a problem, because in the absence of tax evasion we would expect the response of Bin 2 workers to be weaker than that of Bin 1 workers. The effect of tax evasion among minimum wage employees works in the opposite direction (the response of Bin 2 is stronger than that of Bin 1), so that the identified difference in responses of these two groups underestimates the difference that we could obtain if we were able to remove part-time employees from the sample.

For the analysis of switches to part-time work, however, the effect of a higher initial share of part-time workers in Bin 2 works in the same direction as tax evasion. If there is tax evasion and no differences in the share of part-time workers across wage bins, minimum wage earners may be more likely to switch to part-time work than Bin 2 workers, because, presumably, they are more likely to evade. If there is no tax evasion but the share of part-time workers in Bin 2 is larger than that in Bin 1, switches to part-time work among Bin 2 workers might be less common because of the initially larger share of part-time workers. Therefore, to disentangle the effect of tax evasion from the effect of different shares of part-time workers, we

need to make an additional identifying assumption. We assume that the difference in shares of part-time workers in Bin 1 and Bin 2 is the same in small and large firms. Under this assumption, the small vs. large firm difference in the relative switches to part-time work from Bin 1 and Bin 2 should capture the effect of tax evasion.

Table 3 shows the estimation results for switches to part-time employment. In small firms, minimum wage earners are significantly more likely to switch to part-time work than those unaffected by minimum wage hikes. The coefficient is significant in all years, but in 2014 and 2015 the effect is 3-4 times as large as in 2013. The effect for employees earning a bit more is not significant. In big firms, the results are somewhat mixed. But, in contrast to the sample of small firms, we find that in big firms both minimum wage workers and those earning a bit more are more likely to switch to part-time work than the control group. Figure A.8 plots the estimated coefficients based on a quarterly version of our baseline specification. In small firms, the estimated positive effect appears right after the minimum wage hike in 2014, while in big firms the results are much more mixed. It is also important to note that the share of minimum wage earners in big firms is much smaller than in small firms (see spikes in Figures 1 and 2); hence the absolute effect on part-time employment in big firms is much smaller than in small firms.

Table 3: Probability of switching to part-time employment within the same firm

Dependent Variable:	Employed part-time		
Model:	All firms	Small firms	Big firms
Variables			
Minwage x 2013	0.005***	0.005***	-0.0005
	(0.001)	(0.002)	(0.001)
Minwage x 2014	0.018***	0.017***	0.007***
	(0.002)	(0.004)	(0.002)
Minwage x 2015	0.022***	0.019***	0.010***
	(0.004)	(0.006)	(0.004)
(290-310 EUR) x 2013	0.003*	0.002	0.006*
	(0.002)	(0.002)	(0.003)
(290-310 EUR) x 2014	0.007**	0.003	0.011**
	(0.003)	(0.005)	(0.005)
(290-310 EUR) x 2015	0.002	-0.004	0.010*
	(0.004)	(0.006)	(0.006)
Fixed-effects			
Individual	Yes	Yes	Yes
Year	Yes	Yes	Yes
Fit statistics			
Observations	146,426	108,049	38,377
Adjusted R^2	0.29855	0.31073	0.2032

Standard errors clustered at individual level in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Note: OLS estimates of Equation 1. The sample consists of individuals continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 360 - 400 EUR in 2012. Continuing firms are firms that survived until 2015.

4.2 Switches across firms

In the second part of the regression analysis, we exploit a period when the minimum wage remained constant and look at the sample of workers who changed employers during this period and switched from a small to a big firm or vice versa. If tax evaders are overrepresented among the minimum wage earners we expect them to experience a larger wage gain when switching from an evading firm (approximated by small firms) to a clean firm (approximated by big firms).

We base our analysis on a sample of private sector workers who were employed in all three months of the 1st quarter of 2012 and then changed employers in 2012 or 2013. We consider a new job match only if it existed for at least two consecutive quarters (i.e., an individual received at least six consecutive monthly wages in the new job) and we exclude any second jobs that an individual had before exiting the job. We compute the entry wage as the average wage in the second quarter of employment in the new job, to exclude the first months of employment when the wage can be lower.

