Do place-based tax incentives create jobs?*

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November 2017

[PRELIMINARY AND INCOMPLETE]

Abstract

Large and persistent disparities in regional employment is a main driver of inequality in income and wellbeing. To reduce these regional inequalities, programs of geographically differentiated payroll taxes have been implemented in certain countries. In this paper, we evaluate the effectiveness of such programs in stimulating local employment by exploiting a unique policy setting in Norway, where a system of geographically differentiated payroll taxes was suddenly abolished due to an EU regulation. The reform was enforced independently of the local labor market developments, and created arguably exogenous variation in the payroll tax rates that firms in different regions faced over time. Our key finding is that the incidence of regional payroll taxes is not shifted onto workers through wage decreases. Instead firms respond to the cost increase by reducing their demand for labor. Our findings indicate that place-based tax incentives can be effective in stimulating local employment in settings characterized by rigid wage setting (through centralized bargaining).

* Data made available by Statistics Norway have been essential for the research project.
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1. Introduction

Differences in employment levels across regions within a country is often at least as large as within a country over time, or across countries (Elhorst, 2003; Overman and Puga, 2002; Taylor and Bradley, 1997). For example, the unemployment rate differential between US cities in 2008 was more than twice as large as the overall change in national unemployment over the Great Recession (Kline and Moretti, 2014). In Europe, regional employment in 2016 varied broadly from around 2% in certain regions in Germany and Prague to around 30% in parts of Greece and Spain (Eurostat, 2017). Moreover, regional differences in employment rates (and income) are persistent both over time (Kline and Moretti, 2013; Blanchard and Katz, 1992), and across generations (Chetty et al, 2014). Labor income is an important tax base, and employment is one of the main indicators of socio-economic wellbeing. Large and persistent disparities in regional employment is therefore a main driver of inequality in income and wellbeing.

To reduce these regional inequalities, spatially targeted or *place-based* policies to stimulate employment have been implemented both in the US and in Europe. A prominent example is large public infrastructure spending such as the Tennessee Valley Authority (Kline and Moretti, 2014) and Appalachian Regional Commission (Glaeser and Gottlieb, 2008) in the US, and the European Regional Development Fund that grant business subsidies and public investments to low-employment regions of Europe (Becker, 2012).[1] Another important policy tool is to provide tax incentives for firms through programs of geographically differentiated payroll taxes.[2] Payroll taxes are usually flat taxes levied on firms, proportional to workers' earnings, and these tax programs have been widely used in the Nordic countries and some countries in South America to stimulate employment in less developed areas within a country. Despite the multitude of programs that have been implemented, empirical knowledge on the effectiveness of place-based policies, in particular regional tax incentives for firms, is scarce (Bartik, 1991).[3]

[1] Other examples of region-targeted programs are given in Kline and Moretti (2014).

[2] See Bartik (1991) and Glaeser (2001) for a review of the literature, and theoretical considerations, on how geographically differentiated business taxes affect local labor demand.

[3] There exist a small literature evaluating the Federal Empowerment Zones (EZ) Program in the US, a program that introduced place-based tax incentives and block grants to stimulate employment and growth in poor areas of the country. The evidence on employment effects from this literature is mixed (see Peters and Fisher (2002) for a review, and Bondonio and Greenbaum (2007); Elvery (2009); Ham, Imrohoroglu and Song (2011); Hanson (2009); Hanson and Rohlin (2011); and Neumark and Kolko (2010) for more recent studies). Busso, Gregory and Kline (2013) provide a comprehensive empirical welfare analysis of the EZ program, and find an increase in employment and wages in EZ neighbourhoods compared to control neighbourhoods.

This paper aims to contribute to reducing this gap in knowledge. In particular, we look at the effects of a place-based tax incentive on employment by exploiting a unique policy setting in Norway, where a system of geographically differentiated payroll taxes was suddenly abolished. In 2002, the European Free Trade Association (EFTA) Surveillance Authority ruled that the Norwegian system of geographically differentiated payroll tax rates was not in compliance with EU trade regulations. As a result, EFTA imposed a tax rate harmonization to take place between 2004 and 2006. The reform was adopted and implemented independently of the local labor market developments, and thereby created arguably exogenous variation over time in payroll tax rates across firms in different regions. We exploit this setting to look at firms' adjustments to the abolition of the regional tax incentive, and hence to evaluate the effectiveness of such programs in stimulating local employment.

Our identification strategy relies on the fact that the relevant tax rates are determined by the location of the workers rather than that of the firm. Therefore, depending on the initial composition of workers, different firms (even within the same location) are differentially exposed to the tax change induced by the reform. Moreover, a subsidy scheme was implemented to facilitate firms' transitions to paying higher tax rates, and this scheme rendered small firms entirely unaffected by the reform. We can hence use small firms (even located in the affected regions) as an additional control group. In 2007 the geographically differentiated system was re-introduced, after an appeal by Norway on EFTA's ruling. This setting allows us to assess whether firms' and workers' adjustments to the initial tax increase are reversed when the tax incentive is re-introduced. [Only results on the tax increase are presented in this version of the paper.]

Our key finding is that the incidence is not shifted onto workers through wage decreases. Instead firms respond to the cost increase by reducing their demand for labor. Our findings might be explained by the centralized wage bargaining scheme in Norway, which leaves little room for wage cuts. To assess whether this is the case, we look at sub-groups of firms depending on the degree of unionization of their workers, as well as whether unionized and non-unionized workers within the same firm are affected differently. [Result to be included.]

Our unusually rich longitudinal administrative data from Norway on all workers and firms allows us, for the first time, to provide evidence on which type of jobs—e.g. low versus high skilled workers in low versus high productivity firms, or new hires versus tenured workers—are eliminated or created in response to the tax change. We also look at how the regional tax change (as opposed to a national tax change) affects both firms' and workers' location and migration patterns. Knowledge on what types of workers and firms are affected is crucial to assess

distributional effects of place-based tax incentives, and consequentially, their potential in contributing to reducing economic inequality.