As in our analysis of job retention and switches to part-time work, we restrict the sample to low-wage workers earning 400 euro or less in the initial job and assign workers to wage bins. The widths of the wage bins are chosen so that there are at least 50 observations for each job switch, i.e., for switches from small to small firms from each bin, small to big firms from each bin, etc. As in the previous subsection, we have a separate wage bin for workers who earn exactly the minimum wage in the 1st quarter of 2012 (in all three months of the quarter). Other workers are assigned to bins of 290-319 euro, 320-340 euro and 341-400 euro if in all months of the 1st quarter of 2012 they received wages falling within these intervals. We then split the sample based on the size of the initial employer and estimate the following specification on the samples of small (30 employees or less) and big (more than 30 employees) firms:

$$
\begin{aligned}
ln(w_{ik}) = \sum_{z \neq [341-400]} \beta_1^z W_{ijz} + \beta_2 Big_{ik} + \\
+ \sum_{z \neq [341-400]} \beta_3^z W_{ijz} Big_{ik} + \gamma_i + \xi_q + \epsilon_{ij}
\end{aligned}
\tag{2}
$$

Where $ln(w_{ik})$ is the logarithm of the wage that individual i receives in the new

job in firm k, W_{ijz} is equal to 1 if the individual's i wage in the old job in firm j fell in the minimum wage bin, the wage bin of 290-319 euro, or 320-340 euro (the wage bin of 341-400 euro is the reference bin) and 0 otherwise, Big_{ik} takes the value of 1 if the new employer is a big firm and 0 otherwise, γ_i is age fixed effect, but ξ_q is the fixed effect for the quarter of entry into the new job.

It is well documented in the literature that large firms pay higher wages than small firms (see Oi and Idson (1999) for a survey), so we expect all workers to have a larger wage gain when switching to a big firm than when switching to a small firm. But our primary interest is whether minimum wage workers have a significantly larger wage gain when switching from a small to a big firm than workers who in the initial job earned slightly more than the minimum wage. Therefore, our main coefficient of interest is β_3^z. If tax evaders are overrepresented among minimum wage earners, we expect their wage gain to be the largest when they switch to a clean firm (β_3^z should be the largest for minimum wage employees switching from small firms). The wage gain of workers in wage bins 290-319 and 320-340 should not be much different from the wage gain of those who initially earned 341-400 euro (the reference group) both for switchers from small and for switchers from big firms.

Tables 4 and 5 present the results. All employees switching from a small to a big employer receive almost 40% higher wages in their new job (Table 4, coefficient on (Switch to a big firm)). Those who switch from the minimum wage get an additional 17% wage gain compared to those who received wages between 340 and 400 in the initial job (coefficient on (Min.wage x Big firm)). And notably, those who in the previous job received a wage slightly above the minimum wage (290-319 euro) do not have a significantly larger wage gain from switching to a large firm. For those who initially worked in big firms (Table 5), switching to another big firm ensures a higher wage than switching to a small firm. However, in the case of big firms the wage gain for minimum wage earners is not significantly different from that of workers earning slightly more than the minimum wage.

Table 4: Wage in new job for employees switching from small firms

Dependent Variable:	ln(wage)			
Model:	(1)	(2)	(3)	(4)
Variables				
(Intercept)	5.68***			
	(0.024)			
Min.wage	-0.085***	-0.080**	-0.089***	-0.084**
	(0.033)	(0.033)	(0.033)	(0.033)
Wage 290-319 EUR	0.076	0.079*	0.061	0.064
	(0.047)	(0.047)	(0.047)	(0.047)
Wage 320-340 EUR	0.033	0.036	0.014	0.017
	(0.049)	(0.049)	(0.048)	(0.048)
Switch to a big firm	0.390***	0.383***	0.385***	0.379***
	(0.036)	(0.036)	(0.035)	(0.035)
Min.wage x Big firm	0.175***	0.173***	0.169***	0.167***
	(0.051)	(0.051)	(0.051)	(0.051)
(290-319 EUR) x Big firm	0.099	0.102	0.090	0.093
	(0.080)	(0.080)	(0.079)	(0.079)
(320-340 EUR) x Big firm	-0.003	0.007	0.013	0.022
	(0.075)	(0.075)	(0.074)	(0.074)
Fixed-effects				
Age group		Yes		Yes
Quarter of entry			Yes	Yes
Fit statistics				
Observations	3,609	3,609	3,609	3,609
Adjusted R^2	0.10787	0.11292	0.12868	0.13258

Normal standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: Notes: OLS estimates of Equation 2. The sample consists of individuals employed in all months of Q1 2012 who changed employer in 2012-2013 and were employed for at least two consecutive quarters in the new job. Small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees. The control group consists of employees receiving 341 - 400 EUR in the initial job.

Table 5: Wage in new job for employees switching from big firms

Dependent Variable:	ln(wage)			
Model:	(1)	(2)	(3)	(4)
Variables				
(Intercept)	5.64***			
	(0.022)			
Min.wage	0.024	0.035	0.010	0.021
	(0.048)	(0.047)	(0.047)	(0.047)
Wage 290-319 EUR	0.007	0.007	0.009	0.010
	(0.061)	(0.061)	(0.061)	(0.060)
Wage 320-340 EUR	0.034	0.024	0.034	0.025
	(0.051)	(0.051)	(0.051)	(0.050)
Switch to a big firm	0.434***	0.435***	0.425***	0.427***
	(0.027)	(0.026)	(0.026)	(0.026)
Min.wage x Big firm	-0.077	-0.080	-0.059	-0.061
	(0.058)	(0.058)	(0.058)	(0.057)
(290-319 EUR) x Big firm	0.028	0.036	0.014	0.021
	(0.077)	(0.076)	(0.076)	(0.075)
(320-340 EUR) x Big firm	0.004	0.028	0.006	0.029
	(0.062)	(0.062)	(0.062)	(0.061)
Fixed-effects				
Age group		Yes		Yes
Quarter of entry			Yes	Yes
Fit statistics				
Observations	3,641	3,641	3,641	3,641
Adjusted R^2	0.10145	0.11991	0.12655	0.14553

Normal standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: OLS estimates of Equation 2. The sample consists of individuals employed in all months of Q1 2012 who changed employer in 2012-2013 and were employed for at least two consecutive quarters in the new job. Small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees. The control group consists of employees receiving 341 - 400 EUR in the initial job.

5   Conclusions

In this paper, we study the interaction of tax evasion and minimum wage policy and present evidence suggesting that tax evaders are bunching at the minimum wage. We study two minimum wage hikes implemented in Latvia in 2014 and 2015 and show that (i) minimum wage employees are more likely to survive these minimum wage hikes than employees earning slightly more, and (ii) minimum wage employees are more likely to switch to part-time work within the same firm than their peers earning slightly more. These effects are present in the sample of small (presumably more prone to tax evasion) firms but are not found in the sample of big (less prone to tax evasion) firms. We further show that the negative effect on employment of workers earning slightly more than the minimum wage is driven entirely by firm closures.

In addition, we explore a period with no minimum wage hikes and show that minimum wage earners switching from employment in a small to a big firm enjoy a significantly larger wage gain than employees earning slightly more than the minimum wage. There is no such effect for minimum wage employees initially working in big firms. Taken together, these results are consistent with tax evaders being overrepresented among minimum wage earners and are hard to rationalize otherwise. Our paper complements existing scarce literature on the minimum wages policy in the context of widespread tax evasion (most notably Bíró et al. (2021), Elek et al. (2012), and Tonin (2011, 2013)).

To the extent that minimum wage employees survive the minimum wage hikes, our findings suggest that the minimum wage policy can be effective in improving tax compliance and social protection of employees in countries with widespread tax evasion. This positive effect comes at a cost though. First, minimum wage hikes can lead to job losses among genuine low wage earners and closures of tax-compliant firms that are affected by the hikes. Second, the fiscal effect can be limited by induced shifts to other forms of informality, such as underreporting of hours (switches to part-time employment) or shifts to fully informal employment. Finally, an important question is who is actually bearing the extra tax burden of a higher minimum wage. Although minimum wage employees of tax evading firms gain better social protection, in the short run they can lose by facing a reduction in disposable income if they bear most of the tax burden (Tonin, 2011).