A few studies have looked at wage and employment effects of regional payroll tax decreases, and they tend to find no or small employment effects, and partial wage shifting (see Bohm and Lind (1993) and Bennmarker, Mellander and Öckert (2009) for Sweden; Korkeämaki and Uusitalo (2009) for Finland; Johansen and Klette (1997) and Stokke (2015) for Norway, and Cruces, Galiani and Kidyba (2010) for Argentina). The overall findings from this literature is in line with most of the early literature on the incidence of *national* payroll tax changes, where researchers tend to find substantial wage shifting, and small or no employment effects.[4] In contrast, in a recent study from Greece, Saez, Matsaganis and Tsakloglou (2012) find that the incidence of payroll taxes levied on employers are fully borne by them, and at the same time, they find no effects on employment. Similarly, Lehmann, Marical and Rioux (2013) find no wage shifting following changes in the marginal payroll tax rate in France, whereas Kugler and Kugler (2009) find small wage effects and considerable employment effects from a payroll tax increase in Columbia. Further, Scherer (2015) find sizable employment effects from a payroll tax cut in Brazil.[5] These findings suggest that part of the incidence is borne by firms, at least in the short run.

There are several reasons why the incidence of regional tax changes might differ from national tax changes. At the national level, labor demand is generally considered to be more responsive to wage changes than labor supply (Hamermesh, 1979; 1993). This implies that in perfectly competitive labor markets the incidence of payroll taxes is primarily borne by the worker, regardless of whether the tax is levied on the employer or the employee. If tax changes affect only particular local labor markets, however, workers may commute or migrate to other local labor markets with lower tax rates and higher wages. Hence, labor supply might be more elastic at the regional level compared to the national level. Local tax changes may also drive firms to relocate to other local labor market. Moreover, the incidence of both regional and national tax changes is likely to depend on the country's institutions, most notably the wage bargaining system.

Our paper adds to the literature on the incidence of payroll taxes as well as to the debate on the effects of place-based policies more broadly. Our finding of reduced demand for labor

[4] See Murphy (2007) and Anderson and Meyer (1997; 2000) for the US and Gruber (1997) for Chile.

[5] Saez, Schoefer and Seim (2017) look at the effects of a payroll tax decrease for young workers in Sweden, and find an increase in youth employment, as well as a collective increase in wages among all workers in firms with high shares of youths (rent sharing).

rather than a decrease in wages illustrate the importance of labor market institutions, in particular union presence and centralized wage bargaining, in determining the incidence of payroll taxes.

The paper proceeds as follows. In Section 2 we explain how the policy setting allows us to compare firms that were affected by the tax increase with both unaffected firms in other parts of the country, and unaffected firms located in the same regions as the treated firms. In Section 3 we formalize our empirical strategy. In Section 4 we start by start by presenting out main results, and contrasting them with the results from a set of "placebo" estimations. Next, we present results from an event study, demonstrating that "treated" and "control" firms indeed experienced similar developments in employment and wages prior to the reform. [The key part of section 4 that shows what types of firms and workers are affected is to be completed.] Finally, Section 5 concludes with a discussion of the effectiveness of place-based tax incentives in stimulating employment and hence in reducing regional inequality.

2. Institutional setting and data

2.1 The payroll tax harmonization reform

Since 1975 Norway has had a system of geographically differentiated payroll taxes as a means to stimulate employment in more remote areas of the country. Until 2006, the country was divided into five tax zones, with payroll tax rates ranging from 14.1% in the central areas to 0% in the northernmost regions (see Figure A1 in the Appendix). The relevant tax rates faced by a firm was determined by the locations of the workers rather than the location of the firm. This meant that firms located in the same tax zone could face different average tax rates depending on the locations of residencies of their workers. Even workers within the same firm could be subject to different payroll tax rates if they lived in different tax zones.

In 2002, the European Free Trade Association (EFTA) Surveillance Authority ruled that the Norwegian system of geographically differentiated tax rates was not in compliance with EU trade regulations. As a result, EFTA imposed a tax rate harmonization to take place between 2004 and 2006. The resulting payroll tax changes in the different zones are illustrated in Figure 1. Zone 5 (the northernmost region) was allowed to keep its zero payroll tax rate. Zone 1 (central areas) was likewise unaffected, and the payroll tax rate remained constant at 14.1%. In zone 2 the harmonization took place immediately in 2004, raising the tax rate from 10.6% in 2003 to 14.1% in 2004, while the harmonization was more gradual in zones 3 and 4, raising the payroll tax rate by 5.7 and 6.6 percentage points over a three year period. In 2007, another EFTA ruling allowed Norway to re-introduce the system of differentiated payroll taxes (after an appeal case), and tax rates were reduced to their pre-2004 levels. The externally imposed harmonization provides an

ideal setting to study firm adjustments to payroll taxes, since the changes in the average payroll tax rate faced by firms are likely to be independent of the local labor market business cycles. Moreover, anticipation effects are unlikely since the details regarding both the harmonization in 2003, and the restoration of the geographically differentiated were unclear as late as six months before the changes were implemented.[6]

To ease the burden of the higher payroll taxes introduced in 2004 (in particular for small firms) a subsidy scheme was implemented. Firms (in most sectors) could pay the pre-reform (2003) payroll tax rate (τ_t^l) for the wage bill up to a cap, after which firms would pay the contemporary statutory tax rate (τ_t^o) for the remaining wage bill (τ_t^o and τ_t^l are reported in Table A1 in the Appendix). The cap was set such that firms were given a maximum tax relief (subsidy) of 270,000 NOK (38,136 USD) per year.[7] Accordingly, the actual subsidy received by a firm varied over time (as the harmonization proceeded), and depended on the worker composition of the firm.

The subsidy for firm j in year t is given by:

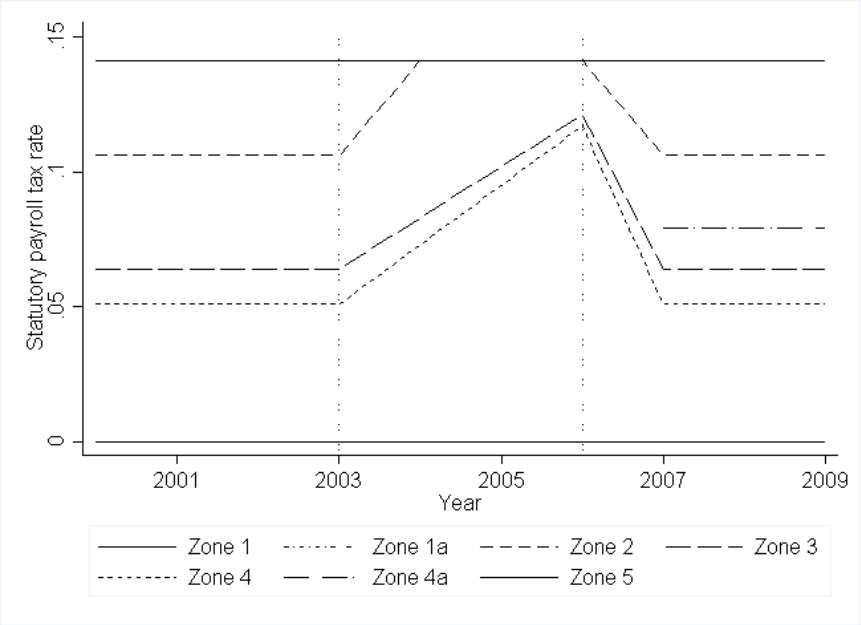
$$S_{j,t} = min\left(\sum_{i=1}^{N_{j,t=2003}} w_{i,t=2003} \times (\tau_{i,t}^o - \tau_{i,t}^l)\right), S^{max}), \qquad (1)$$

where $w_{i,t}$ is the total earnings of worker *i* in year *t*, $N_{j,t=2003}$ is the number of workers in firm *j* in 2003, and S^{max} is the maximum subsidy. This means that firms below a certain size were *unaffected* by the tax reform (assuming no immediate spillover effects).