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Appendix

Figure A.1: Minimum wage and minimum wage ratio to the average wage

(a) Minimum wage, EUR

(b) Minimum wage ratio to the average wage
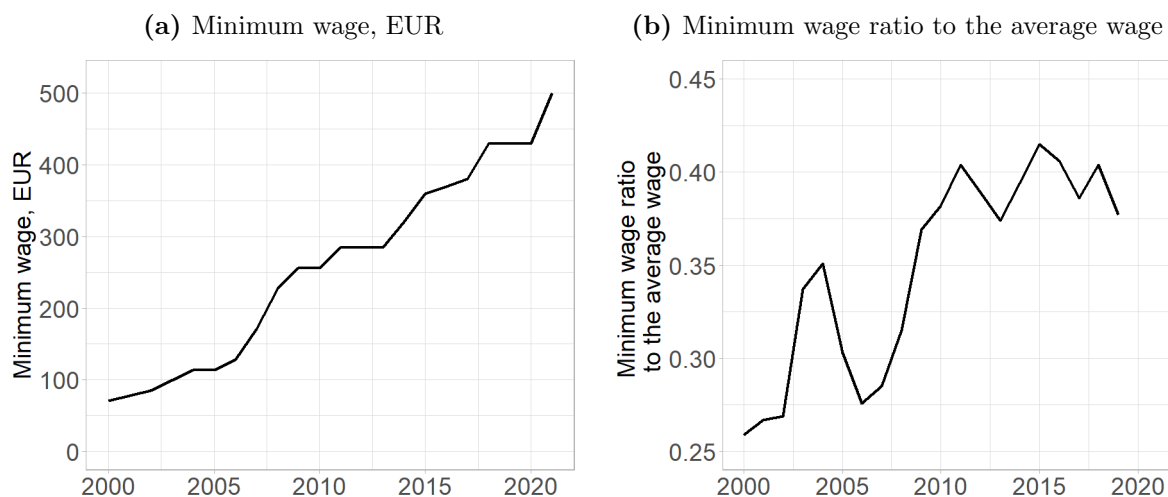
Source: OECD for (b) figure.

Table A.1: Minimum wage increase and share of affected private sector jobs

Year	MW increase, EUR	MW increase, %	Share of jobs affected
2003	85.37 to 99.6	16.669	0.247
2004	99.6 to 113.83	14.287	0.220
2006	113.83 to 128.06	12.501	0.176
2007	128.06 to 170.74	33.328	0.223
2008	170.74 to 227.66	33.337	0.233
2009	227.66 to 256.12	12.501	0.152
2011	256.12 to 284.57	11.108	0.163
2014	284.57 to 320	12.450	0.149
2015	320 to 360	12.500	0.173
2016	360 to 370	2.778	0.096
2017	370 to 380	2.703	0.081
2018	380 to 430	13.158	0.146

Notes: Jobs affected are jobs paying wages between the old and the new minimum wage in the last quarter preceding the minimum wage hike. Public sector jobs, microenterprises and jobs paying wages below the pre-reform minimum wage are excluded.

Table A.2: Tax wedge on the minimum wage and wages just above the minimum wage

	2011	2012	2013	2014	2015
PIT rate, %	25.000	25.000	24.000	24.000	23.000
Basic PIT allowance, EUR	64.030	64.030	64.030	75.000	75.000
Employer's SSC rate, %	24.090	24.090	24.090	23.590	23.590
Employee's SSC rate, %	11.000	11.000	11.000	10.500	10.500
Tax wedge:					
Minimum wage	0.417	0.417	0.411	0.404	0.404
Minimum wage + 5%	0.419	0.419	0.413	0.406	0.405
Minimum wage + 10%	0.421	0.421	0.415	0.408	0.407

Notes: Tax wedge is computed assuming no dependents and assuming an employee is below the retirement age.
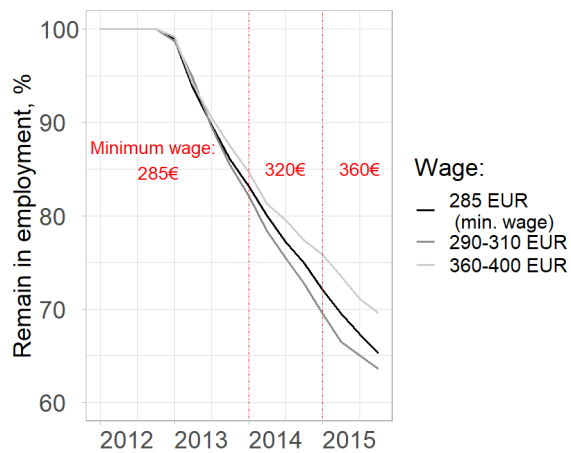
**Figure A.2:** Tax wedge on the minimum wage and wages just above the minimum wage

Notes: Tax wedge is computed assuming no dependents and assuming an employee is below the retirement age.

Figure A.3: Share of employees remaining in employment from 2012 to 2015 in small firms, by wage bins in 2012

(a) All firms employing less than 30 employees in 2012

(b) Continuing firms employing less than 30 employees in 2012
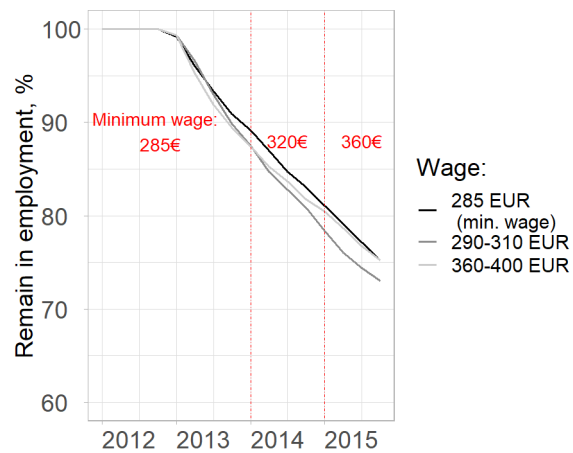
Note: The sample consists of individuals continuously employed in all quarters of 2012 in private sector firms that were registered in 2010 or earlier. Micro enterprises are excluded. Continuing firms are firms that existed throughout the period of 2012 - 2015.

Figure A.4: Share of employees remaining in employment from 2012 to 2015 in big firms, by wage bins in 2012