[6] In the summer of 2003 it was still unclear to what extent and over what time period Norway would change the tax rates to meet the requirements from EFTA (Aftenposten, 18.07.2003*)*. Similarly, the restoration of the system in 2007 was still under negotiation in the summer of 2006 (Aftenposten, 10.02.2006). A search for the keywords "Arbeidsgiveravgift" (payroll tax) and "EFTA [ESA]" in the archives of Norway's largest newspaper gives 40 [32] hits in 2003, and only 2-6 [3-6] hits annually for the years 2004-2007.

[7] All monetary amounts in this paper are converted to USD using the average exchange rate for 2003 where 1 USD = 7.08 NOK.

Figure 1: Statutory payroll tax rate by tax zone



Notes: Statutory payroll tax changes (by tax zone) imposed by the EFTA Surveillance Authority in Norway, 2003-2006. In zone 1 and zone 5, the tax rates remained unchanged at 14.1% and 0%. In zone 2 the payroll tax rate increased from 10.6% in 2003 to 14.1% in 2004, and in zone 3 and 4, the tax rates increased by 5.7 and 6.6 percentage points from 2003 to 2006. In 2007 the geographically differentiated system was re-introduced, after an appeal by Norway on EFTA's ruling.

2.2 Wage setting in Norway

The system of wage bargaining in Norway is characterized by central bargaining and a high degree of unionization; in 2013 close to 50% Norwegian workers were members of a trade union and about 70% were covered by collective bargaining (OECD, 2016; NOU 2013:13). The guiding idea behind the wage bargaining system is that the outcome of wage negotiations in the sectors exposed to foreign competition should set the norm for wage growth also in other sectors of the economy. In this way, overall wage growth is linked to productivity and profitability growth in the exposed sectors.

In practice, the main federation of trade unions (*Landsorganisasjonen i Norge*) and the main private sector employee federation (*Næringslivets Hovedorganisasjon*) bargain over wages in the manufacturing sector, based on a common assessment of the economic situation produced by a committee with broad representation. This centralized wage bargaining typically determines a minimum wage increase, while leaving room for local negotiations of supplementary wage increases at the firm level. The local negotiations are supposed to take into account a firm's profitability, productivity, expectations for the future and ability to compete (NOU 2013:13). Despite the manufacturing sector being quite small in Norway, the outcome of the centralized

negotiations in this sector has usually served as an effective norm for wage growth both in other private sectors and in the public sector (Kahn, 1998; Gjelsvik, Nymoen and Sparrman (2015)).

While there is some room for wage negotiations at the firm level, wage setting is more centralized in Norway than in most other comparable countries (OECD, 2016).

2.3 Data

Our analyses make use of several sources of administrative register data, provided by Statistics Norway, that can be linked through unique firm and worker identifiers. The main data source is the linked employer-employee register that consist of all employment spells for the period 2000-2006. The data includes information on the duration (in days) and type (full time versus part time) of each employment spell, and allows us to track workers over time and across local labor markets, to match establishments to firms, and to identify firm and establishment sector, entry, exit and relocations. Each employment spell is matched with tax records to include information on workers' wages. We match these data to data on worker demographics, including education, labor market experience, age, gender and country of origin. We further make use of a longitudinal data base with information on workers' municipality of residence.

We aggregate the spells of all workers aged 16-67 from the employer-employee register to a balanced sample of all private sector firms with at least one employee in the years 2000-2006.[8] [9] We use firm rather than establishment as the unit for analysis since the subsidy scheme was enforced at the firm level. The sample consists of 42,387 firms (descriptive statistics in Appendix Table A2).

3. Empirical Strategy

The main challenge to evaluating a regional tax incentive policy is that the policy is usually implemented in response to a poor economic development. This makes it difficult to find a comparable control group to construct a counterfactual outcome – i.e., the outcome in the absence of the place-based policy – for the affected regions. In this paper, we overcome this challenge by exploiting a setting where the existing place-based policy was suddenly abolished due to an EFTA

[8] The age range of 16-67 is chosen since compulsory schooling normally finishes at age 15, and the official age of retirement is 67.

[9] We exclude firms in the 99th percentile of the firm size distribution (measured by number of employees). Private sector firms include the following organizational forms: general partnership, general partnership with shared liability, limited companies, public limited company, limited liability companies, sole proprietorship and Norwegian division of foreign business enterprise.

ruling, but only for a subset of firms within the region. We hence exploit two types of variation in tax rates: (i) variation across tax regions arising from differential changes in statutory tax rates for workers living in different regions, and (ii) variation across firms of different sizes arising from the subsidy scheme rendering small firms unaffected by the tax reform. This allows us to compare changes in firm outcomes before and after the abolition, in affected and unaffected regions, and for firms of different sizes. We first explain in detail how we make use of the variation in statutory tax rates (Section 3.1), and next, how effective tax rates differ according to the size of the firm (Section 3.2).

3.1 Changes in the statutory tax rate

We start out by constructing a measure of the increase in the statutory tax rate faced by a firm, for each of the post-reform years 2004-2006, based on the share of a firm's workers that lives in the different payroll tax zones. We fix a firm's worker compositions to the pre-reform year 2003, such that the variation in the measure is driven by the statutory payroll tax changes, and not by potentially endogenous changes in the worker composition of a firm. The predicted average statutory tax rate (hereby average statutory tax rate) faced by firm *j* in year *t* is given by:

$$\bar{\tau}_{j,t} = \sum_{i=1}^{N} \frac{days_{i,j,t=2003}}{\sum_{k=1}^{N} days_{k,j,t=2003}} \times \tau_{ij,t}, \qquad (2)$$

where *i* denotes worker, *N* is the number of workers in firm *j* in 2003, and τ_{ijt} is the statutory tax rate in year *t* in the municipality of residency of worker *i*, working for firm *j* in 2003. Each worker's contribution to the mean is weighted by the number of days of the employment spell in 2003 $(days_{i,j,t=2003})$.[10] The source of variation in the average statutory tax rate is strongly correlated with firm location; firms in low-tax regions often employ workers from low-tax regions, and firm in high-tax regions often employ workers from high-tax regions. However, around 25% of firms employ workers living in a different tax zone from where the firm is located, which gives variation in reform exposure also *within* the firms' tax zones.