(a) All firms employing more than 30 employees in 2012

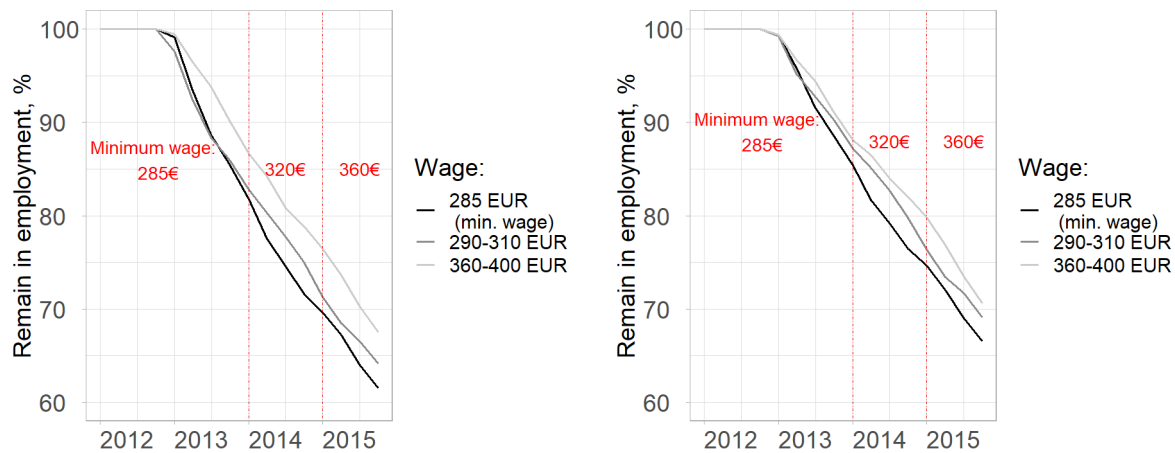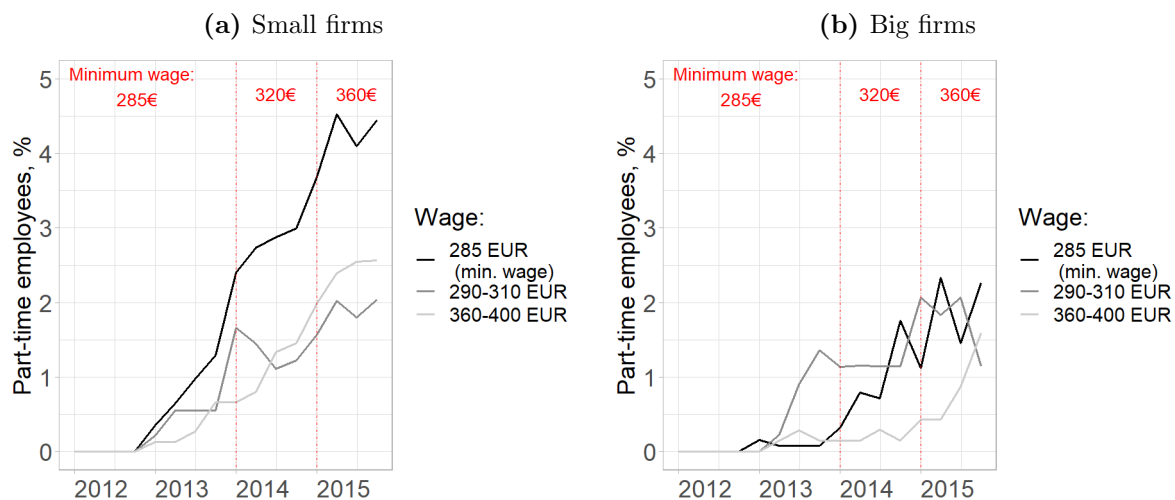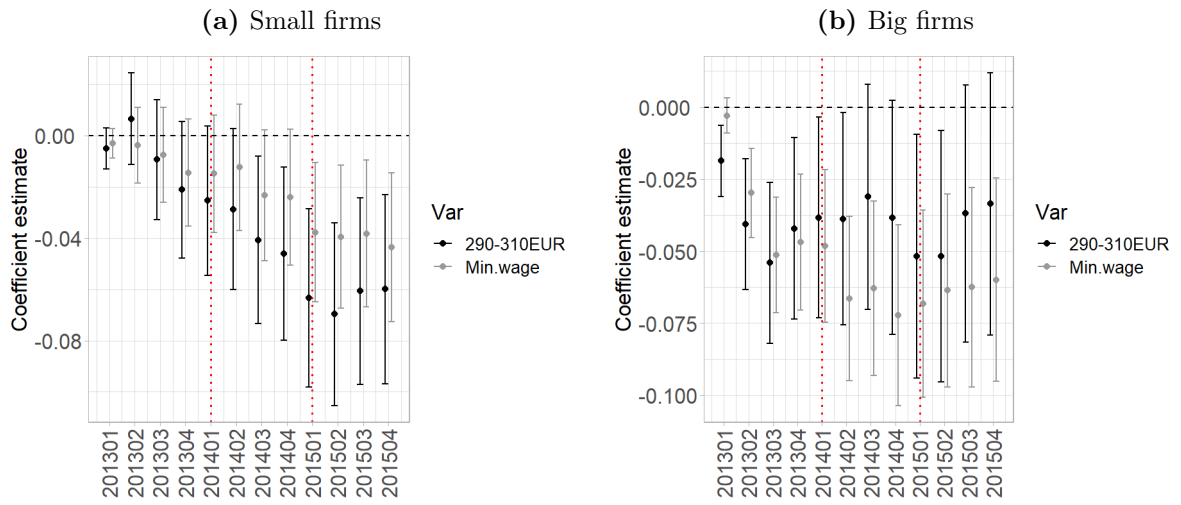**(b)** Continuing firms employing more than 30 employees in 2012

Note: The sample consists of individuals continuously employed in all quarters of 2012 in private sector firms that were registered in 2010 or earlier. Micro enterprises are excluded. Continuing firms are firms that existed throughout the period of 2012 - 2015.

Figure A.5: Share of workers switching to part-time employment, % of continuously employed full-time employees in 2012, by wage bins in 2012

(a) Small firms
(b) Big firms
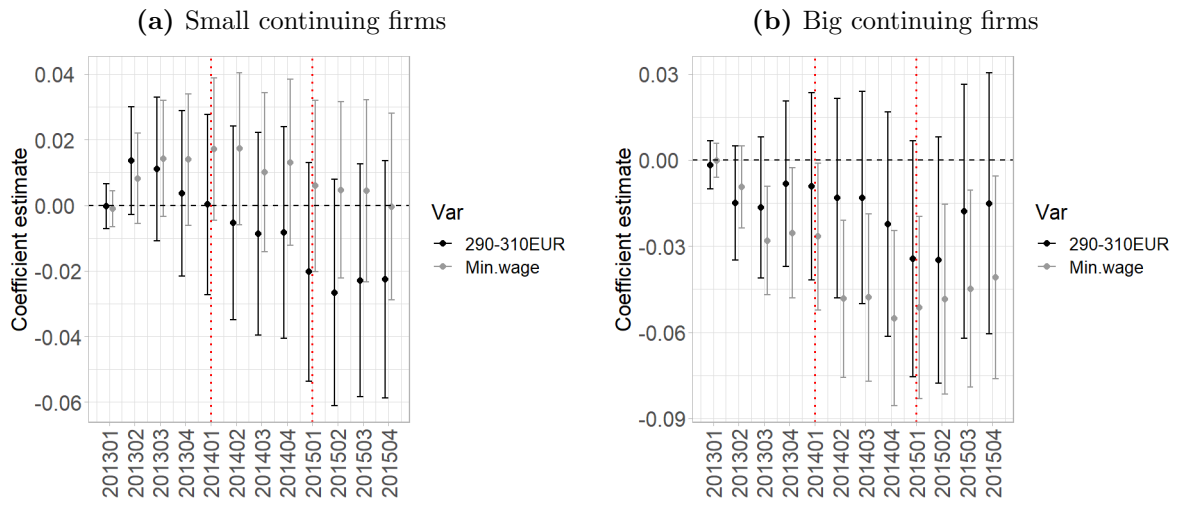

Note: The sample consists of full-time employees continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Part-time workers are defined as workers receiving 50% of the minimum wage or less.

Figure A.6: Diff-in-diff estimates for probability of retaining a job in small and big firms

(a) Small firms   **(b)** Big firms

Note: OLS estimates from specification of Equation 1, quarterly version. The figure plots estimated coefficients on $Minwage*YearQuarter$ and $(290-310euro)*YearQuarter$. The sample consists of individuals continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 360 - 400 EUR in 2012.

Figure A.7: Diff-in-diff estimates for probability of retaining a job in small and big continuing firms

(a) Small continuing firms   **(b)** Big continuing firms

Note: OLS estimates from quarterly specification of Equation 1. The figure plots estimated coefficients on $Minwage * YearQuarter$ and $(290 - 310euro) * YearQuarter$. The sample consists of individuals continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 360 - 400 EUR in 2012. Continuing firms are firms that existed until 2015.