For illustrative purposes, we will sometimes split firms into two groups based on the increase in their average statutory tax rate (keeping worker composition at the 2003 level) such that:

$$\Delta\bar{\tau}_j = \bar{\tau}_{j,t=2006} - \bar{\tau}_{j,t=2003} \qquad (3)$$

[10] For simplicity we only keep one spell per worker-firm when constructing the measure of treatment exposure.

$$Treated_j = \begin{cases} 1 & if\ \Delta\bar{\tau}_j \geq 0.4 \\ 0 & if\ \Delta\bar{\tau}_j < 0.4 \end{cases} \quad (4)$$

This gives 4,795 "treated" and 37,592 control firms. The cut-off of 0.4 is chosen to ensure that the treated firms experienced a significant tax increase. In all figures where we rely on this cut-off, the qualitative conclusions are unaffected by changing the cut-off (e.g., to comparing firms with a zero versus positive change). Table A2 in the Appendix gives descriptive statistics on the sample of firms in 2003, split into two groups by treatment status as defined in equation (4). The firms in the two groups are not identical in 2003 prior to the reform; treated firms are on average slightly smaller than the control firms, and the sector composition differ slightly across the two groups. This will however, be accounted for in our empirical approach, where we include firm fixed effects.

3.2 Changes in the effective tax rate

Because of the subsidy scheme described in Section 2.1., not all firms are affected by the tax reform, even if they experienced an increase in the average statutory tax rate. The average effective tax rate is obtained by subtracting the subsidy (given in equation (1)) from the average statutory tax rate given in equation (2):

$$\bar{\tau}^*_{j,t} = \bar{\tau}_{j,t} - (S_{j,t} / \sum_{i=1}^{N_{j,t=2003}} w_{i,t=2003}) \quad (5)$$

Firms below a certain size are hence unaffected by the reform. The cut-off for wage bills below which firms are unaffected are illustrated in Panel (a) of Figure 2. The figure shows the average statutory tax increase from 2003-2006 ($\Delta\bar{\tau}_j$), and the average effective tax increase from 2003 to 2006:

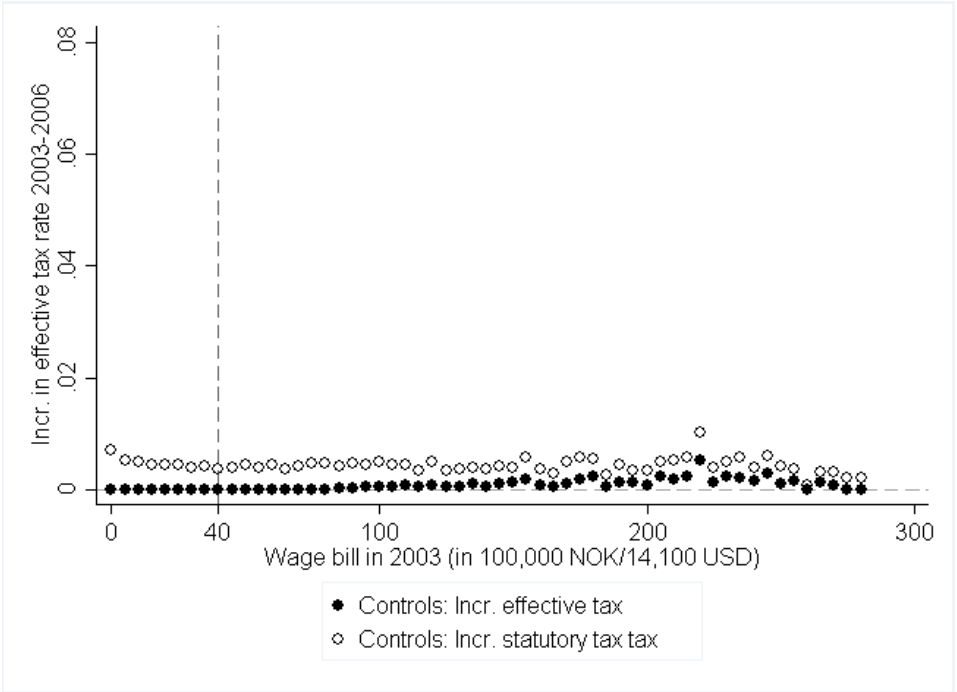
$$\Delta\bar{\tau}^*_j = \bar{\tau}^*_{j,t=2006} - \bar{\tau}^*_{j,t=2003}, \quad (6)$$

for firms by treatment status (as defined in equation (4)) over their 2003 wage bill. Firms with an annual wage bill of less than 4,100,000 NOK (around 580,000 USD) in 2003 are not affected by the tax increase (assuming their work force remains unchanged). Since most of the firms are small, this corresponds to firms with a wage bill in the 5th quintile of the firm size distribution being affected by the reform (as seen in Panel (b) of Figure 2). On average, these firms experience an increase in the statutory tax rate of around six percentage points and an increase in the effective tax rate of around two percentage points.

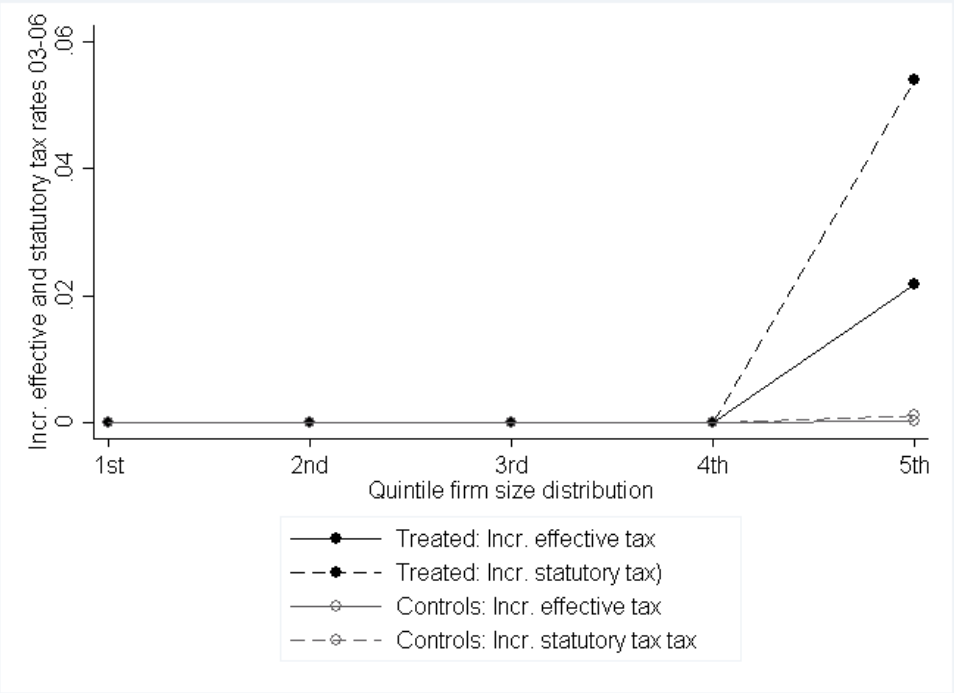
Figure 2: Average tax increase from 2003-2006 over firm size.



(a) Increase in statutory and effective tax rates over wage bill. "Treated" firms.



(b) Increase in statutory and effective tax rates over wage bill. "Control" firms.



(c) Increase in effective and statutory tax rates over wage bill (quintiles).

Notes: The figure shows the expected average statutory and effective tax increases from 2003 to 2006 ($\Delta\bar{\tau}_j$ and $\Delta\bar{\tau}_j^*$) over firms' 2003 wage bills for "treated" firms (Panel (a)) and "control" firms (Panel (b)). Similarly, Panel (c) shows the average statutory and effective tax increases from 2003 to 2006 over quintiles in the wage bill distribution. Treatment status is defined by equation (4). Firms with an annual wage bill of less than 4,100,000 NOK in 2003 (5th quintile) were not affected by the tax increase (assuming their work force remained unchanged). Balanced sample of 42,387 firms, where 4,795 are treated and 37,592 are not treated.

3.3 Baseline regression equation

To estimate the effects of an increase in the regional payroll tax rate, we specify the following regression equation at the firm level:

$$\ln(y_{j,t}) = \beta\bar{\tau}_{j,t} + \rho_t + \delta_j + \varepsilon_{j,t}, \qquad (7)$$

where $y_{j,t}$ is the outcome variable of interest (employment and wages) in firm *j* at time *t*; $\bar{\tau}_{j,t}$ is the average statutory tax rate based on the firm's worker composition at 2003, as defined in equation (2)*;* ρ_t and δ_j denote time- and firm fixed effects, and $\varepsilon_{j,t}$ is an error term. The parameter of interest, β, measures the impact of a one percentage point increase in the average statutory tax rate on the outcome of interest. We first estimate equation (7) by OLS on firms in the 5th quintile of the firm size distribution. Additionally, we run a set of placebo estimations based on firms in the bottom four quintiles. The motivation for the placebo regressions is that firms usually hire the

majority of their workers from their geographical vicinity such that many of firms experiencing a large tax increase are located within the same tax zones (zones 3 and 4). The placebo estimations are tests for whether firms located in these areas of the country experienced different developments over time in wages and employment from firms in less remote areas. An absence of any effects of the tax reform on small firms indicates that the treatment effects on large firms are indeed caused by the tax reform, and not by differential macroeconomic conditions in different regions of the country.

Finally, to account for the possibility that the groups of treated and non-treated firms differ in their industry structure, and that industries may have different macroeconomic trends in outcome variables, we do a robustness test where we condition on sector-specific time fixed effects. The results are not sensitive to controlling for sector-specific developments over time in outcome variables.

3.4 Event study

To check whether the firms that were differently affected by the reform experienced similar time trends prior to the 2003 reform, we also conduct an event study. This further allows us to trace out the dynamic effects of the payroll tax cuts on economic outcomes. For this purpose, we use the binary treatment indicator given in equation (4). Further, we split the sample into two groups by firm size based on Figure 2, such that the small firms are unaffected by the reform. Hence, we define large (small] firms as firms with a wage bill above (below] 4,100,000 NOK (around 580,000 USD) in 2003. In the event study, we plot the time series of average outcomes for the group of treated and control firms as defined by equation (4), for large and small firms separately.

4. Results

We estimate equation (7) by OLS for different outcomes, and for different groups of firms by quintiles in the firm size distribution, and present the estimated coefficients β from the different regressions in Figure 3. The main results are those for the firms in the 5^{th} quintile of the firm size distribution that on average experienced an increase in the statutory tax rate of six percentage points. Panel (a) of Figure 3 shows that these firms significantly reduce their demand for the number of man days: an increase in the statutory tax rate by one percentage point leads to a decrease in the demand for man days of around 1.2%, implying that more than the full cost increase is reflected in a reduction in employment. Consequently, we find no shifting onto workers' daily wage rate (see Panel (b)). This means that at least in the short run, the incidence

of the tax is entirely borne by the firm.[11] The results for the number of workers are almost identical to the one for number of days, meaning that firms respond to the tax increase by adjusting employment through a decrease in the number of workers, and not through a decrease in the number of days per worker. Figure 3 also show results from the placebo regressions on the firms in the 1st to the 4th quintiles of the firm size distribution. As expected (as these firms were unaffected by the reform), we do not find any effects on neither employment nor wages of a change in the statutory tax rate for these groups of firms.