Table A.3: Probability of retaining a job, all firms, placebo sample

Dependent Variable:		Employed	
Model:	All firms	Small firms	Big firms
Variables			
(570-580 EUR) x 2013	-0.036	-0.024	-0.073
	(0.032)	(0.034)	(0.064)
(570-580 EUR) x 2014	0.001	0.010	-0.030
	(0.048)	(0.056)	(0.092)
(570-580 EUR) x 2015	0.042	0.051	0.005
	(0.052)	(0.061)	(0.095)
(580-590 EUR) x 2013	-0.021	-0.028	-0.014
	(0.021)	(0.025)	(0.033)
(580-590 EUR) x 2014	-0.010	-0.032	0.013
	(0.038)	(0.054)	(0.053)
(580-590 EUR) x 2015	-0.035	-0.007	-0.064
	(0.043)	(0.060)	(0.060)
Fixed effects			
Individual	Yes	Yes	Yes
Year	Yes	Yes	Yes
Fit statistics			
Observations	12,544	6,416	6,128
Adjusted R^2	0.51509	0.50421	0.52431

Standard errors clustered at individual level in parentheses
Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Note: OLS estimates of Equation 1. Base year is 2012. The sample consists of individuals continuously employed in all months of 2012 in firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 640-650 EUR in 2012.

Figure A.8: Diff-in-diff estimates for probability of switching to part-time work

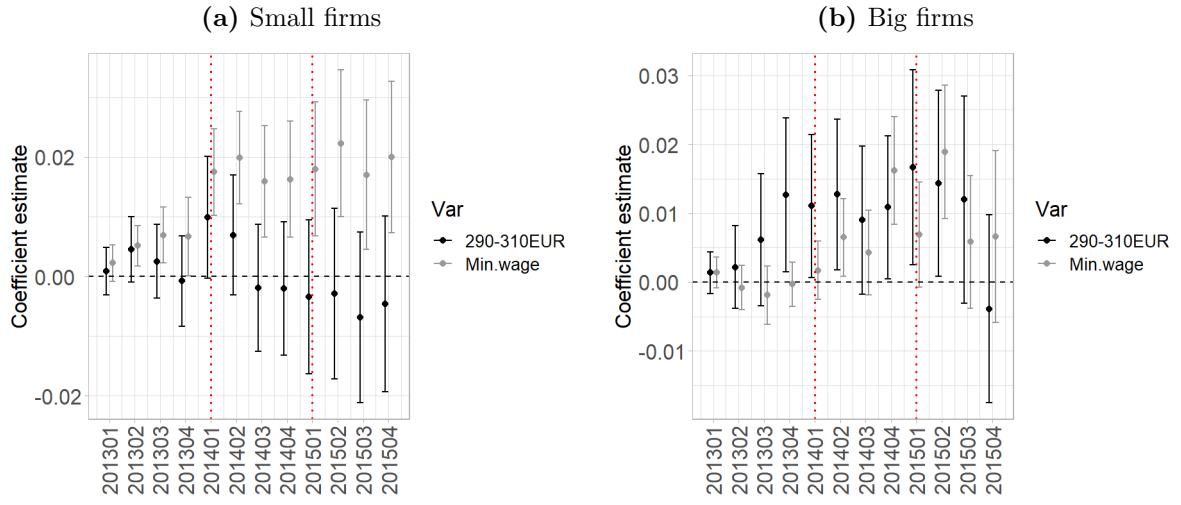**(a)** Small firms   **(b)** Big firms

Note: OLS estimates from quarterly specification of Equation 1. The figure plots estimated coefficients on $Minwage * YearQuarter$ and $(290 - 310 euro) * YearQuarter$. The sample consists of individuals continuously employed in all months of 2012 in private sector firms that were registered in 2010 or earlier; small firms are firms employing less than 30 employees, big firms are firms employing more than 30 employees in 2012. Micro enterprises are excluded. Control group - workers receiving wages 360 - 400 EUR in 2012

Table A.4: Distribution of job switchers by wage bins in the initial job, switchers from small (less than 30 employees) and big (more than 30 employees) firms

	Small firms	Big firms
Observations	3609	3641
Shares of employees by wage bins, %:		
Minimum wage	38.2	15.6
290-319 EUR	11.1	7.8
320-340 EUR	11.7	13.4
341-400 EUR	38.9	63.2
Shares of switchers to big firms by wage bins, %:		
Recipients of minimum wage	38.1	66
Recipients of 290-319 EUR	31.8	63
Recipients of 320-340 EUR	41	66.9
Recipients of 341-400 EUR	45.3	69.3