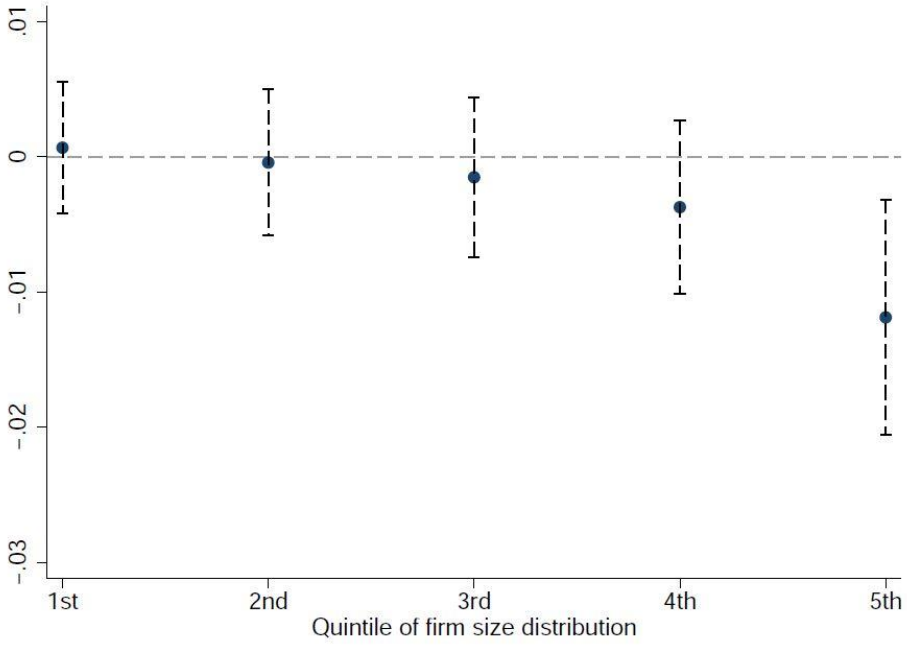
Our result hinge on the assumption that the treated and non-treated firms would have experienced similar developments over time in the outcome variables in the absence of the reform. We test this assumption by conducting an event study. Figure 4 shows the time series of average log man-days (Panel (a)) and log daily wage rate (Panel (b)), for the groups of treated and control firms as defined by equation (4), for large and small firms (as defined in Section 3.1.). Among the large firms, treated and control firms experience similar developments over time in employment and wages prior to the reform. After the reform however, treated firms significantly reduce their demand for labor, while there is no change in the daily wage rate relative to that of the control firms. Figure 5 shows corresponding estimates for small firms, that according to their worker composition in 2003, would be unaffected by the reform. The results are striking: While we see a dramatic drop in the demand for labor among large firms, there is no effect for small firms.[12]

[Analyses of heterogeneous effects will be added here. In particular, we will include results on what type of jobs—e.g., low versus high skilled workers in low versus high productivity firms, or new hires versus tenured workers—are eliminated or created in response to the tax change. We will also look at the role of unionization.]

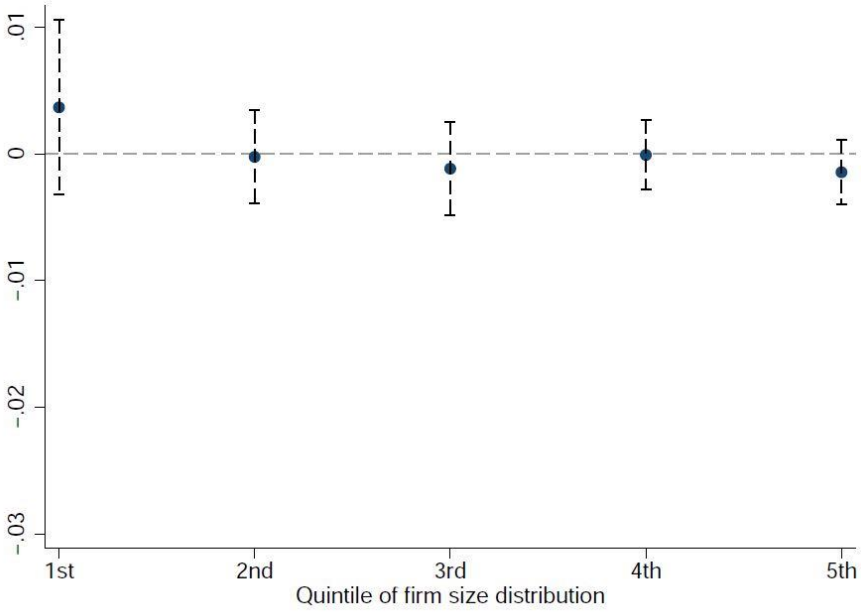
[11] If the firms have some market power in the product market, they might shift the tax burden onto consumers through price increases. [Using a survey panel data set containing monthly product prices, for a subset of the firms in our sample, we will investigate this for the next version of this paper.]

[12] Even if we were to find a positive effect among small firms, this could have been explained by spill-over effects from large to small firms within the same region.

Figure 3: Effects of tax increase over firm size.



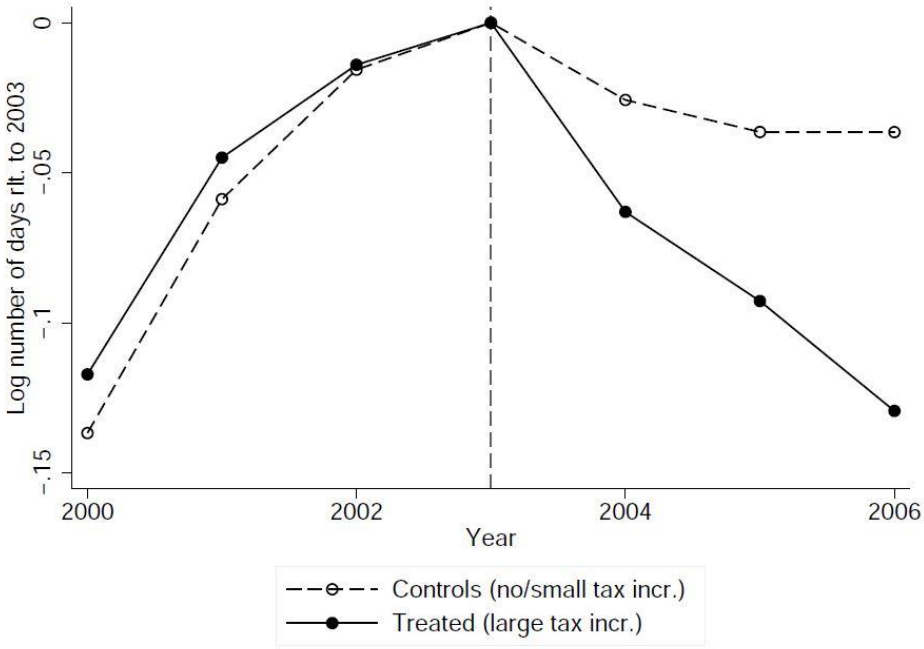
(a) Employment: Log man-days



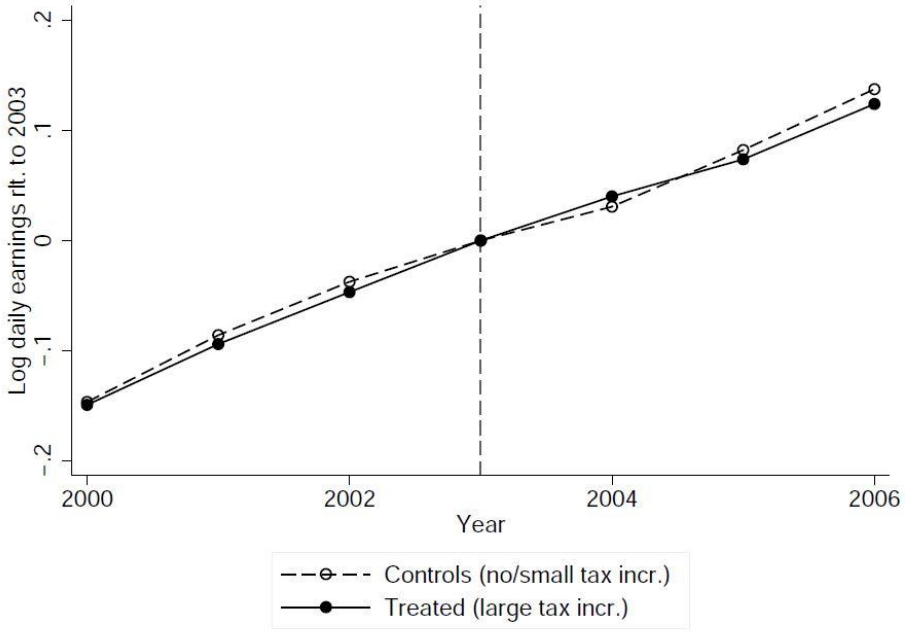
(b) Log daily wage rate

Notes: Balanced sample of 42,387 firms, where 4,795 are treated and 37,592 are not treated. The figures plot the coefficient β from the regression of equation (7). Regressions are weighted by the number of employees in the firm in year 2003, and standard errors are clustered at the level of the municipality of the firm.

Figure 4: Firm outcomes over time



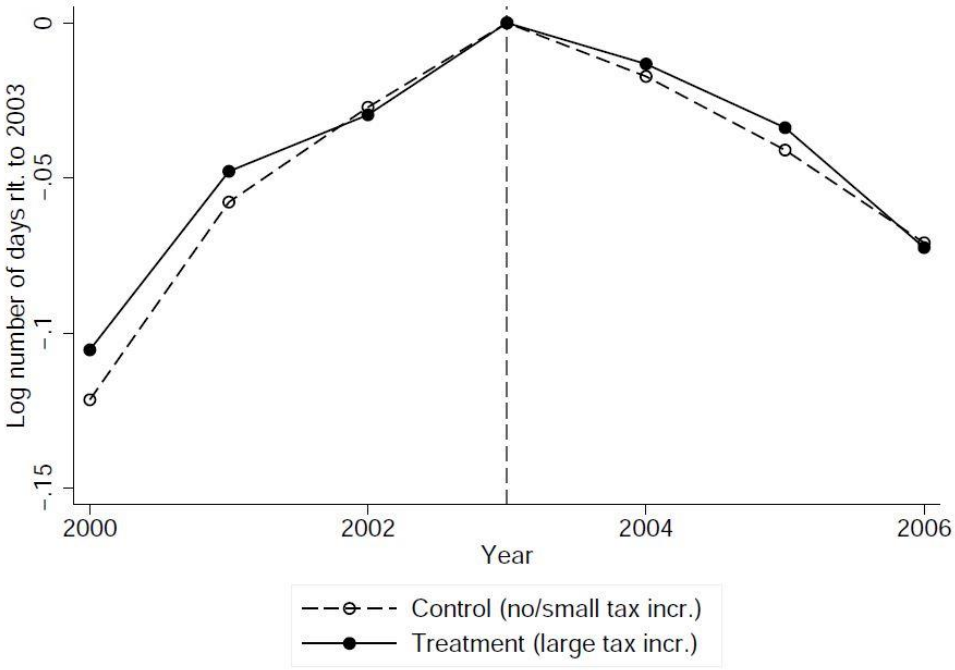
(a) Log number of man-days



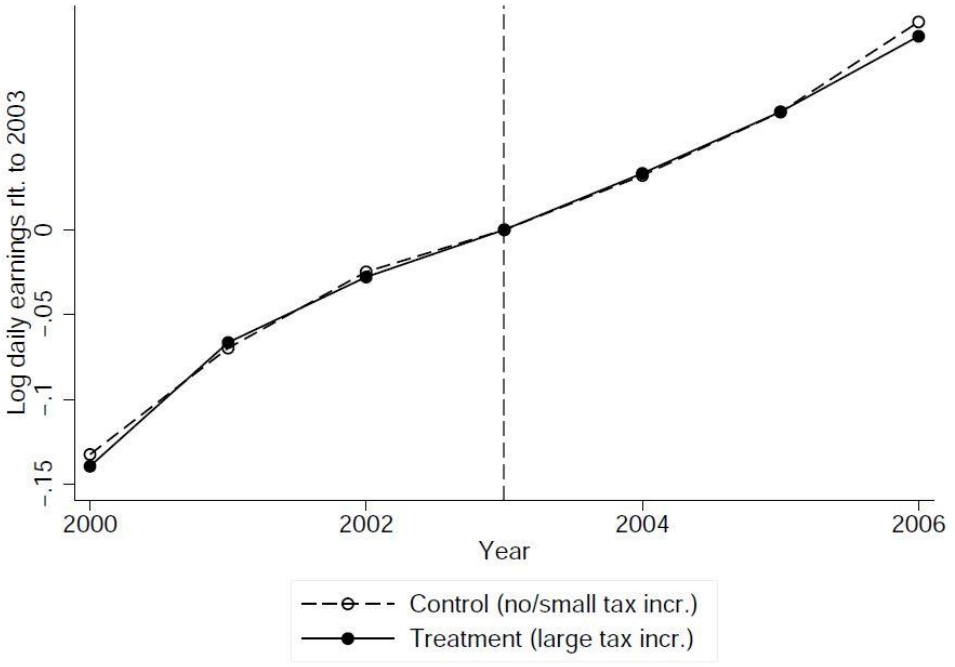
(b) Log daily wage rate

Notes: Balanced sample of 8,134 large firms, where 706 are treated and 7,428 are not treated. The figures show the time series of average outcomes for the group of treated and control firms as defined by equation (4).

Figure 5: Firm outcomes over time – placebo (based on small firms not affected by reform)



(a) Log number of man-days



(b) Log daily wage rate

Notes: Balanced sample of 30,164 small firms, where 4,089 are treated and 30,164 are not treated. The figures show the time series of average outcomes for the group of treated and control firms as defined by equation (4).

5. Conclusion

This paper evaluates the effectiveness of a place-based tax incentive in stimulating local employment, by exploiting a unique policy setting in Norway, where a system of geographically differentiated payroll taxes was suddenly abolished. In 2002, the European Free Trade Association (EFTA) Surveillance Authority ruled that the Norwegian system of geographically differentiated tax rates was not in compliance with EU trade regulations. As a result, EFTA imposed a tax rate harmonization to take place between 2004 and 2006. The reform was adopted and implemented independently of the local labor market developments, and thereby created exogenous variation over time in payroll tax rates across firms in different regions. We exploit this setting to look at firms' adjustments to the abolition of the regional tax incentive, and hence to evaluate the effectiveness of such programs in stimulating local employment. Our key finding is that the incidence is not shifted onto workers through wage decreases. Instead firms respond to the cost increase by significantly reducing their demand for labor.

In 2004, the first year into the reform, the outcome of the centralized bargaining between the main federation of trade unions and the main private sector employee federation implied a wage growth for industry workers of 3.6% (*Landsorganisasjonen i Norge*, 2015), while inflation measured by the growth in the CPI (adjusted for tax changes and excluding energy products) was at 0.3% (Statistics Norway). Similarly for 2005 and 2006, the outcomes of the central negotiations implied significant increases in real wages. These outcomes might have made it difficult for firms to cut wages in response to the local payroll tax increases, leading instead to a sizable reduction in the demand for labor. Overall, our study shows that regional tax incentives can be an important policy tool in reducing inequality between regions through stimulating employment. However, the effectiveness of such programs are likely to depend on a country's labor market institutions, in particular the system of wage bargaining.

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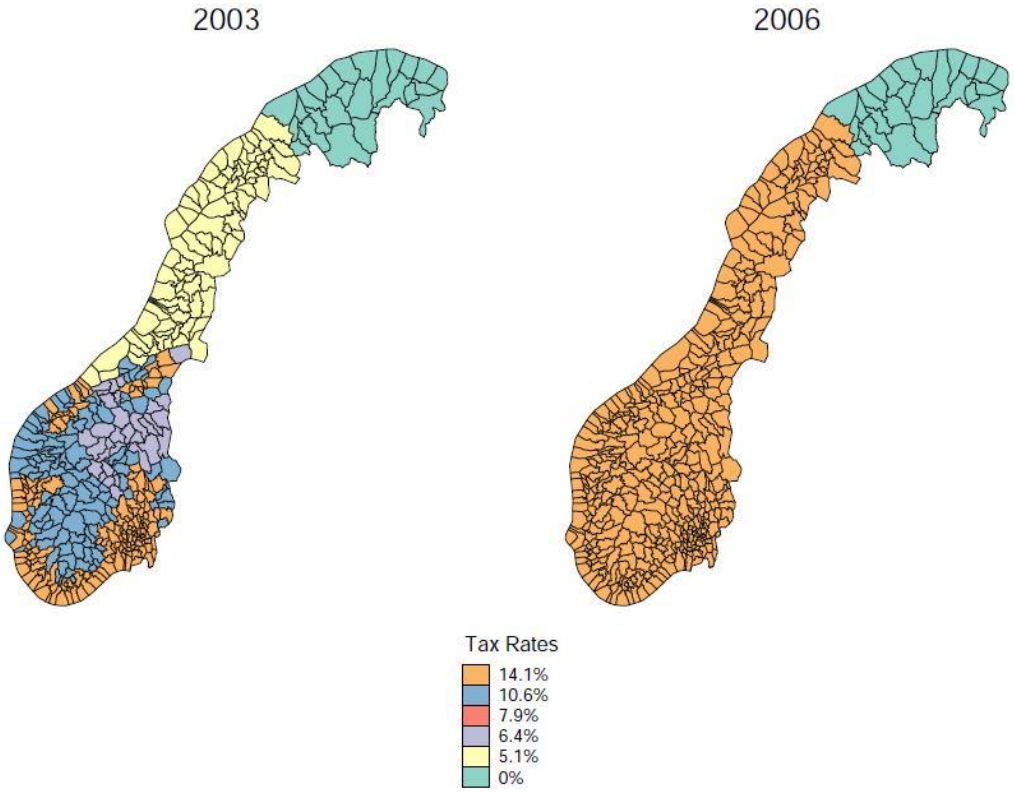
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Appendix A

Figure A1: Geographically differentiated tax rates 2003 and 2006.



Notes: The figure shows maps of Norway with payroll tax rates in 2003 (pre-reform) and in 2006.

Table A1: Payroll tax rates τ_t^o (τ_t^l in parenthesis) 2000-2009

	Zone 1	Zone 1a	Zone 2	Zone 3	Zone 4	Zone 4a	Zone 5
2000	14.1		10.6	6.4	5.1		0
2001	14.1		10.6	6.4	5.1		0
2002	14.1		10.6	6.4	5.1		0
2003	14.1		10.6	6.4	5.1		0
2004	14.1		14.1 (10.6)	8.3 (6.4)	7.3 (5.1)		0
2005	14.1		14.1 (10.6)	10.2 (6.4)	9.5 (5.1)		0
2006	14.1		14.1 (10.6)	12.1 (6.4)	11.7 (5.1)		0
2007	14.1	14.1	10.6	6.4	5.1	7.9	0
2008	14.1	14.1	10.6	6.4	5.1	7.9	0
2009	14.1	14.1	10.6	6.4	5.1	7.9	0

Notes: Payroll tax rates by tax zone and region (Source: The Norwegian Tax Authorities).

Table A2: Descriptive statistics

	Control (zero/small tax incr.)	Treated (large tax incr.)
Daily earnings	683	598
Number of workers	12.85	11.68
Number of days	4,364	3,953
Statutory payroll tax rate	0.133	0.055
Industries		
Agriculture/oil/mining	0.027	0.045
Manufacturing	0.122	0.117
Construction	0.130	0.139
Wholesale and retail	0.341	0.334
Hotel/restaurants/catering	0.041	0.053
Transport	0.070	0.089
Finance/insurance/property management	0.160	0.116
Health	0.055	0.059
Other	0.054	0.050
Number of firms	37,592	4,795

Notes: The table shows descriptive statistics for the balanced sample of 42,387 firms with at least one employee in the years 2000-2006.The sample is split into two groups by treatment status as defined by equation (4). All variables are measured in 2003. Monetary amounts are given in NOK (1 USD = 7.08 NOK in 2003).